

#	NUMBER AND TITAL (Document Name)	DATE FILED	Age
	<b>Henry William Dopp 1824 - 1888</b>		
1	287424 JACKETED STEAM KETTLE FOR RENDERI_1883.pdf	1883	59
2	27279 IMPROVEMENT IN SEWING MACHINES_1860.pdf	1860	36
3	27355 STEAM ENGINE+CUT OFF_1860.pdf	1860	36
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6	37436 IMPROVEMENT IN APPARATUS FOR BURNI_1863.pdf	1863	39
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11	133590 GRAIN DRYER_1872.pdf	1872	48
12	142215 IMPROVEMENT IN NUT LOCKS_1873.pdf	1873	49
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14	175342 IMPROVEMENT IN CARBONIC ACID GAS_1876.pdf	1876	52
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17	285736 SOAP REMELTING AND CRUSHING APPARATUS_1883.pdf	1883	59
18	414687 STEAM STAMING PRESS_1889.pdf	1889	65
	<b>William Henry Dopp 1853 - 1942</b>		
1	834892 PRESSURE FILTER_1906.pdf	1906	53
2	966177 METHOD OF TREATING FILTERING ELEM_1910.pdf	1910	57
	<b>David S. Dopp</b>		
1	3499330 MECHANICAL BALANCERS_1966.pdf	1966	36

March 10, 1970

T. E. BJORN ET AL  
MECHANICAL BALANCERS

3,499,330

Filed Dec. 27, 1966

6 Sheets-Sheet 1

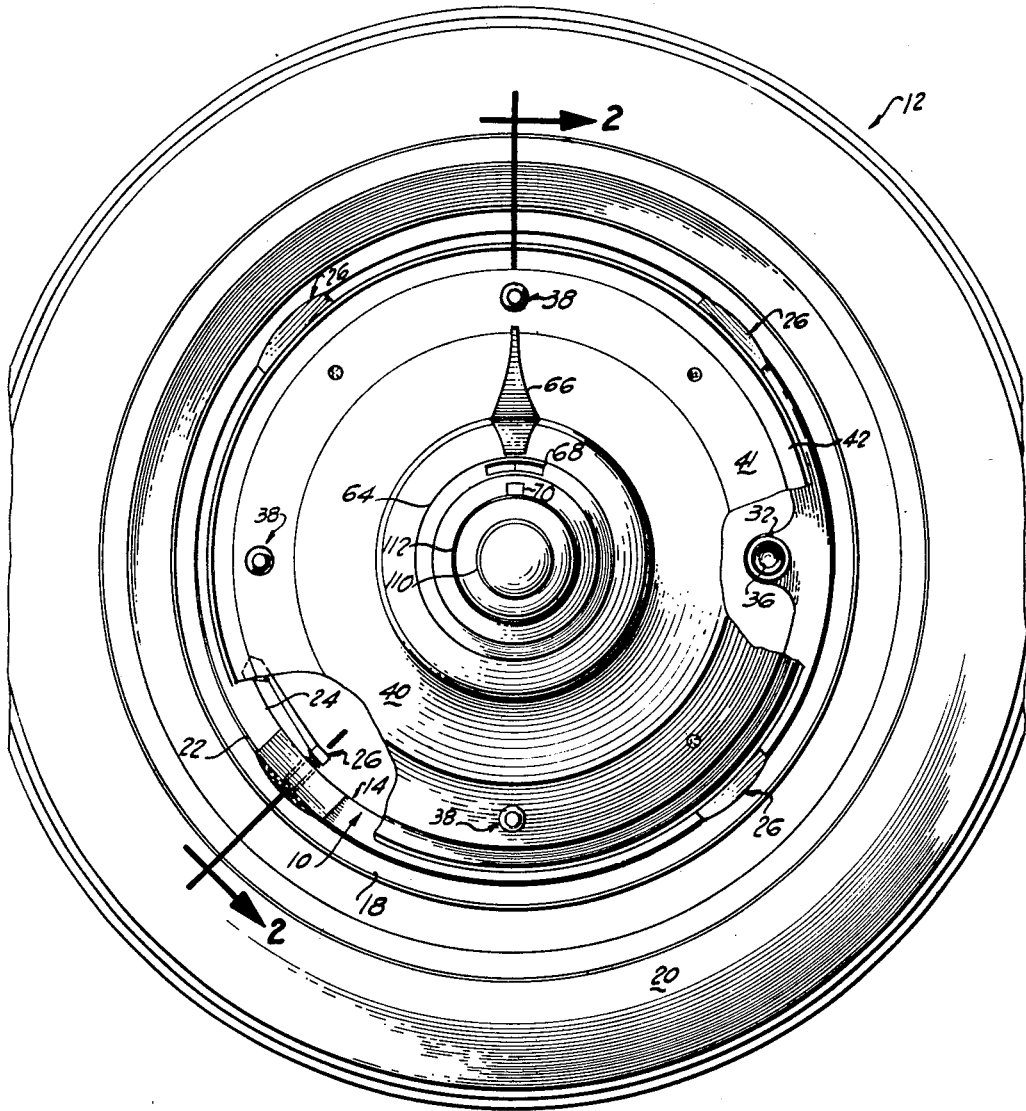


FIG. 1.

INVENTORS

Thomas E. Bjorn  
David S. Dopp

By *William J. Newman*  
Attorney

March 10, 1970

T. E. BJORN ET AL  
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6 Sheets-Sheet 2

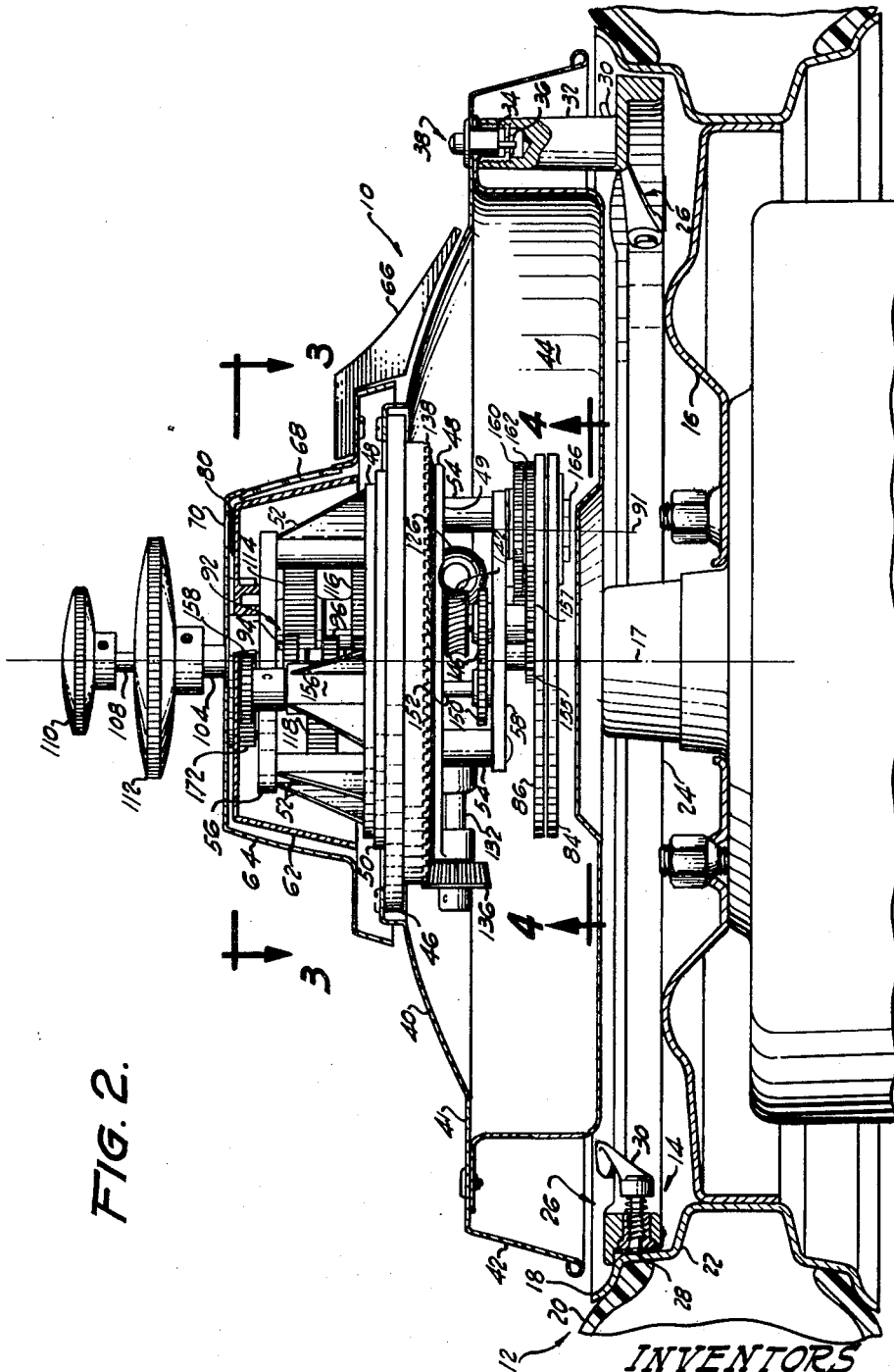


FIG. 2.

INVENTORS

Thomas E. Bjorn.  
David S. Dopp

By *William J. Newman*  
ATTORNEY

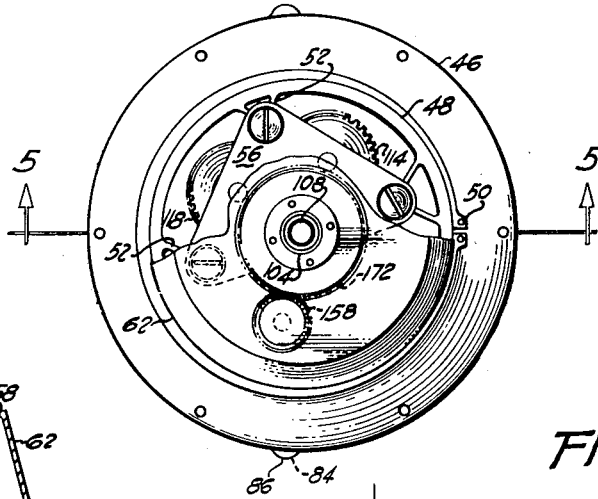


FIG. 3.

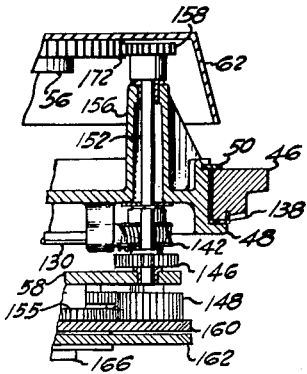


FIG. 6.

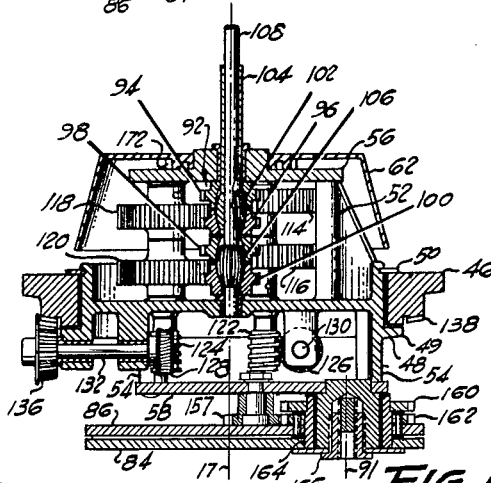


FIG. 5.

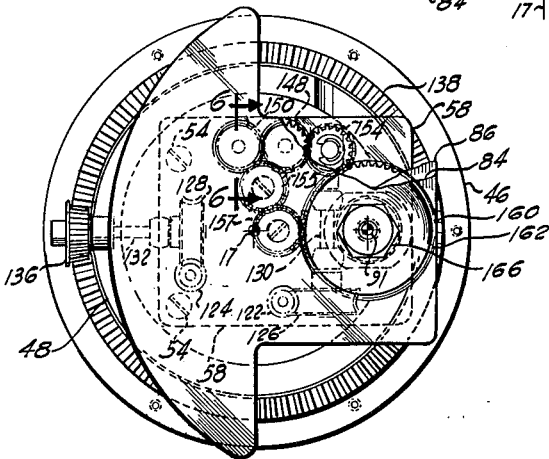


FIG. 4.

INVENTORS

Thomas E. Bjorn.  
David S. Dopp.

By *William J. Newman*

Attorney

March 10, 1970

T. E. BJORN ET AL  
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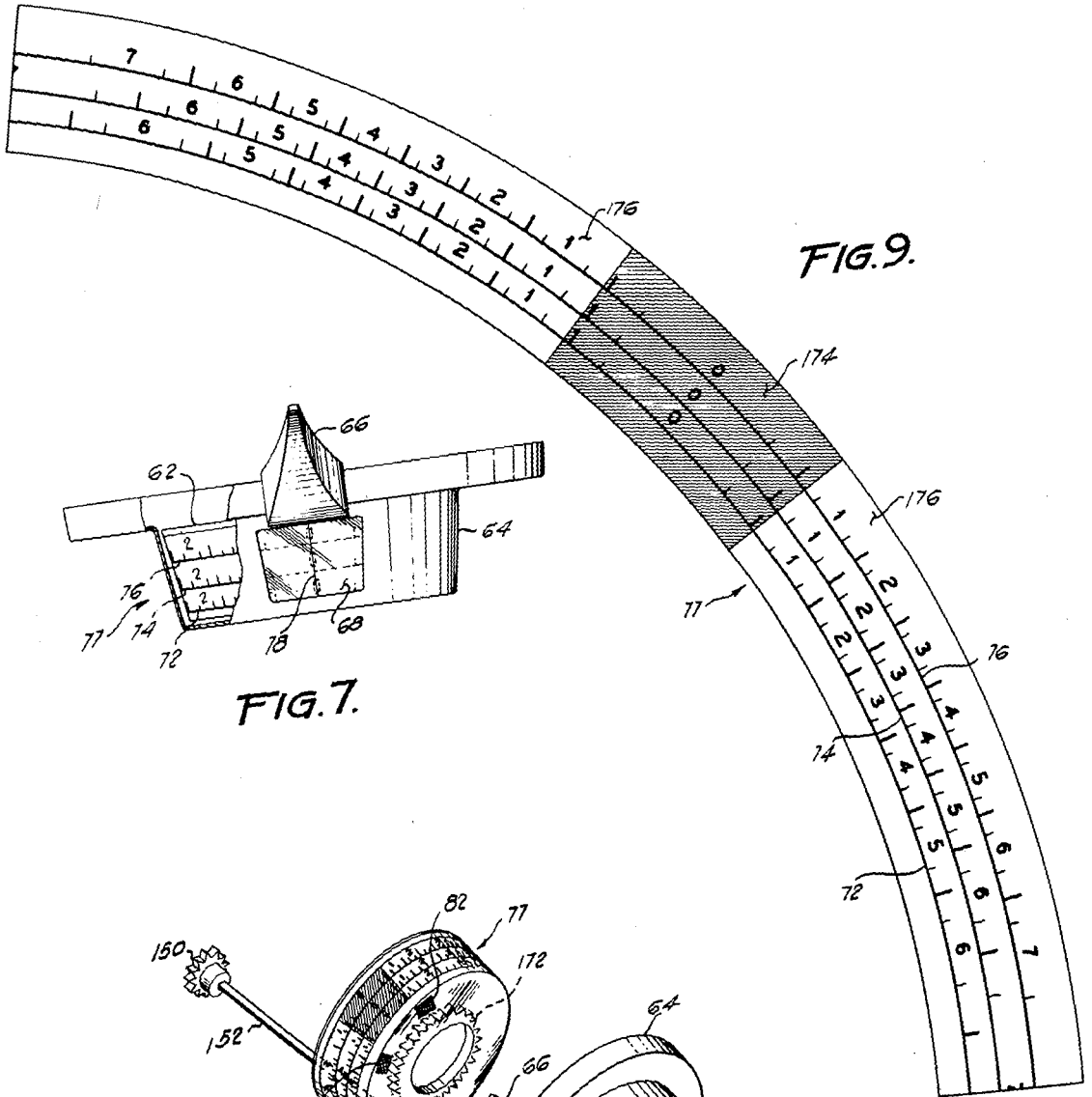


FIG. 9.

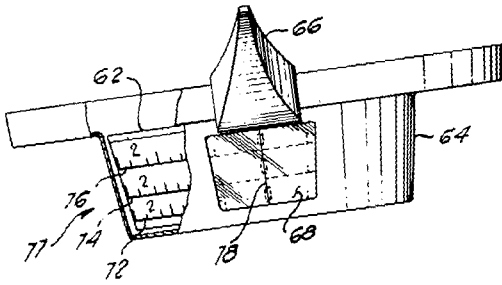


FIG. 7.

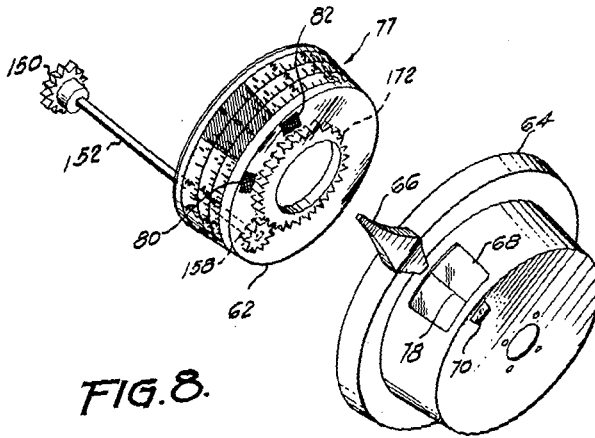


FIG. 8.

INVENTORS  
Thomas E. Bjorn  
David S. Dopp

By *William J. Newman*  
Attorney

March 10, 1970

T. E. BJORN ET AL

3,499,330

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6 Sheets-Sheet 5

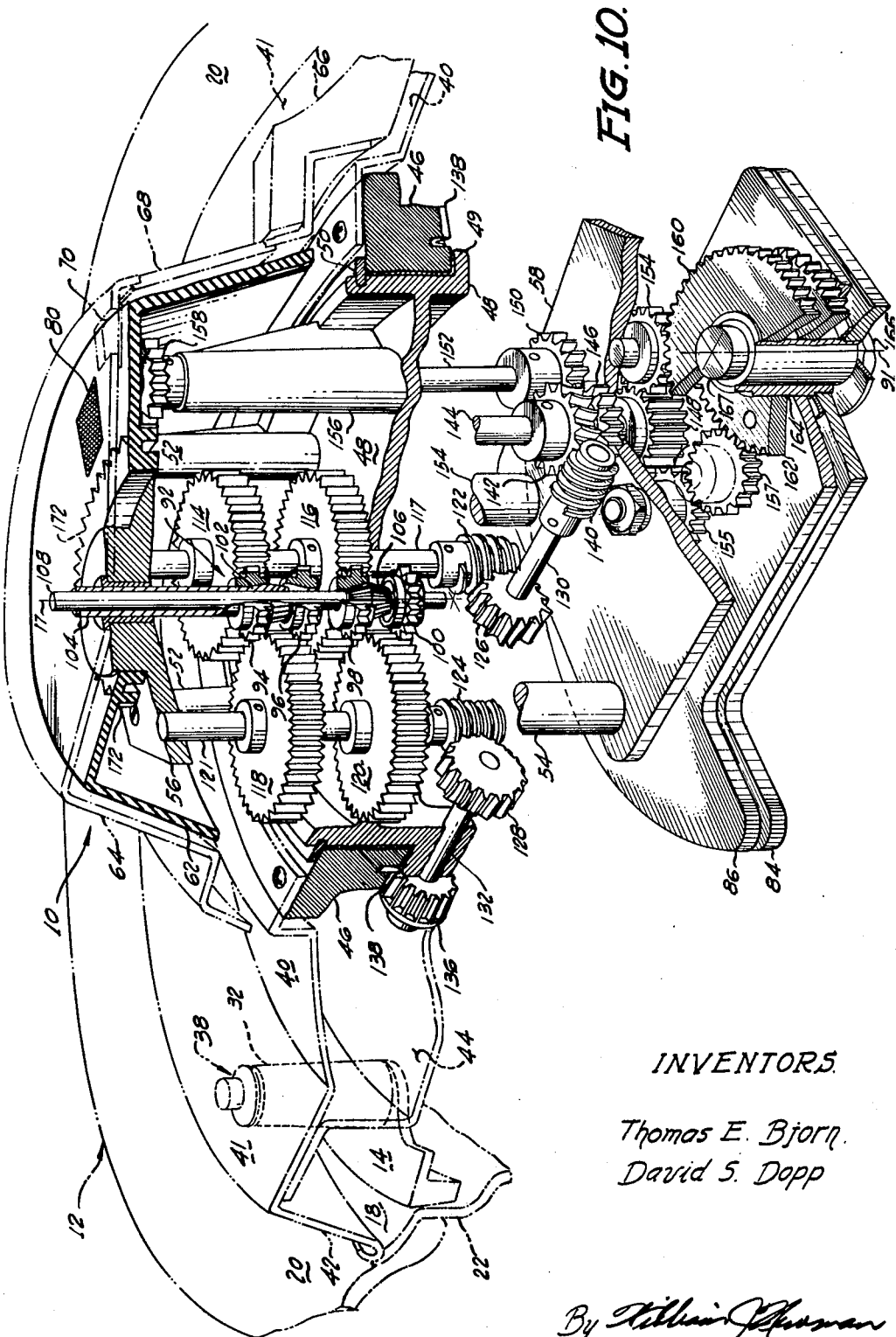


FIG. 10.

INVENTORS

Thomas E. Bjorn.  
David S. Dapp

By *William J. Hansen*  
Attorney

March 10, 1970

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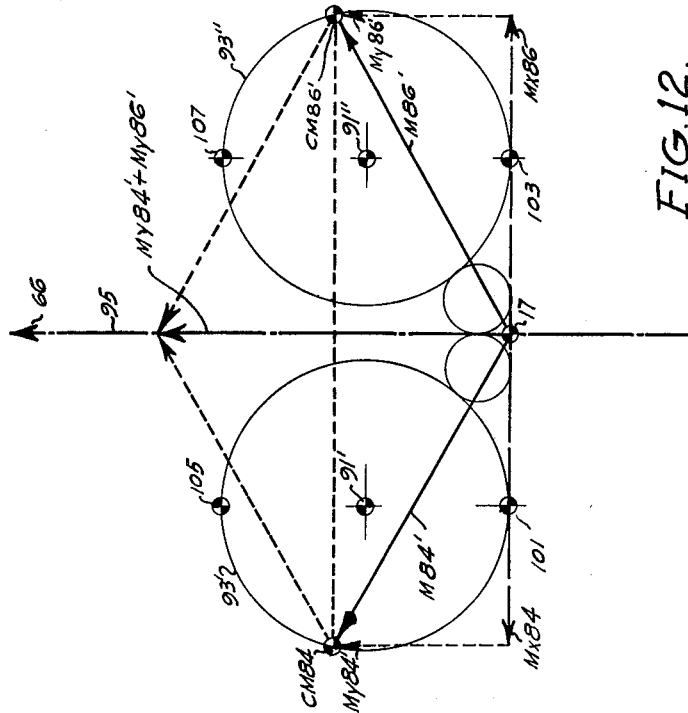


FIG. 12.

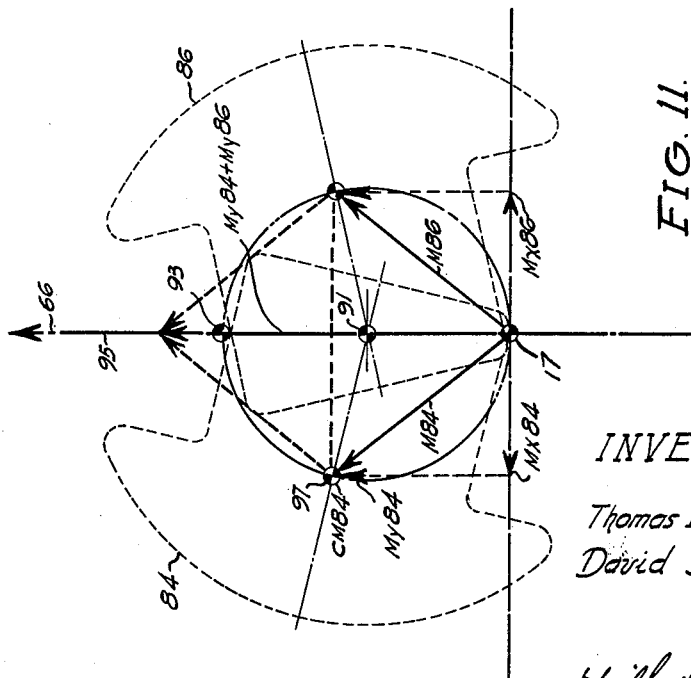


FIG. 11.

INVENTORS.

Thomas E. Bjorn  
David S. Dopp

By

*William J. Neuman*

Attorney

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3,499,330

## MECHANICAL BALANCERS

Thomas E. Bjorn, Northbrook, and David S. Dopp, Chicago, Ill., assignors to Stewart-Warner Corporation, Chicago, Ill., a corporation of Virginia

Filed Dec. 27, 1966, Ser. No. 604,921

Int. Cl. G01m 1/00

U.S. Cl. 73—458

10 Claims

### ABSTRACT OF THE DISCLOSURE

This application describes mechanical balancers used for correcting unbalance in rotating bodies, particularly of the type which attach to a rotating body and have structure therein to compensate for the unbalance in the rotating object. The counterbalance mechanism is cyclically operable through the manipulation of knobs by an operator as the object is spinning and includes two weights, each of which is rotatable about an axis radially spaced from the axis of the object being balanced. The weights are rotated simultaneously in opposite directions so that the resultant of their vectorially added moments move along a diametric line passing through the axis of the object. The weights are constructed and arranged so that the counterbalance force of the device ranges from a completely balanced or zero condition to a maximum counterbalance force position, and so that it may be cyclically operated to approach the maximum and zero positions from either direction.

### Background of the invention

The invention herein defined relates to the counterbalancing structure by which the amount of counterbalancing force provided by the device is varied. Although the embodiments shown herein relate specifically to devices for counterbalancing unbalance of vehicle wheels in situ, the teachings herein are not necessarily restricted thereto as they may be used in any balancing process in which an object to be balanced is caused to rotate about its axis of rotation and may conveniently have a balancing device attached thereto.

Prior art balancers provided for variable counterweight forces by the use of two or more weights mounted for rotation about the axis of the object being balanced, or by the use of a single weight operable along a line perpendicular to, and intersecting, the axis of rotation of the object. If the rotating weights were permitted to rotate through 360°, or if the linearly movable single weight was permitted to move from a point on one side of the object axis to the other, ambiguities in read out were present because of the existence of two positions for each value of resultant weight displaced from one another by 180 angular degrees.

To eliminate such ambiguities, some prior art devices have been constructed so that the rotating weights only move through 90 angular degrees from a position in alignment with each other on one side of the axis to a position wherein the weights are opposite each other on either side of the axis of rotation of the object. This type of balancer is shown in U.S. Patent No. 2,723,555, issued Nov. 15, 1955. A cyclic balancer which eliminates the ambiguities is shown in U.S. Patent No. 3,094,003, issued June 18, 1963, but is accomplished by utilizing a third fixed weight in the device against which the two rotatable weights about the object axis operate.

### Summary

The teachings of this invention provide a balancer of the counterbalance force type which is fully cyclic

through maximum and minimum positions with no read out ambiguities and with no fixed weights against which the rotatable weights must operate. This is accomplished by the provision of a pair of weights, each of which is mounted for rotation about an axis which is radially displaced from the axis of rotation of the object to which the device is attached. The weights are rotatable by operator manipulation in opposite directions simultaneously so that the resultant of the vectorially added moments of the two weights follow a path along a line perpendicular to and intersecting the axis of rotation of the object. A simplified, and thus less expensive, fully-cyclic ambiguityless balancer is thereby presented.

This invention, its objects and advantages will be better understood upon a further reading of this specification and claims together with the following drawings, wherein:

FIG. 1 is a front elevational view illustrating the balancer of the present invention mounted on a wheel;

FIG. 2 is a sectional side elevational view of the balancer taken generally along the line 2—2 of FIG. 1;

FIG. 3 is a sectional view of the balance assembly taken generally along the line 3—3 in FIG. 2, with the balancer housings omitted;

FIG. 4 is a sectional view of the balancer assembly taken generally along the line 4—4 in FIG. 2;

FIG. 5 is a sectional view taken along the line 5—5 in FIG. 3;

FIG. 6 is a fragmentary view in section of the indicating drum drive taken generally along the line 6—6 in FIG. 4;

FIG. 7 illustrates one relationship between the indicating drum scales and pointer housing;

FIG. 8 is an exploded perspective of the pointer housing and indicating drum;

FIG. 9 illustrates the scale strip prior to mounting on the indicator drum;

FIG. 10 is an isometric drawing of the balancer in partial section illustrating the coaction of the balancer gear trains with certain of the parts displaced somewhat for easier viewing;

FIG. 11 is a schematic diagram of the balancer of FIGS. 1 through 10, showing balance force vectors; and

FIG. 12 is a schematic diagram of a second embodiment balancer showing balance force vectors related thereto.

In FIGS. 1 and 2 a mechanical wheel balancer assembly 10 is shown mounted on an automobile wheel assembly 12 by means of a mounting ring 14.

The automobile wheel assembly 12 comprises a wheel 16 supported on an automobile for rotation about its axis 17 and conventionally denominated as either a 13", 14" or 15" diameter wheel. The wheel 16 terminates in a bead rim 18 for engaging a tire 20, and a circumferential felly band portion 22 adjacent the rim 18 is engaged by the mounting ring 14.

The mounting ring 14 may be of the type described in Patent No. 2,929,598, issued to Pierce on Mar. 22, 1960, and comprises an annular frame 24 having a diameter somewhat less than the felly band portion of the wheel diameters noted above. The frame 24 is lockingly engaged with the wheel 16 by means of a plurality of spaced locking lever assemblies 26. Each lever assembly comprises a locking screw 28 threaded through the frame 24 and operated by a locking lever 30 to press a hardened steel point on the end of the screw 28 into the felly band portion 22 for clamping the ring to the wheel.

A plurality of spaced posts 32 project from the frame 24 outwardly of wheel 16 in a horizontal direction, and each has a central insert 34 in which a slot is formed. The slot receives a cross pin 36 of a spring biased bayonet type lock assembly 38, which is rotated in one direc-



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tion to engage the lock assembly to the post and rotated to align the pin with the slot for disengaging the lock assembly. The bayonet lock assembly 38 is carried by the wheel balancer assembly 10 and locks the balancer assembly to the ring 14.

The balancer assembly 10 comprises a conical shaped housing having a central opening 39. An outer circular rim 41 on housing 40, in which the pushbutton assemblies 38 are seated, terminates in a peripheral end flange 42 overlapping the posts 32 to prevent accidental engagement of a foreign object with the posts. A second pan-like housing 44, spaced from housing 40 and having an end flange fastened to the circular rim 41, nests between the posts 32.

A support plate 46 is fastened to the margin of the central opening 39 in housing 40. The support plate 46 has a circular opening in which a bearing plate 48 is journaled with the bearing plate 48 being held against axial movement by a flange 49 at one end and a C-ring 50 at the other end as best seen in FIGS. 5 and 10. The bearing plate 48 has a plurality of posts 52 projecting from one surface thereof, and a plurality of posts 54 extending from the opposite surface. The posts 52 support a plate 56, and the posts 54 support a mounting plate 58, whose center of mass is substantially offset from the central horizontal axis of plates 48 and 56. The plates 48, 56 and 58 comprise a hub assembly which is rotatable about the axis 17.

The plate 56 rotatably carries a cup-shaped, plastic indicating drum 62 (FIG. 2), and fixedly carries a cup-shaped pointer housing 64 with the indicating drum 62 nested in the housing 64. The pointer housing 64 has a pointer 66 extending radially therefrom. The pointer is used for indicating the location of the unbalance relative wheel 16.

Pointer housing 64 is provided with a pair of windows 68 and 70. Seen through window 68 are a plurality of annular scales 72, 74 and 76 (FIGS. 7, 8 and 9) concentric to the axis 17 and carried by the flange portion of the indicating drum 62. The scales correspond to respective different diameters of wheel 16 and are printed on a scale strip 77. The drum 62 is actually formed as a truncated cone and the scales on strip 77, as seen in FIG. 9, are developed as respective arcs conforming to the respective diameters of the adjacent portions of the drum flange when strip 77 is secured thereto. For convenience in reading, the wheel 16, balancer 10 and the window 68 may be rotated from whatever position they are in to bring the window 68 to the top and place the relevant portion of the scales in a generally horizontal plane, as seen for example from FIG. 2. A hairline 78 across the window 68 and aligned with pointer 66 permits facile selection of the proper indication on one of the scales 72, 74 or 76. Additional spaced markings 80 and 82 corresponding to between  $1\frac{1}{2}$  and 2 ounces of unbalance are provided on the back of drum 62 as best seen in FIG. 8. Markings 80 and 82 are seen through window 70 at the back of housing 64 for the purpose of providing the operator with a quick indication of the most often used resultant weight for scanning the unbalance condition of wheel 16.

The scales 72, 74 and 76 provide an indication of the correction weight to be applied to respective diameter wheels in accordance with the ounce inches represented by a resultant weight necessary to balance the wheel 16. The resultant weight is controlled by the angular position of a pair of adjustable weights 84 and 86. The hub assembly including plates 48, 56, 58 and the weights 84 and 86 are rotatably adjusted relative to the housing 40 and wheel 16. The weights 84, 86 are rotatably adjustable and the hub assembly relative to each other about an axis 91 which is parallel to but radially spaced from the axis of rotation 17 of the wheel.

Reference is now made to FIG. 11 which shows in a vectorial schematic diagram the operation of the balance forces. As previously mentioned, the balancer as well as

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the wheel rotates about the axis 17 while the weights 84 and 86 are rotatable with respect to each other and to the wheel about axis 91 which is parallel to but spaced from the wheel axis 17. The weights 84 and 86 are adapted and arranged to rotate with equal velocity in opposite directions with respect to each other through gearing means operable by manual controls to be hereinafter described.

The weights 84 and 86 are also constructed so that their respective centers of mass CM84, CM86 rotate about axis 91 along the circular path 93. There will be two positions along the circular path 93 at which the centers of mass (CM84, CM86) are aligned with one another, and the balancer is so constructed that one of these positions coincides with the axis 17 of wheel rotation. The other position is naturally  $180^\circ$  from this position and hence lies at point 93 along the diametric line 95 passing through the wheel axis 17 and axis of weight rotation 91.

When the two weights 84, 86 are positioned so that their respective centers of mass (CM84, CM86) are in line with the wheel axis of rotation 17, the whole balancer 10 is balanced with its center of mass located at the axis of rotation 17. Thus, when the wheel 12 is spun with the balancer assembly 10 attached and the weights 84, 86 in their aligned position with the axis of wheel rotation 17, no balance forces or moments are contributed by the balancer assembly 10.

On the other hand when the weights 84, 86 are in the position in which their centers of mass CM84, CM86 are aligned at point 93, the balancer assembly has a balance force or moment about the axis of wheel rotation 17 corresponding to the respective masses of the weights 84, 86 and the respective distances of the centers of mass from the axis of rotation 17. The position indicated 93 of course corresponds to the maximum balance force or moment which the balancer assembly 10 may contribute to the rotating wheel and balancer assembly.

As the weights 84, 86 are manipulated to rotate between their two aligned positions 17, 93, they provide intermediate balance forces between the zero condition at 17 and the maximum condition at 93. These balance forces always operate along the diametric line 95 as may be seen by the vectorial representations in FIG. 11.

For example, if the weights 84, 86 are positioned so that their respective centers of mass are at positions 97, 99, they will each cause balance forces acting along the vectors M84 and M86 about the axis of rotation 17. As viewed in FIG. 11, these balance forces or moments M84, M86 may be broken up into their respective X components MX84, MX86 and their respective Y components MY84, MY86. Since the X components MX84, MX86 are equal and operate in opposite directions to the center of rotation 17, they cancel out and result in no moment about the wheel axis 17. On the other hand the Y components MY84, MY86 both act on the same side of axis 17 and hence are additive to provide a resultant moment represented by the resultant vector MY84 plus MY86. As long as the moments M84, M86 which represent the product of the respective centers of mass CM84, CM86 and their respective distances from the axis of rotation 17, the resultant of their Y components MY84 plus MY86 will operate along the diametric line 95. Hence, the pointer 66 on the housing 64 is aligned with the diametric line 95 through which the resultant moments act to point to a position on the wheel where the weight of an amount corresponding to the positions of weight arms 84, 86 is to be positioned.

FIG. 12 shows in schematic form a second embodiment of a balancer using the invention in which the centers of mass CM84', CM86' of weights 84', 86' (not shown) rotate in separate circular paths 93', 93'' about their own respective axes 91', 91''. As long as the weights are constructed and arranged so that their respective centers of mass CM84', CM86' produce equal balance forces or moments MY84', MY86' about the axis of wheel rotation 17, the resultant balance force will pass along

the line 95 from a zero position when the centers of mass CM84', CM86' are positioned at points 101, 103 to a maximum position whereat the centers of mass lie at points 105, 107. Again the X components of the moments cancel out and the Y components MY84', MY86' are additive to produce the resultant MY84' plus MY86' along the line 95. It can be seen that if the minimum points 101, 103 define a line passing through the wheel axis 17, the balancer will have no moments about the axis 17 as it rotates with the wheel with the weights in this position.

It will also be understood that the weights 84, 86 need not necessarily be equal as long as the loci of the moments produced by their respective centers of mass about the axis of wheel rotation 17 follow identical mirror image paths with respect to a diametric line.

A cone clutch assembly 92 provides the operator controllable means for driving the weights 84, 86, and comprises a set of four axially-spaced gears 94, 96, 98 and 100 (FIGS. 5 and 10) between plates 48 and 56. Gears 94 and 96 are engaged alternately by a cone clutch 102 in response to axial movement in a respective direction of a shaft 104 journalled in plate 56. Gears 98 and 100 are engaged alternately by a cone clutch 106 in response to axial movement in a respective direction of a shaft 108 journalled in shaft 104. Both shafts 104 and 108 extend through the pointer housing 64 with shaft 108 extending beyond shaft 104. Knurled handles or knobs 110 and 112 are provided for ease in manipulating the shafts 108 and 104, respectively, as seen in FIG. 2.

Gears 94 and 98 engage with respective axially-spaced gears 114 and 116 located on a shaft 117 journalled in plates 48 and 56. Gear 114 is journalled on shaft 117 and operates only to rotate an adjacent gear 118 in response to the operation of gear 94 by clutch 102. Gear 116 is pinned to shaft 117 and rotates the shaft 117 in one direction responsive to the operation of gear 98 by its cone clutch 106.

Gears 96 and 100 engage with respective axially-spaced gears 118 and 120 carried on another shaft 121 journalled in plates 48 and 56. Gear 118 is pinned to shaft 121 to rotate the shaft in one direction in response to the operation of gear 96 by cone clutch 102 and in the opposite direction in response to rotation by gear 114. Gear 120 is journalled on shaft 121 and only rotates gear 116 and shaft 117 in a direction opposite to the direction in which gear 116 is rotated by gear 98.

The shafts 117 and 121 rotated by gears 116 and 118 respectively protrude through plate 48 and carry respective worm gears 122 and 124 on the protruding end. Worm gears 122 and 124 engage respective worm wheels 126 and 128 carried on respective shafts 130 and 132.

Shaft 132 carries a bevelled pinion gear 136 for engagement with a bevelled ring gear 138 formed on the adjacent surface of support plate 46 which is attached to housing 40. When housing 40 is rotating with wheel 16, the angular position of the plates 48, 56 and 58, and the indicating drum 62 carried by plate 56 are adjusted about the central axis of housing 40 and wheel 16 by axial movement of shaft 104 to engage either gears 94 or 96 and cause gears 118, 124, 128 and 134 to rotate in respective directions for moving the plates and drum in a desired direction.

The shaft 130 carries a worm gear 140 for engagement with a worm wheel 142. Wheel 142 is carried on a shaft 144 journalled in plates 48 and 58. The shaft 144 carries a pair of gears 146 and 148 spaced on opposite sides of mounting plate 58. The tandem connection of worm gears and wheels 122, 126, 140 and 142 of course provides a considerable gear reduction in the available space.

Gear 146 engages an adjacent gear 150 carried on an elongate shaft 152 to drive gear 150 and shaft 152 in the opposite direction from gears 146 and 148. One end of shaft 152 is journalled in plate 58. The other end of shaft

152 extends through a post 156 on plate 48 and carries a gear 158 nested in a circular recess of drum 62.

The gear 148 engages idler gear 154 which in turn engages a large diameter gear 160. In addition, gear 148 drives the large gear 162 through the two equal sized gears 155, 157. Gear 162 is fixed to weight 86 for rotating same and is journalled on a hub 164 which connects gear 160 to weight arm 84. Hub 164 in turn is journalled on a spindle 167 projecting from plate 58, and a thrust nut and washer 166 holds the gears and weight arms in position. Gears 160 and 162 rotate in opposite directions due to the action of gears 148, 154, 155 and 157 to in turn move the weights 84 and 86 towards or away from each other dependent on the direction in which the gears are rotated by wheel 140.

Gear 158 on the end of shaft 152 opposite gear 154 engages a ring gear 172 integrally formed on the wall of the recess in indicator drum 62 so that the drum rotates with gear 150. The gears 158, 172 have the same gear ratio as gears 148, 162 so that the drum will indicate the resultant weight produced by changes in the angular positions of weights 84 and 86 relative to the plate 58.

The three circumferential scales 72, 74 and 76 on drum 62 are calibrated for indicating respective correction weights corresponding to an unbalance condition in ounces for wheels of respective 13", 14", and 15" diameter. The 13" diameter scale can also be used for 12" diameter wheels with minor allowance and the 15" scale can also be used for 16" wheels with allowance for the increased diameter.

The scales seen through window 68 have respective graduations and characters offset from each other in accordance with each correction weight corresponding to the resultant weight produced when weights 84 and 86 are set in any particular angular position. The ratio of the spacing between increments on the scales varies in accordance with the wheel diameter ratios so that spacings on the 13" diameter scale 72 are  $\frac{13}{14}$  those of the 14" diameter scale 74, which in turn are  $\frac{14}{15}$  of the 15" diameter scale 76.

The background of the scales is marked with one color in area 174 extending for about  $\frac{1}{2}$  ounce on opposite sides of the zero mark for providing a quick indication to the operator of the near-balanced or balanced condition. A differently colored area occupies the remainder of the background indicated at area 176 to provide a quick indication of a large unbalance condition.

To balance the wheel 16, it is conventionally raised from the supporting surface. The mounting ring 14 is attached to the wheel 16 usually before the wheel is raised. The assembly 10 is attached to the posts 32 by operation of the pushbutton assemblies 38. Both the ring 14 and balancer assembly 10 are given a substantial axial tug to ensure that they are securely locked into position. The wheel 16 is rotated rapidly, after it is raised, either with a wheel spinner or through the vehicle drive to rotate assembly 10 therewith.

Since the unbalance condition of most wheels does not exceed 3 to 4 ounces, the operator will likely choose to scan the wheel with a resultant weight of  $1\frac{1}{2}$  to 2 ounces. He grabs the knob 110 and pulls or pushes it along with shaft 108 to cause cone clutch 106 to engage with either gears 98 or 100. This actually holds the engaged gear 98 or 100 stationary with respect to the spinning balancer and causes the associated gear 116 or 120 to also rotate relative to the rotating balancer 10. Gear 116 and shaft 117 are therefore rotated in a respective direction depending on whether gear 98 or 100 is engaged with clutch 106, for rotating gear train 122, 126, 140, 142, 146, 148, 154, 155, 157, 160 and 162 in respective directions.

Gears 160 and 162, of course, rotate in opposite directions dependent on the direction of rotation of gear 116 under control of either gear 96 or 100 to rotate weights 84 and 86 either towards or away from each other until

the operator, by simply observing the window 70, notes that one of the red flags or indicators 78 appears stationary in the window 70. Weights 84 and 86 are then positioned so as to correspond to a 1½ to 2 ounces resultant weight, which is used for scanning the wheel to locate the position of the unbalance weight.

The operator now releases knob 110 and conveniently reaches thereover to grasp knob 112 and pull or push shaft 104 to engage cone clutch 102 with either gear 94 or 96. This holds one of the gears 94 or 96 stationary to rotate the associated gear 114 or 118. Gear 118 rotates in a direction dependent on whether gear 94 or 96 is engaged. Gear 118 in turn drives the gears 124, 128 and 136 relative the ring gear 138 on plate 46, the balancer housing 40 and the wheel 16. The plate 58 together with weights 84 and 86 therefore move as a unit relative the axis of the balancer until the operator detects a minimum vibration. It will be noted that the resultant weight of 1½ to 2 ounces defined by the position of weights 88 and 90 relative to each other has been used for scanning the wheel 16. The location of the unbalanced position relative the wheel 16 at the position of minimum vibration is given by the pointer 66.

As the correct unbalance weight may not yet be accurately determined, the operator again manipulates knob 110 and shaft 108. He now manipulates shaft 108 to either increase or decrease the resultant weight defined by the angular spacing between weights 88 and 90 until he senses a further reduction in vibration. This informs him that the resultant weight corresponds to the actual unbalanced weight of the wheel. Of course, if the operator believes the sensed vibration is still too high, he may again manipulate shaft 104 to define more accurately the location of the unbalance and follow this procedure with further refinement of the resultant weight. It will be noted that the direction in which the operator usually chooses to move the hub assembly or the weights 84 and 86 is dependent on the direction in which he thinks he will most easily achieve a balance condition. The choice of the initial scanning weight is, of course, variable and depends on what weight the operator believes most closely corresponds to the unbalance condition of the wheel.

The operator, after he has detected the lowest level of vibration, stops the wheel 16. To accurately read the correction weight in ounces on the appropriate one of the scales 72, 74 or 76, he may manually rotate the wheel until the pointer 66 is located along the vertical axis of the wheel and is pointing upwardly. This places the window 68, the hairline 78 and the appropriate portion of the scales 72, 74 and 76 in a generally horizontal plane where they may be more easily read and without the necessity of the operator maintaining his eye level at the level of the scales. After reading the correction weight and noting the position of the pointer, he thereafter adds a corresponding weight to the wheel 16 in the appropriate position.

While the foregoing has described preferred modes of carrying out this invention, the attached claims define the invention to be protected.

What is claimed is:

1. In a device for balancing an object rotatable about its intended center of mass, said device having a base fixedly attachable to said object for rotation therewith about the axis of said object, a hub mounted on the base rotatable with respect thereto about said axis, means controllable by an operator for effecting rotation of said hub, and means for counter-balancing the unbalance in the object, an improvement of said device wherein said counter-balancing means comprises a pair of substantially identical weights, means journalling said weights on said hub for continuous rotation of the centers of mass of said weights with respect to said hub about an axis radially spaced but parallel to the axis of said object, and means for causing simultaneous but opposite rotation of said weights in either direction, the axis of rotation of said

weights being positioned with respect to each other and said hub so that their centers of mass coincide with each other on the axis of said object to define a zero balance force position and coincide with each other at a point radially spaced from the axis of said object to define a maximum balance force position.

2. The device of claim 1 comprising means in co-operative relationship with at least one of said weights for indicating the amount of unbalance of said object.

3. The device of claim 1 comprising a pointer on said hub in diametric alignment with the line between said zero and maximum positions for indicating the locus of unbalance of said object.

4. In a device for balancing an object rotatable about its center of mass, said device having a base fixedly attachable to the object for rotation therewith about the axis of the object, a hub mounted on the base rotatable with respect thereto about said axis, means controllable by an operator for effecting rotation of said hub, and means for counter-balancing the unbalance in the object, an improvement of said device wherein said counter-balancing means comprises a pair of weights, means journalling each of said weights on said hub for continuous rotation of the centers of mass of said weights with respect to said hub about an axis radially spaced but parallel to the axis of said object, and means for causing simultaneous but opposite rotation of said weights in either direction, said journalling means positioning said weights with respect to each other and said hub so that the resultant of their vectorially added moments about the axis of said object ranges from zero to maximum in a linear direction outwardly from said object axis along a radial line.

5. The device of claim 4 comprising means in cooperative relationship with at least one of said weights for indicating the amount of unbalance of said object.

6. The device of claim 4 comprising a pointer on said hub in diametric alignment with the line between said zero and maximum positions for indicating the locus of unbalance of said object.

7. In a device for balancing an object having a base fixedly attachable to the object for rotation therewith about the axis of the object, a hub mounted on the base rotatable with respect thereto about said axis, means controllable by an operator for effecting rotation of said hub, and means for counter-balancing the unbalancing in the object, an improvement of said device wherein said counter-balancing means comprises a first weight, means mounting said first weight on said hub for rotation of its center of mass in a circular path intersecting said axis, a second weight, means mounting said second weight on said hub for rotation of its center of mass in a circular path intersecting said axis and means for simultaneously driving said weights to rotate in opposite directions with respect to said hub from a zero balancing force position whereat the centers of mass of both of said weights lie on said axis.

8. In a device for balancing an object rotatable about an axis having means for counter-balancing the unbalance in the object and means for fixing said counter-balancing means to said object, an improvement in said device wherein said counter-balancing means comprises a pair of weights, means mounting said weights for rotation of the centers of mass of said weights with respect to said object, the axis of rotation of each of said weights being parallel to and displaced from the axis of said object, and means for causing simultaneous but opposite rotation of said weights in either direction while said object is spinning, said mounting means positioning said weights with respect to each other and said object so that the resultant of their vectorially added moments about said object axis ranges from zero to maximum along a line perpendicular to said wheel axis.

9. A device for balancing wheels comprising a base fixedly attachable to said wheel for rotation therewith about the axis of rotation of the wheel, a hub mounted

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on said base and rotatable with respect thereto about said axis, means controllable by an operator for effecting rotation of said hub, a pair of weights, means journalling said weights on said hub for continuous rotation of the centers of mass of said weights with respect to said hub about an axis parallel to and radially displaced from said wheel axis, operator manipulatable means for causing simultaneous but opposite rotation of said weights in either direction while said wheel is spinning, said journalling means positioning said weights with respect to each other and said hub to create a minimum balancing force when the centers of mass of said weights are in a position aligned with said wheel axis, a maximum balancing force when the centers of mass of said weights are aligned with each other at a position radially spaced from said wheel axis and intermediate balancing forces when the centers of mass of said weights are equispaced from said wheel axis and from a line between the maximum and minimum positions.

10. A device for balancing wheels comprising a base fixedly attachable to said wheel for rotation therewith about the axis of rotation of the wheel, a hub mounted on said base and rotatable with respect thereto about said axis, means controllable by an operator for effecting

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rotation of said hub, a pair of weights, means journalling said weights on said hub for continuous rotation of the centers of mass of said weights with respect to said hub, the axis of rotation of each of said weights being parallel to and displaced from said wheel axis, and means manipulatable by an operator for causing simultaneous but opposite rotation of said weights in either direction while said wheel is spinning, said journalling means positioning said weights with respect to each other and said hub so that the resultant of their vectorially added moments about said wheel axis ranges from zero to maximum in an outwardly direction from said wheel axis along a radial line.

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JAMES J. GILL, Primary Examiner

W. H. DOPP.

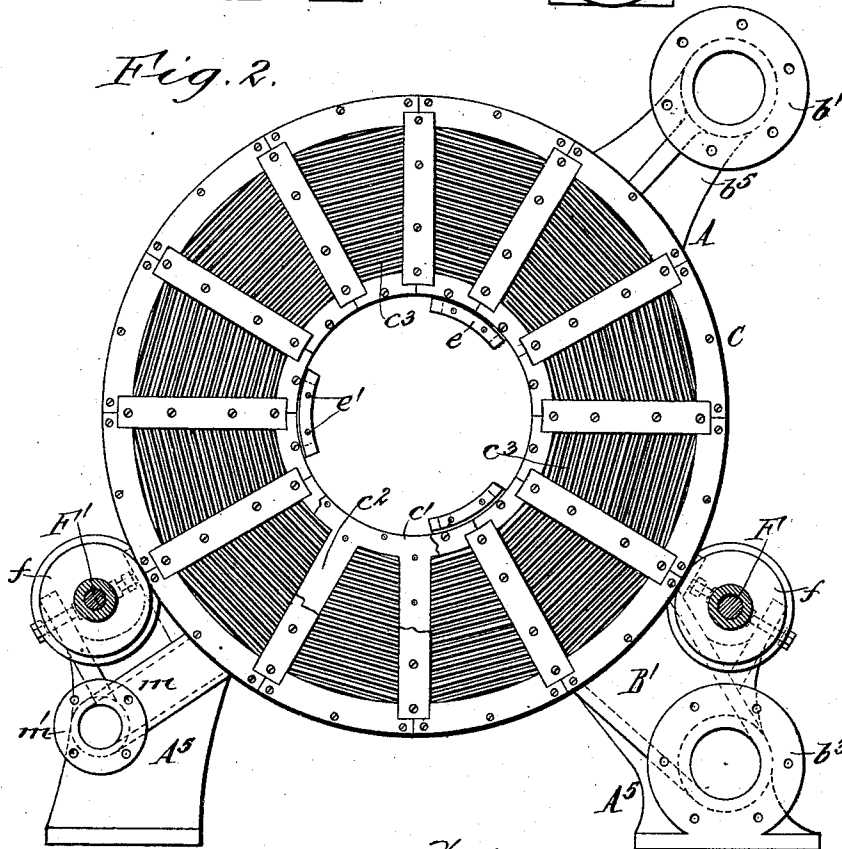
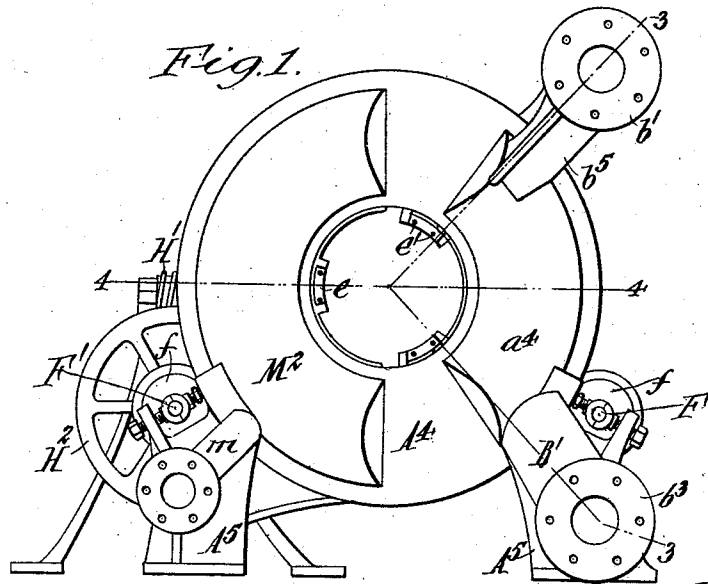
METHOD OF TREATING FILTERING ELEMENTS AND FILTERED LIQUID.

APPLICATION FILED NOV. 3, 1906.

966,177.

Patented Aug. 2, 1910.

3 SHEETS—SHEET 1.



Witnesses:  
Richard Sommer.  
Louis W. Stratz

William H. Dopp, Inventor  
by Meyer & Dopp  
Attorneys

W. H. DOPP.  
 METHOD OF TREATING FILTERING ELEMENTS AND FILTERED LIQUID.  
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966,177.

Patented Aug. 2, 1910.

3 SHEETS—SHEET 2.

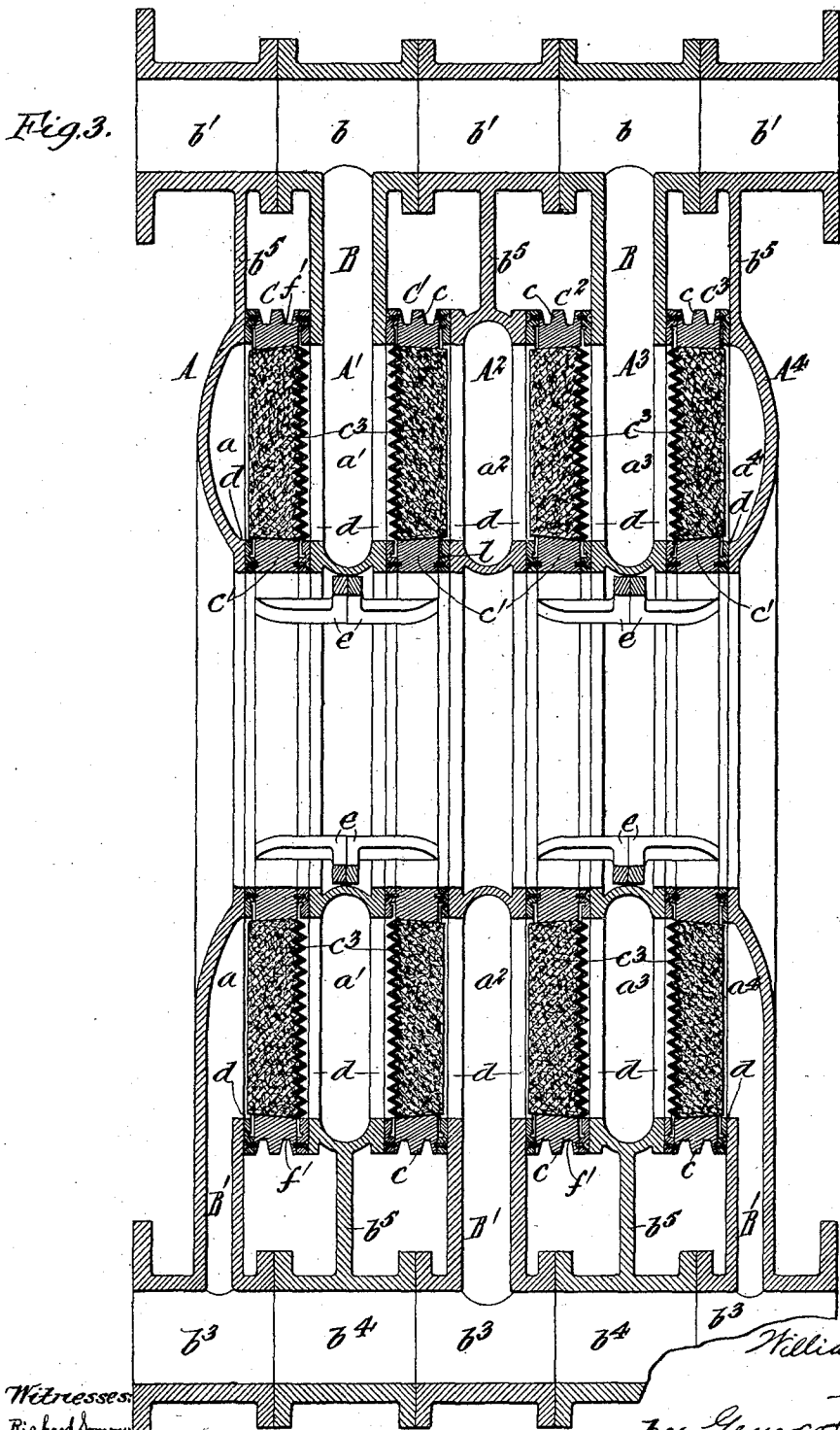


Fig. 3.

Witnesses:  
 Richard D. ...  
 Louis W. ...

William H. Dopp.  
 Inventor.  
 by Geyer & Dopp  
 Attorneys

W. H. DOPP.

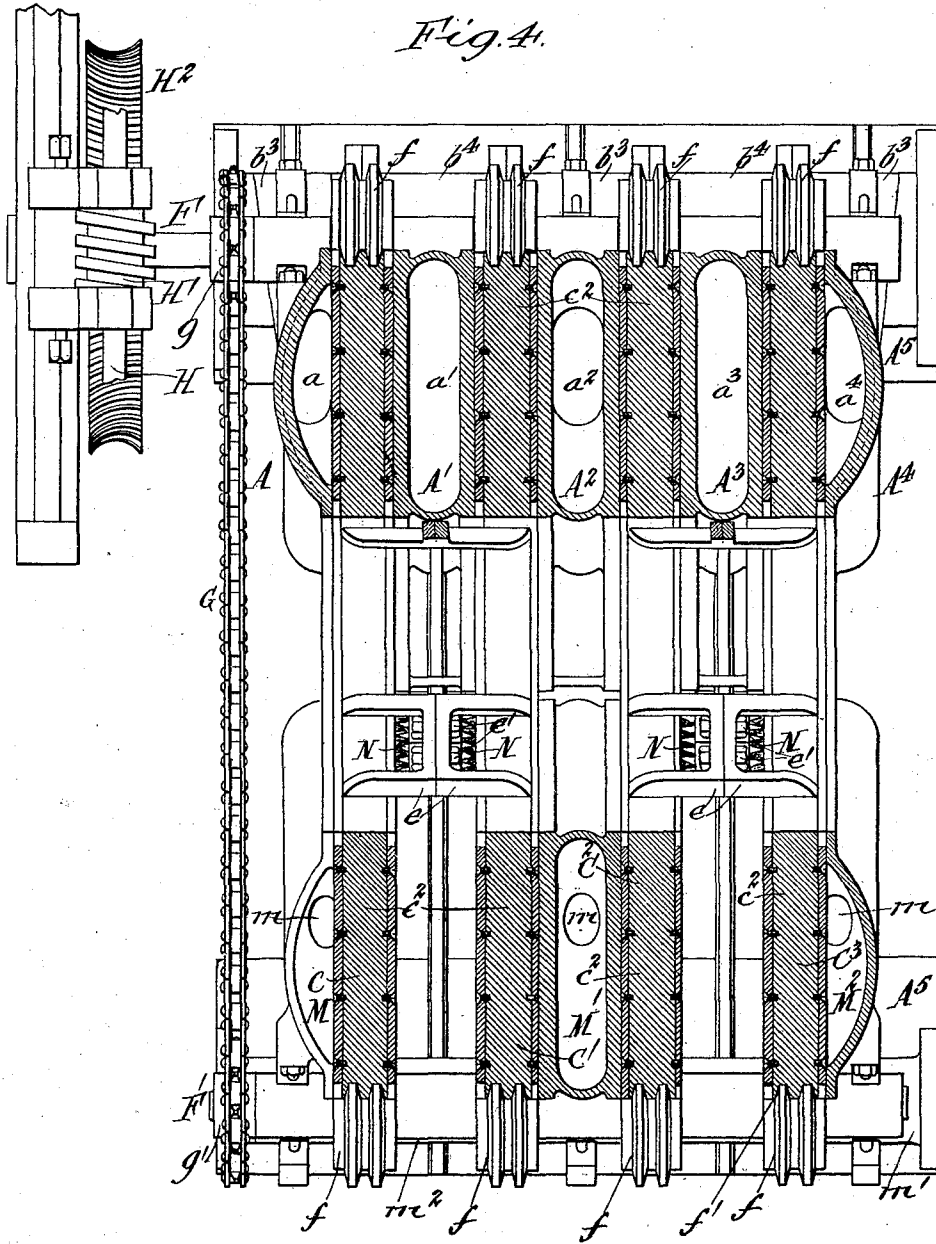
METHOD OF TREATING FILTERING ELEMENTS AND FILTERED LIQUID.

APPLICATION FILED NOV. 3, 1906.

966,177.

Patented Aug. 2, 1910.

3 SHEETS—SHEET 3.



Witnesses:  
Richard Sommer.  
Louis W. Gray

William N. Dopp, Inventor  
by Seymour Dopp  
Attorneys

# UNITED STATES PATENT OFFICE.

WILLIAM H. DOPP, OF BUFFALO, NEW YORK.

METHOD OF TREATING FILTERING ELEMENTS AND FILTERED LIQUID.

966,177.

Specification of Letters Patent.

Patented Aug. 2, 1910.

Original application filed November 3, 1904, Serial No. 231,297. Divided and this application filed November 3, 1906. Serial No. 341,928.

To all whom it may concern:

Be it known that I, WILLIAM H. DOPP, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Methods of Treating Filtering Elements and Filtered Liquid, of which the following is a specification.

This invention relates to a method of cleansing and sterilizing or aerating the filtering elements of filters, and of aerating, sterilizing or bleaching the filtered liquid.

This application is a division of an application for improvements in pressure filters filed by me November 3, 1904, Serial No. 231,297.

The object of my present invention is the provision of an inexpensive and efficient method of the character above mentioned.

It consists essentially, in expelling the contained liquid from the filtering element by a suitable gaseous purifying or sterilizing agent passed through it in a direction opposite to that of entry of the unfiltered liquid, and then interposing the element thus charged or filled with the gaseous agent between the opposing liquid supply and discharge chambers of a filter, whereby the liquid entering the element forces the gas ahead of itself into the filtered liquid in the delivery chamber.

In the accompanying drawings consisting of 3 sheets: Figure 1 is a side elevation of a pressure filter by which the improved method may be practiced. Fig. 2 is a transverse section thereof. Fig. 3 is a longitudinal section in line 3—3, Fig. 1, on an enlarged scale. Fig. 4 is a horizontal section in line 4—4, Fig. 1, on an enlarged scale.

Similar letters of reference indicate corresponding parts throughout the several views.

Referring to the drawings, the body or casing of the apparatus comprises a series of upright sections A, A<sup>1</sup>, A<sup>2</sup>, A<sup>3</sup>, A<sup>4</sup>, arranged side by side and provided with feet or standards A<sup>5</sup> which support the apparatus. The end sections A, A<sup>4</sup> and the middle section A<sup>2</sup> are circular, while the intermediate sections A<sup>1</sup>, A<sup>3</sup> are semi-circular. The end sections contain segmental delivery or filtered-liquid chambers a, a<sup>4</sup>, respectively, which are closed on their outer sides and open on their inner sides and extend around about one-third of the sections. The sections

A<sup>1</sup>, A<sup>3</sup> next to the end sections are provided with segmental inlet or supply chambers a<sup>1</sup>, a<sup>3</sup> for the raw or unfiltered liquid, and the central section A<sup>2</sup> is provided with a similarly-shaped delivery chamber a<sup>2</sup>, these alternating supply and delivery chambers being arranged in line with one another, as shown in Figs. 3 and 4. The supply chambers a<sup>1</sup>, a<sup>3</sup> are provided at their upper ends with inlet branches B, while the delivery chambers a, a<sup>2</sup> and a<sup>4</sup> are provided at their lower ends with discharge branches B<sup>1</sup>. The inlet branches of the supply chambers are provided with alined transverse nipples b and the delivery chambers are provided at their upper ends with corresponding nipples b<sup>1</sup> registering with the nipples b and forming therewith a continuous supply main, the contiguous flanges of the nipples being suitably secured together. The branches B<sup>1</sup> of the delivery chambers have similar transverse nipples b<sup>3</sup> which alternate with coinciding nipples b<sup>4</sup> at the lower ends of the supply chambers, the series of nipples being bolted or otherwise secured together and forming a continuous delivery main. The nipples b<sup>1</sup> and b<sup>4</sup> are carried by webs or blind connections b<sup>5</sup> formed on the respective sections.

Adjacent supply and delivery chambers of the apparatus are separated by movable filtering partitions or diaphragms C, C<sup>1</sup>, C<sup>2</sup>, C<sup>3</sup> of annular or disk form, through which the liquid percolates in passing through the apparatus. The chambers of the three intermediate sections A<sup>1</sup>, A<sup>2</sup>, A<sup>3</sup>, are open at opposite sides, as shown at d, to expose the filtering partitions to the supply and delivery chambers, and the partitions are of sufficient width to close the open side of said chambers and the end delivery chambers a, a<sup>4</sup>. The partitions thus form porous walls which alternate with the chambers and through which the liquid must percolate in passing from the supply to the delivery chambers. Each of the partitions shown in the drawings consists of a skeleton frame of metal composed of inner and outer concentric rings c, c<sup>1</sup> rigidly connected together by radial bars c<sup>2</sup>, and blocks or elements c<sup>3</sup> of suitable filtering material seated in the sector-shaped openings of the partitions, as shown in Figs. 2 and 3. The partitions are tied together in pairs by U-shaped lugs e formed on their inner rings c<sup>1</sup> and bolts e<sup>1</sup>



passing through the contiguous bars of the lugs, as best shown in Fig. 4. The several partitions are free to turn relatively to the adjoining chambered sections of the filter, to cause different portions of the filtering surfaces of the partitions to pass successively through or between the corresponding supply and delivery chambers, about one-third of such surface being always within said chambers and the other two-thirds outside thereof.

In the construction shown in the drawings the filtering partitions are slowly and continuously rotated by flanged friction wheels  $f$  mounted on horizontal shafts  $F$ ,  $F^1$  and engaging with annular grooves  $f^1$  formed in the periphery of the partitions. These shafts are supported in bearings on the standards  $A^5$  and caused to turn in unison by a sprocket chain  $G$  running around sprocket wheels  $g$ ,  $g^1$  secured to the shafts. A slow rotary motion is transmitted from the driving shaft  $H$  to one of the shafts  $F$ ,  $F^1$  by intermediate worm gearing  $H^1$ ,  $H^2$  or other suitable means.

Opposite the liquid supply and delivery chambers  $a$ ,  $a^4$ , the end and middle sections  $A$ ,  $A^2$ ,  $A^4$  of the filter are provided with segmental aerating, ozonizing, sterilizing or bleaching chambers  $M$ ,  $M^1$ ,  $M^2$  to the action of which the filtering partitions  $C$ ,  $C^3$  are subjected while outside of the supply and delivery chambers in accordance with my improved method. These sterilizing chambers are similar in form to the opposing delivery chambers  $A$ ,  $A^2$ ,  $A^4$  and extend from about the top to the bottom of the sections, as shown in Fig. 1. The end chambers  $M$ ,  $M^2$  are closed on their outer sides and open on their inner sides, so that the backs or delivery sides of the opposing filtering partitions form the inner walls thereof, while the central chamber  $M^1$  is open at both sides so that the backs or delivery sides of the central filtering partitions are exposed to the interior of the chamber. Each of these sterilizing chambers is provided with an inlet branch  $m$  for supplying ozone, steam or any other suitable sterilizing, purifying or bleaching agent under pressure to the chambers. This sterilizing agent is forced into and through the filtering partitions from their delivery toward their entry or supply sides, displacing the liquid contained in the pores of the partitions, and when the traveling partitions so charged with the gaseous agent again enter between the supply and delivery chambers, the liquid from the supply chambers in permeating the filtering partitions forces the ozone or other gas ahead of it in the form of minute bubbles into the delivery chambers, thereby ozonizing or sterilizing the filtered liquid. The inlet branches of the ozonizing chambers are provided with transverse nipples  $m^1$  which

alternate with similar nipples  $m^2$ , so as to form a continuous supply main similar to the supply and delivery mains of the filtering chambers.

The spaces between the portions of the filtering partitions outside the supply and delivery chambers are open to the atmosphere, as shown in Fig. 4, and in these spaces are arranged brushes  $N$  or other cleaning devices which act upon the opposing faces of the filtering partitions, so as to remove any impurities adhering thereto.

The filtering medium may consist of any suitable material and constructed in any ordinary manner.

From the foregoing, it will be understood that about one third of the surface of each filtering partition is always interposed between the corresponding supply and delivery chambers and about one-half of each partition is outside of said chambers and opposite the corresponding sterilizing chamber and the cleaning appliances.

When liquid is forced into the supply main  $b$ ,  $b^1$ , it enters the supply chambers  $a^1$ ,  $a^3$  and passes through the portions of the filtering partitions  $C-C^3$  located between said chambers and the delivery chambers  $a$ ,  $a^2$ ,  $a^4$ , into the latter chambers and thence into the delivery main  $b^3$ ,  $b^4$ . The filtering partitions are slowly rotated, say at the rate of about four revolutions per hour, in such a direction that they enter between the chambers at the top and leave the same at the bottom. When the filtering elements or surfaces arrive opposite the aerating or sterilizing chambers  $M$ ,  $M^1$ ,  $M^2$  the air, steam, ozone or other desired agent under pressure therein forces the contained liquid out of said elements, in a direction opposite to that of entry. By this method, a most effectual cleansing of the filtering elements is accomplished, for as soon as the liquid is expelled from the same, their pores are further cleansed by the flow of air or other medium used. Only filtered liquid comes in contact with the body of the element during this cleansing operation, and only so much of the filtered liquid as is in the body of the element is used, thus effecting a great saving of the same. The air or other agent may be allowed to blow through the element for any desired length of time, so as to thoroughly aerate and sterilize the body thereof. When the filtering element again enters between the supply and delivery chambers of the apparatus and is brought into action, not only will the liquid on entering the element force ahead of itself the greater portion of the gaseous contents of the element into the already filtered liquid in the delivery chambers, and thus sterilize the same, as hereinbefore described, but the filtration will take place largely through a sterilizing medium formed by a thin layer

of gas which persistently adheres to the walls of the pores.

As is well known, carbon, especially in the form of charcoal, has the property of condensing many times its own volume of gases upon its surfaces; and in order to increase the above-described sterilizing effect, carbon or material combined with carbon is preferably used for the filtering element.

In this improved method, the entry sides of the filtering elements are free and not in contact with a body of water or otherwise subjected to the pressure or resistance of such a body. The cleansing of the elements can therefore be effected with a smaller quantity of liquid and with less head or pressure. Furthermore, the adhering particles or impurities when once dislodged cannot fall back upon the filter bed or element.

I claim as my invention:

1. The hereindescribed method of aerating, sterilizing or bleaching a filtered liquid which consists in displacing the liquid in a filtering element by forcing a suitable aerating, sterilizing or bleaching agent into the same at its delivery side, and then interpos-

ing the element between the opposing liquid supply and delivery chambers of the filter, whereby the liquid entering the element forces said agent ahead of itself into the filtered liquid in the delivery chamber, substantially as set forth.

2. The hereindescribed method of aerating, sterilizing or bleaching a filtered liquid which consists in employing a carbonaceous filtering element and displacing the liquid in the same by forcing a suitable aerating, sterilizing or bleaching agent into the element at its delivery side, and then interposing the element between the opposing liquid supply and delivery chambers of the filter, whereby the liquid entering the element forces said agent ahead of itself into the filtered liquid in the delivery chamber, substantially as set forth.

Witness my hand this 30th day of October, 1906.

WILLIAM H. DOPP.

Witnesses:

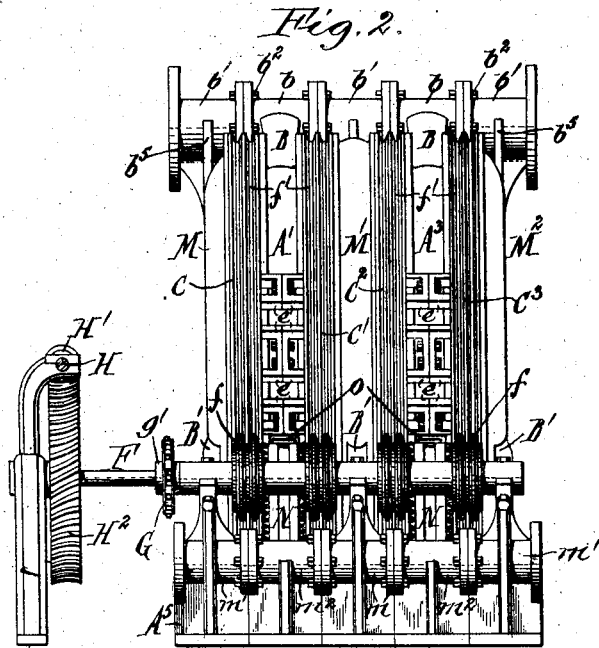
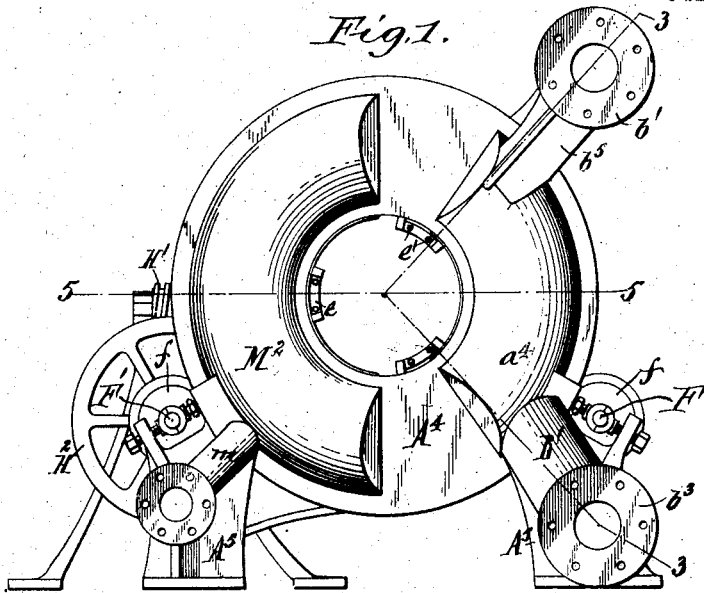
C. F. GEYER,  
E. M. GRAHAM.

No. 834,892.

PATENTED NOV. 6, 1906.

W. H. DOPP.  
PRESSURE FILTER.  
APPLICATION FILED NOV. 3, 1904.

5 SHEETS—SHEET 1.

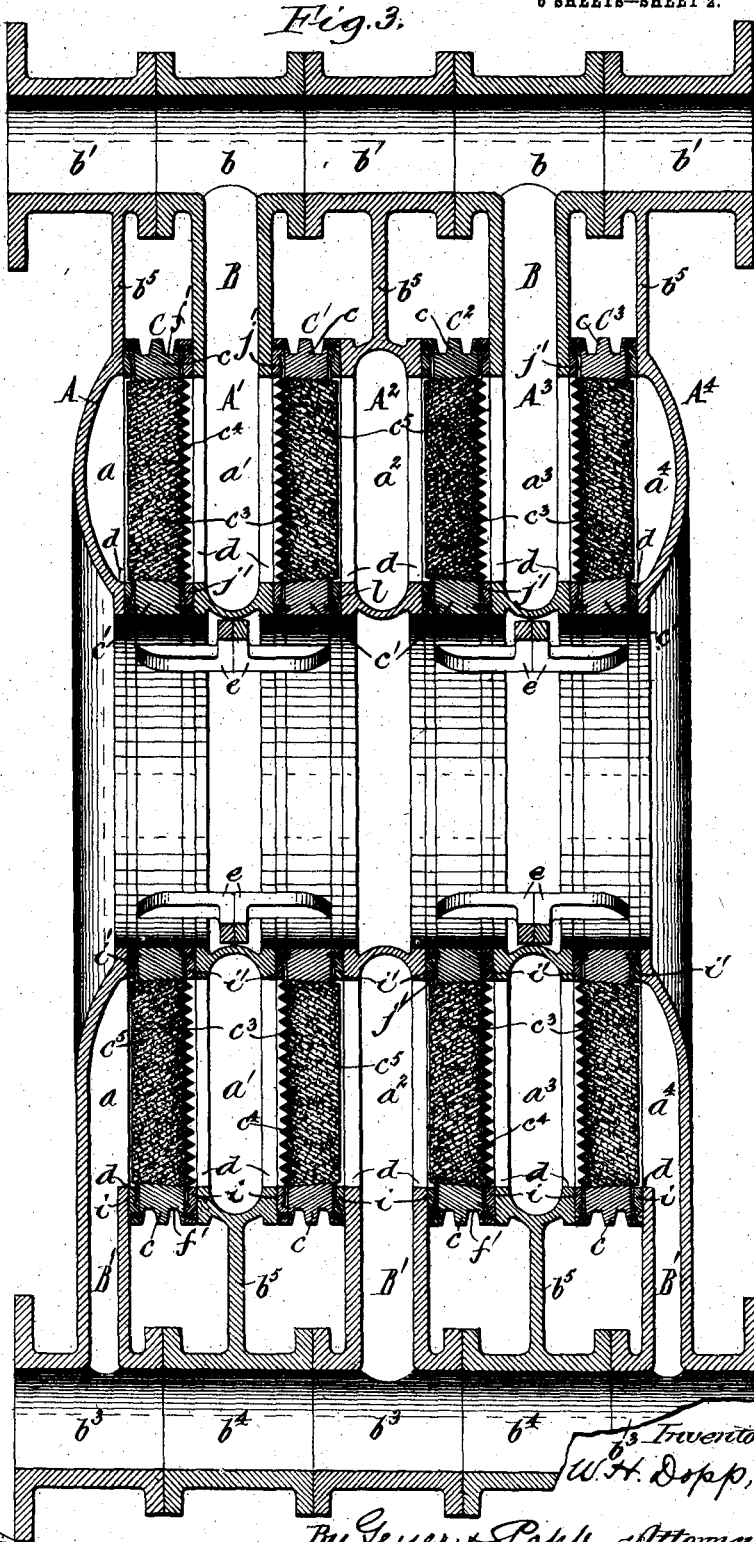
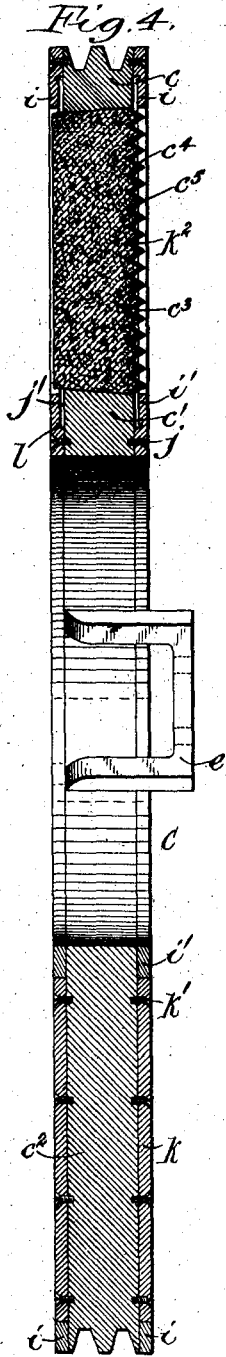


Witnesses:  
*Louis W. Gray*  
*Robert Weikensack*

Inventor:  
*William H. Dopp*  
 By *Geyer & Popp* Attorneys

W. H. DOPP.  
PRESSURE FILTER.  
APPLICATION FILED NOV. 3, 1904.

6 SHEETS—SHEET 2.

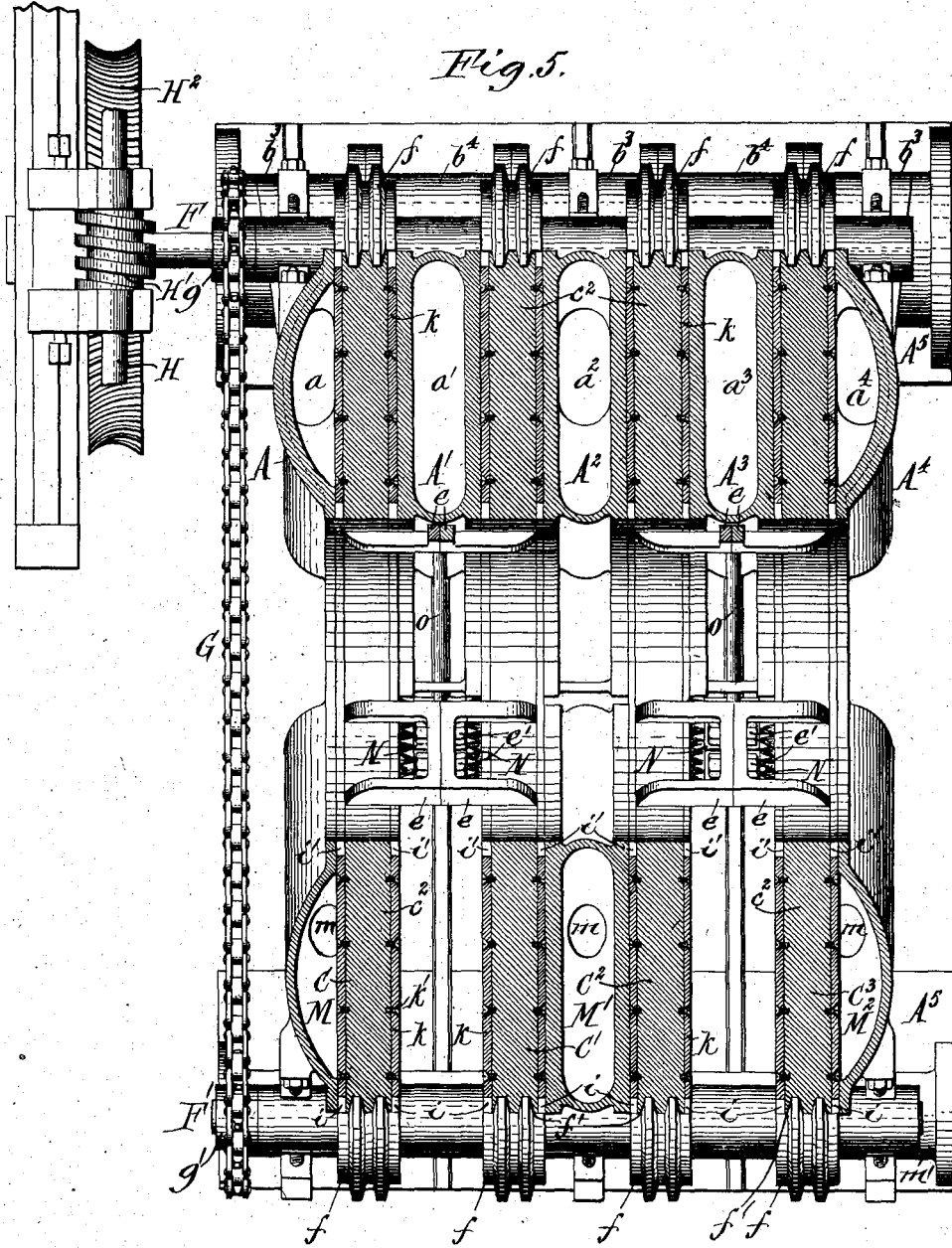


Witnesses:  
Louis W. Gray,  
Robert Wittknecht

Inventor:  
W. H. Dopp,

By Geiser & Papp Attorneys

W. H. DOPP.  
PRESSURE FILTER.  
APPLICATION FILED NOV. 3, 1904.



Witnesses:  
*Louis C. Gratz*  
*Robert Warknecht*

*William H. Dopp, Inventor*  
 By *Geyer & Pappe*  
 Attorneys.

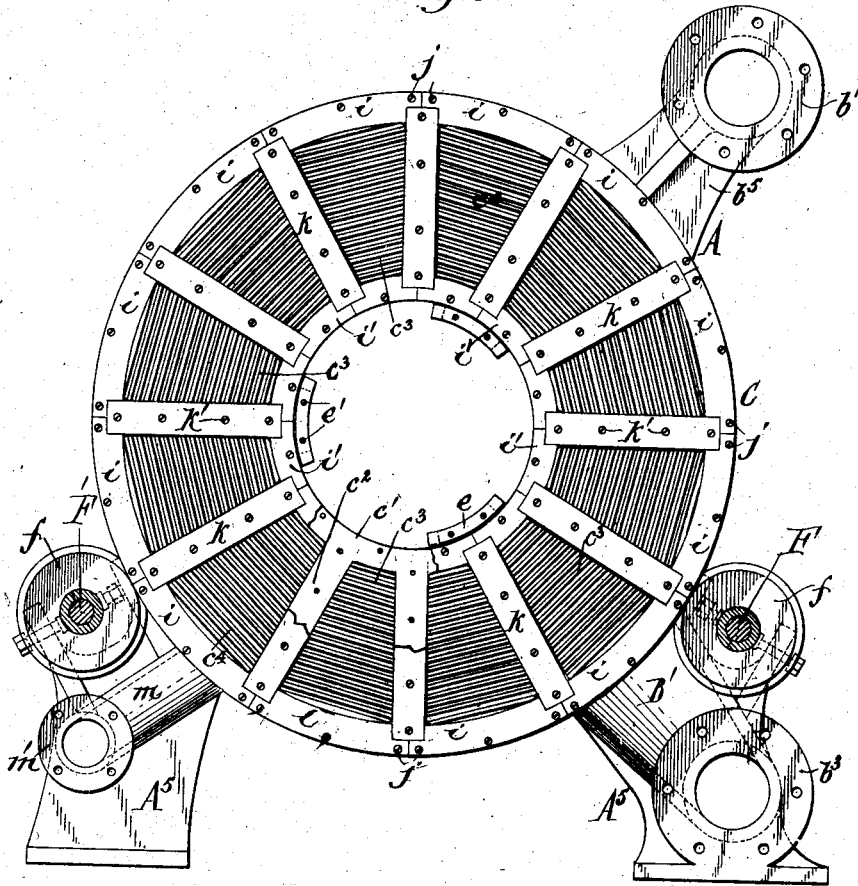
No. 834,892.

PATENTED NOV. 6, 1906.

W. H. DOPP,  
PRESSURE FILTER.  
APPLICATION FILED NOV. 3, 1904.

5 SHEETS—SHEET 4.

Fig. 6.

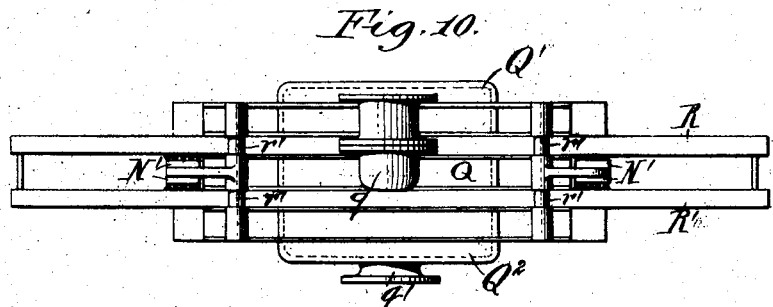
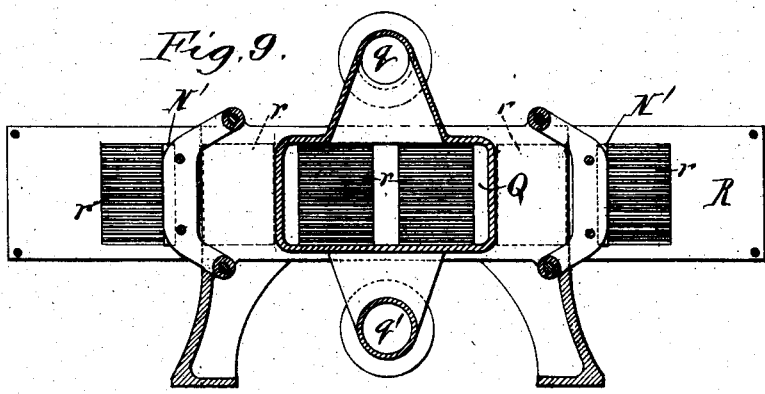
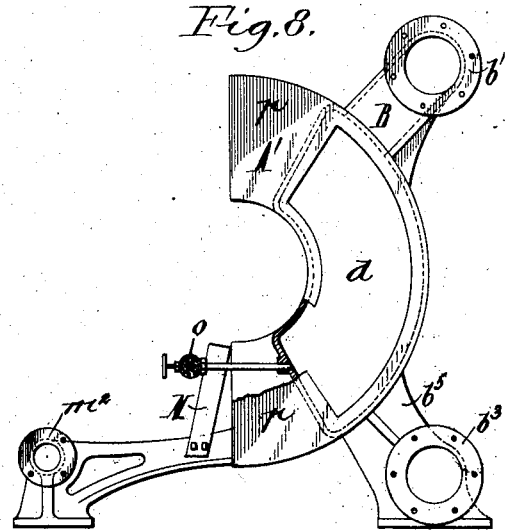
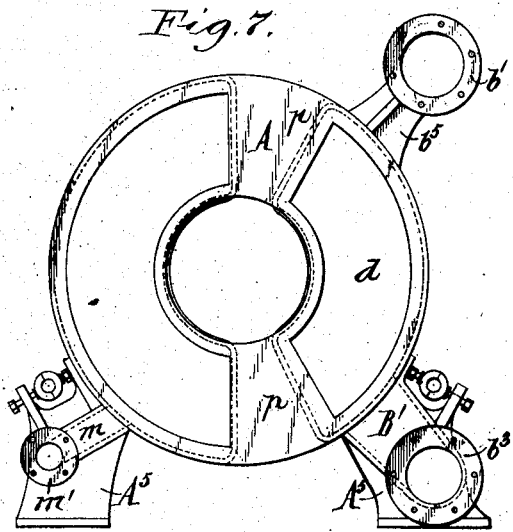


Witnesses:  
*Louis W. Gray*  
*Robert Weithauscht*

*William H. Dopp,*  
Inventor  
By *Geyer & Papp*  
Attorneys

W. H. DOPP.  
PRESSURE FILTER.  
APPLICATION FILED NOV. 3, 1904.

5 SHEETS—SHEET 5.



Witnesses:  
*Louis W. Gratz*  
*Robert Wittkowsky*

*William H. Dopp* Inventor  
 By *Geyer & Hoff*  
 Attorneys

# UNITED STATES PATENT OFFICE.

WILLIAM H. DOPP, OF BUFFALO, NEW YORK.

## PRESSURE-FILTER.

No. 834,892.

Specification of Letters Patent.

Patented Nov. 6, 1906.

Application filed November 3, 1904. Serial No. 231,297.

To all whom it may concern:

Be it known that I, WILLIAM H. DOPP, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Pressure-Filters, of which the following is a specification.

This invention relates more particularly to pressure-filters, although some features of the same are also applicable to other filters.

The principal object of my invention is the production of an apparatus of this kind which has a large filtering capacity in proportion to its size.

Another object is to provide an apparatus in which portions of the filtering surfaces or elements can be cleaned while other portions remain in use, thus permitting the filtering operation to continue without interruption and increasing the capacity of the apparatus accordingly.

Another object is to automatically cleanse the entire filtering material while outside the filter-chambers, so as to prevent accumulation of filth or breeding of bacteria in the filter.

A further object of the invention is to combine with the filter simple means for aerating, ozonizing, or sterilizing the liquid to be purified.

In the accompanying drawings, consisting of five sheets, Figure 1 is a side elevation of my improved filter. Fig. 2 is a front elevation thereof. Fig. 3 is a longitudinal section in line 3 3, Fig. 1, on an enlarged scale. Fig. 4 is an enlarged transverse central section of one of the filtering-partitions. Fig. 5 is a horizontal section in line 5 5, Fig. 1, on an enlarged scale. Fig. 6 is a transverse vertical section of the filter, taken between the corrugated face of one of the filtering-partitions and the opposing liquid-chamber. Fig. 7 is a side elevation of one of the filter-sections containing a liquid-delivery chamber and a sterilizing-chamber. Fig. 8 is a similar view of one of the filter-sections containing a supply-chamber. Fig. 9 is a sectional elevation of a modified construction of the apparatus. Fig. 10 is a top plan view thereof.

Similar letters of reference indicate corresponding parts throughout the several views.

Referring to the embodiment of the invention shown in Figs. 1-8, inclusive, the body or casing of the apparatus comprises a series

of upright sections  $A A' A^2 A^3 A^4$ , arranged side by side and provided with feet or standards  $A^5$ , which support the apparatus. The end sections  $A A^4$  and the middle section  $A^2$  are preferably circular, while the intermediate sections  $A' A^3$  are semicircular, as shown in Figs. 1, 7, and 8. The end sections contain segmental delivery or filtered-liquid chambers  $a a^4$ , respectively, which are closed on their outer sides and open on their inner sides and preferably formed by hollow bulges on the outer sides of the sections, as shown in Figs. 1, 3, and 5. These segmental chambers extend around about one-third of the sections. The sections  $A' A^3$  next to the end sections are provided with segmental inlet or supply chambers  $a' a^3$  for the raw or unfiltered liquid, and the central section  $A^2$  is provided with a similarly-shaped delivery-chamber  $a^2$ , these alternating supply and delivery chambers being arranged in line with one another, as shown in Figs. 3 and 5. The supply-chambers  $a' a^3$  are provided at their upper ends with inlet branches  $B$ , while the delivery-chambers  $a, a^2$ , and  $a^4$  are provided at their lower ends with discharge branches  $B'$ .

The inlet branches of the supply-chambers are provided with alined transverse nipples  $b$ , and the delivery-chambers are provided at their upper ends with corresponding nipples  $b'$ , registering with the nipples  $b$  and forming therewith a continuous supply-main, the contiguous flanges of the nipples being secured together by bolts  $b^2$ , as shown in Fig. 2. The branches  $B'$  of the delivery-chambers have similar transverse nipples  $b^3$ , which alternate with coinciding nipples  $b^4$  at the lower ends of the supply-chambers, the series of nipples being bolted together and forming a continuous delivery-main, as shown in Fig. 2. These supply and delivery nipples with their connecting-bolts also serve to firmly tie together the several sections of the filter. The nipples  $b'$  and  $b^4$  are carried by webs or blind connections  $b^5$ , formed on the respective sections.

Adjacent supply and delivery chambers of the apparatus are separated by movable filtering partitions or diaphragms  $C C' C^2 C^3$ , preferably of annular or disk form, through which the liquid percolates in passing through the apparatus. The chambers of the three intermediate sections  $A', A^2, A^3$  are open at opposite sides, as shown at  $d$ , to expose the



filtering-partitions to the supply and delivery chambers, and the partitions are of sufficient width to close the open sides of said chambers and the end delivery-chambers  $a a^4$ . The partitions thus form porous walls, which alternate with the chambers and through which the liquid must percolate in passing from the supply to the delivery chambers. Each of the partitions shown in the drawings consists of a skeleton frame of metal, composed of inner and outer concentric rings  $c c'$ , rigidly connected together by radial bars  $c^2$  and blocks or elements  $c^3$  of suitable filtering material seated in the sector-shaped openings of the partition, as shown in Fig. 3, 4, and 6. The partitions are preferably tied together in pairs by U-shaped lugs  $e$ , formed on or secured to the interior of their inner rings  $c'$ , and bolts  $e'$ , passing through the contiguous bars of the lugs, as best shown in Fig. 5. The several partitions are free to turn relatively to the adjoining chambered sections of the filter to cause different portions of the filtering-surfaces of the partitions to pass successively through or between the corresponding supply and delivery chambers, about one-third of such surface being always within said chambers and the other two-thirds outside thereof.

Any suitable means may be employed for slowly and continuously rotating the filtering-partitions. In the preferred construction shown in the drawings this is accomplished by flanged friction-wheels  $f$ , mounted on horizontal shafts  $F F'$  and engaging with annular grooves  $f'$ , formed in the periphery of the partitions. These shafts are supported in bearings on the standards  $A^5$  and caused to turn in unison by a sprocket-chain  $G$ , running around sprocket-wheels  $g g'$ , secured to the shafts. A slow rotary motion is transmitted from the driving-shaft  $H$  to one of the shafts  $F F'$  by intermediate worm-gearing  $H' H^2$  or other suitable means.

In order to maintain liquid-tight joints between the sides of the partitions and the contiguous edges or faces of the chambered sections  $A-A^4$ , each partition is provided on the outer sides of its inner and outer rings  $c c'$  with annular packing strips or tongues  $i i'$ , which may be of any suitable construction, but which are preferably constructed of elastic metal and adapted to be forced outward against the opposing flat faces of the filtering-sections by the liquid-pressure. For this purpose the annular packing-strips are rigidly secured to the partition at or near their rear edges by screws  $j$  or other fastenings, and their front portions, which face the filtering blocks or elements, are detached and recessed on their inner sides, so as to form annular liquid spaces or channels  $j'$  between the strips and the opposing sides of the partition-rings. The liquid under pressure enters these channels and forces the free elastic portions of the

packing-strips outward against the edges of the chambers on opposite sides of the partitions, thus insuring tight joints at these points. As shown in Fig. 4, sufficient clearance is left between the front edges of the annular packing-strips and the edges of the filtering-blocks to permit the liquid to enter behind the strips. The radial bars  $c^2$  of the partitions are provided on opposite faces with similar straight packing strips or tongues  $k$ . These strips are secured centrally to the bars  $c^2$  by screws  $k'$  or other fastenings, and their lateral or edge portions are detached and recessed on their inner edges to form longitudinal liquid-channels  $k^2$ , similar to the channels  $j'$ . In order to increase the elasticity of the detached portions of the packing-strips, they are provided at the junction of their recessed and unrecessed portions with grooves or depressions  $l$ .

Opposite the liquid supply and delivery chambers  $a-a^4$  the end and middle sections  $A A^2 A^4$  of the filter are preferably provided with segmental aerating, ozonizing, or sterilizing chambers  $M M' M^2$ , to the action of which the filtering-partitions  $C-C^3$  are subjected while outside of the supply and delivery chambers. These sterilizing-chambers are similar in form to the opposing delivery-chambers  $A A^2 A^4$  and extend from about the top to the bottom of the sections, as shown in Figs. 1, 2, and 8. The end chambers  $M M^2$  are closed on their outer sides and open on their inner sides, so that the backs of the opposing filtering-partitions form the inner walls thereof, while the central chamber  $M'$  is open at both sides, so that the backs of the central filtering-partitions are exposed to the interior of the chamber. Each of these sterilizing-chambers is provided with an inlet branch  $m$  for supplying ozone, steam, or any other suitable gaseous sterilizing or purifying agent under pressure to the chambers. This sterilizing agent is forced into and through the filtering-partitions, displacing the liquid contained in the pores of the latter, and when the traveling partitions so charged with the gaseous agent enter between the supply and delivery chambers the liquid from the supply-chambers in permeating the filtering-partitions forces the ozone or other gas ahead of it in the form of minute bubbles into the delivery-chambers, thereby ozonizing or sterilizing the filtered liquid. The inlet branches of the ozonizing-chambers are provided with transverse nipples  $m'$ , which alternate with similar nipples  $m^2$  so as to form a continuous supply-main similar to the supply and delivery mains of the filtering-chambers.

The spaces between the portions of the filtering-partitions outside the supply and delivery chambers are open to the atmosphere, as shown in Fig. 5. In these spaces are arranged brushes  $N$  or other cleaning de-

5 vices, which act upon the opposing faces of the filtering-partitions, so as to remove any impurities adhering thereto. These brushes are preferably located in the lower portions of the spaces between the filtering-partitions and may be rigidly or yieldingly secured to the adjacent sections of the filter, the rotary partitions cleansing themselves by contact with the brushes. The partitions may be further cleansed or rinsed by streams of liquid issuing from spray-pipes *o*, arranged adjacent to the brushes, as shown in Fig. 8. These pipes are preferably connected with the supply-chambers *A' A<sup>3</sup>*, as shown.

15 The filtering medium may consist of any suitable material and be constructed in any ordinary manner, but each block or element preferably consists of a ridged or corrugated surface layer *c<sup>4</sup>*, which is comparatively thin and composed of fine-grained filtering material, and a relatively coarse-grained body or mass *c<sup>5</sup>*, which supports the thin surface layer, this coarse mass possessing sufficient strength to withstand the liquid-pressure.

25 As shown in Fig. 3, the corrugated sides of the filtering-blocks face the supply-chambers *a' a<sup>3</sup>*.

It will now be understood that when the parts of the apparatus are properly assembled about one-third of the surface of each filtering-partition is always interposed between the corresponding supply and delivery chambers and about one-half of each partition is outside of said chamber and opposite the corresponding sterilizing-chamber and the cleaning appliances.

The operation of the apparatus is as follows: When liquid is forced into the supply-main *b b'*, it enters the supply-chambers *a' a<sup>3</sup>* and passes through the portions of the filtering-partitions *C-C<sup>3</sup>*, located between said chambers and the delivery-chambers *a a<sup>2</sup> a<sup>4</sup>*, into the latter chambers, and thence into the delivery-main *b<sup>3</sup> b<sup>4</sup>*. As soon as pressure is produced in said supply and delivery chambers the annular and radial packing-strips *i i' k'* are forced against the opposing edges of the chambers, forming tight joints between the members and preventing leakage. The filtering-partitions are constantly and slowly rotated—say at the rate of about four revolutions per hour—in such a direction that they enter between the chambers at the top and leave the same at the bottom. As the partitions rotate the brushes *N* remove any sediment accumulated on their surfaces and the jets of liquid from the pipes *o* rinse the same. As the filtering-surfaces arrive opposite the aerating or sterilizing chambers *M M' M<sup>2</sup>* the air, steam, or ozone under pressure therein expels the liquid from their pores and by virtue of the property of the carbon in the filtering-blocks condenses many times their volume of the air in the pores, and when those gas or air charged por-

tions of the partitions again come between the liquid-chambers the condensed air or gases contained in the pores are pushed before the entering raw liquid and delivered into the filtered liquid in the delivery-chambers, as hereinbefore described. In this manner the filtering and aerating or sterilizing of the liquid and the cleaning of the filter are carried on continuously and automatically.

The flat sector-shaped surfaces *p* of the filter-sections located between the opposing ends of the supply and delivery chambers and the sterilizing-chambers form packing-cheeks against which the radial packing-strips *k* slide as the partitions rotate. These packing-cheeks are of about the same size as the sector-shaped blocks or divisions of the partitions, so that some of such radial strips on each partition will always be in contact with the cheeks and prevent leakage from the supply and delivery chambers.

An important feature of my invention is the construction of the traveling partitions in the form of filtering cells or panels separated or bounded by walls or strips of metal or other suitable material impervious to liquids. The cheeks *p* are likewise impervious, and the division or bounding members on arriving opposite the same form tight joints therewith, thus acting practically as cut-offs, which prevent the escape of the liquid from the supply and delivery chambers, which would occur if the filtering medium were continuous instead of paneled or cellular, as shown.

By tying adjacent filtering-partitions together by means of the lugs *e* and bolts *e'* or other means they are enabled to effectually resist the thrust exerted against their opposing faces by the liquid-pressure.

The apparatus shown in the drawings has four filtering elements or partitions; but a greater or less number may obviously be employed, according to the capacity desired.

An important feature of my improved apparatus is that no sediment or impurities of any kind are allowed to accumulate in the liquid-chambers, the cleansing of the filtering elements being effected wholly outside of the raw and filtered liquid chambers.

The compactness of the apparatus, combined with its large filtering capacity, renders it especially advantageous for municipalities or other localities where real estate or building-space is expensive.

While the filter-sections are preferably circular and semicircular, as shown, they may be rectangular or of other suitable form, if desired. The filtering-partitions are not necessarily rotated continuously, but may in some cases be moved intermittently for bringing some portions of their surfaces outside of the filtering-chambers for cleaning or aerating the same or for other purposes while

other portions are in coöperation with the filtering-chambers.

My invention is also not confined to the use of rotary partitions, as the same effect may be produced by imparting other motions to the same—for instance, a reciprocating movement. A modified construction embodying such reciprocating partitions is illustrated in Figs. 9 and 10. In these figures, Q indicates a supply-chamber, having an inlet branch  $q$ , and  $Q'Q''$  are two delivery or filtered-liquid chambers having a common discharge branch or main  $q'$ . These chambers are arranged in the same relation as the corresponding chambers of the first-described apparatus, but are rectangular instead of circular and semicircular.

$R R'$  are two oblong filtering-partitions interposed between the opposing open sides of the supply and delivery chambers and having a longitudinal series of filtering-blocks  $r$ . The partitions are considerably longer than the supply and delivery chambers, so that more or less of their area is at all times outside of the chambers. In the construction illustrated in the drawings each partition has six filtering-blocks and the supply and delivery chambers are of sufficient length to accommodate two adjacent blocks of the partitions at a time, as seen in Fig. 9. The partitions may be guided between antifriction-rollers  $r'$  and slowly shifted endwise, first in one direction and then in the other, by any suitable actuating mechanism for presenting different blocks successively to the chambers. In the use of this modified apparatus two of the filtering-blocks are always in service, while the remaining ones are exposed outside of the supply and delivery chambers and subjected to the cleaning action of the brushes  $N'$  in the manner described in connection with the first-mentioned apparatus.

I claim as my invention—

1. A pressure-filter, comprising supply and delivery chambers open at their opposing sides and closed on all other sides, and a movable filtering-partition interposed between the opposing open sides of said chambers and arranged partly inside and partly outside thereof, substantially as set forth.

2. A pressure-filter comprising supply and delivery chambers open at their opposing sides and closed on all other sides, a movable filtering-partition interposed between the opposing open sides of said chambers and arranged partly inside and partly outside thereof, and cleaning means for the partition arranged outside of said chambers, substantially as set forth.

3. A filter, comprising a supply-chamber, a delivery-chamber, an interposed filtering-partition exposed to both of said chambers and arranged partly inside and partly outside thereof, the partition being movable past the chambers for successively bringing different

portions thereof opposite the same, and means external to said chambers for treating the partition with an aerating or sterilizing agent, substantially as set forth.

4. A filter, comprising liquid supply and delivery chambers open at their opposing sides, an interposed filtering-partition arranged partly inside and partly outside of said chambers, the partition being movable past the chambers for successively bringing different portions thereof between the same, and a supply-chamber for a sterilizing agent arranged adjacent to the exterior portion of said partition, substantially as set forth.

5. A filter, comprising a liquid-supply chamber, a liquid-delivery chamber, an interposed filtering-partition arranged partly inside and partly outside of said chambers, the partitions being movable past the chambers for successively bringing different portions thereof opposite the chambers, means arranged on one side of the partition for treating the exterior portion thereof with a gaseous agent, and means arranged on the opposite side of the partition for cleaning said exterior portion, substantially as set forth.

6. A pressure-filter, comprising supply and delivery chambers open at their opposing sides and closed on all other sides, and a rotary filtering-disk interposed between said chambers and bearing with its flat sides against the opposing faces of the chambers, the disk being arranged partly inside and partly outside of said chambers, substantially as set forth.

7. A filter, comprising a supply-main, a delivery-main, alternating supply and delivery chambers connected with said supply and delivery mains, respectively, and movable filtering-partitions arranged between said opposing supply and delivery chambers and extending outside thereof, substantially as set forth.

8. A filter, comprising alternating supply and delivery chambers open at their opposing sides, the supply chambers being provided with alining supply nipples or branches located at one side of the apparatus, and delivery-chambers having similar alining discharge-nipples located at another side of the apparatus, each of said sets of chambers also having nipples which alternate with and form continuations of the nipples of the other set of chambers, and a movable filtering-partition arranged between each pair of supply and delivery chambers and extending outside thereof, substantially as set forth.

9. A filter comprising segmental supply and delivery chambers arranged side by side, a rotary filtering-partition arranged between said chambers and extending outside thereof, and a segmental sterilizing-chamber arranged adjacent to the portion of said partition located outside of said supply and delivery chambers, substantially as set forth.

10. A filter comprising segmental supply and delivery chambers arranged side by side, a rotary filtering-partition arranged between said chambers and extending outside thereof, a segmental sterilizing-chamber arranged adjacent to one side of the exterior portion of said partition, and cleaning means arranged to act upon the opposite side of said exterior portion, substantially as set forth.

11. A filter comprising alternating circular and semicircular sections arranged side by side and containing alternating supply and delivery chambers of segmental form, the end sections and the central section of the series containing delivery-chambers and the sections intermediate of the end and central sections containing supply-chambers, rotary filtering-partitions interposed between opposing supply and delivery chambers and arranged partly inside and partly outside thereof, and means for rotating said partitions, substantially as set forth.

12. A filter comprising a series of sections arranged side by side and containing alternating supply and delivery chambers which are open at their opposing sides, and movable filtering-partitions interposed between the open sides of said supply and delivery chambers and arranged partly inside and partly outside thereof, said sections being provided adjacent to the exterior portions of said partitions with sterilizing-chambers which are open on the sides facing the partitions, substantially as set forth.

13. A filter, comprising a series of sections arranged side by side and containing alternating supply and delivery chambers which are open at their opposing sides, movable filtering-partitions interposed between the open sides of said supply and delivery chambers and arranged partly inside and partly outside thereof, said sections being provided adjacent to the exterior portions of said partitions with sterilizing-chambers which are open on the sides facing the partitions, and cleaning-brushes acting on the exterior portions of the partitions, substantially as set forth.

14. In a filter, the combination with a supply-chamber and a delivery-chamber, said chambers being open at their opposing sides, of a rotary filtering-partition interposed between said chambers and arranged partly inside and partly outside thereof, and a driving-shaft arranged crosswise of the partition and having an actuating-wheel which engages with the edge of the partition, substantially as set forth.

15. In a filter, the combination with a supply-chamber and a delivery-chamber, said chambers being open at their opposing sides, of a rotary filtering-partition interposed between said chambers and having circumferential grooves, the partition being arranged

partly inside and partly outside of said chambers, and a driving-shaft having flanged wheels engaging with the grooved edge of the partition, substantially as set forth.

16. In a filter, the combination of a liquid-chamber having an open side, and a filtering element applied to said open side and provided with a yielding packing strip or tongue bearing against the opposing edge of the chamber and having its rear side exposed to the fluid-pressure in the chamber, whereby the strip is forced against the chamber by said pressure, substantially as set forth.

17. A filter, comprising a supply-chamber and a delivery-chamber, said chambers being open at their opposing sides, and a filtering-partition interposed between said chambers and provided on opposite sides with yielding packing strips or tongues bearing against the opposing faces of the chambers and having their rear sides exposed to the fluid-pressure in the chambers, substantially as set forth.

18. A filter, comprising a supply-chamber and a delivery-chamber, said chambers being open at their opposing sides, and a filtering-partition interposed between said chambers and provided with yielding packing strips or tongues bearing against the opposing faces of the chambers and having portions thereof separated from the partition by intervening liquid-channels which communicate with said chambers, substantially as set forth.

19. A filter, comprising a supply-chamber and a delivery-chamber, said chambers being open at their opposing sides, and a filtering-partition interposed between said chambers and provided with yielding packing strips or tongues bearing against the opposing faces of the chambers, said strips being secured at one edge to the partition and recessed at their rear sides to form liquid-channels, substantially as set forth.

20. A filter, comprising a supply-chamber and a delivery-chamber, said chambers being open at their opposing sides, and a filtering-partition interposed between said chambers and provided with yielding packing strips or tongues bearing against the opposing faces of the chambers, said strips being secured at one edge to the partition and recessed on their rear sides to form liquid-channels and provided with longitudinal grooves for increasing their elasticity, substantially as set forth.

21. A filter, comprising a segmental supply-chamber and a segmental delivery-chamber, said chambers being open at their opposing sides and closed on all other sides, and a rotary filtering-partition arranged between said chambers and provided at its sides with yielding annular packing strips or tongues, substantially as set forth.

22. A pressure-filter comprising supply and delivery chambers open at their oppos-

ing sides, and a movable filtering-partition interposed between the open sides of said chambers and having a series of filtering cells or panels separated by impervious members, said partition being arranged partly inside and partly outside of said chambers, substantially as set forth.

23. A filter comprising a supply-chamber, a delivery-chamber, and an interposed movable partition arranged partly inside and partly outside of said chambers and having cells or panels of filtering material and impervious cut-off members separating the panels and cooperating with the opposing faces of said chambers, substantially as set forth.

24. A filter comprising a supply-chamber, a delivery-chamber, and an interposed movable partition arranged partly inside and partly outside of said chambers and having cells or panels of filtering material and impervious cut-off members bounding the cells or panels and cooperating with the opposing faces of said chambers, substantially as set forth.

25. A filter comprising sections containing supply and delivery chambers which are open at their opposing sides, a movable partition interposed between said chambers and arranged partly inside and partly outside thereof, said sections being provided at the ends of their chambers with cut-off faces or cheeks and the movable partition having a series of filtering cells or panels and impervious division members separating the panels and ar-

ranged to bear against said cheeks, substantially as set forth.

26. A filter, comprising a supply-chamber, delivery-chambers arranged on opposite sides of the supply-chamber, filtering-partitions interposed between opposite sides of the supply-chamber and the delivery-chambers, and means for tying the partitions together, substantially as set forth.

27. A filter, comprising a supply-chamber, delivery-chambers arranged on opposite sides of the supply-chamber, filtering-partitions interposed between opposite sides of the supply-chamber and the delivery-chambers and having laterally-extending lugs, and tie-bolts connecting the lugs of the opposing partitions, substantially as set forth.

28. A filter, comprising a segmental supply-chamber and a segmental delivery-chamber, said chambers being open at their opposing sides, and a rotary partition having sector-shaped filtering blocks or sections and yielding radial packing strips or tongues arranged at the sides thereof between adjacent blocks and bearing against the opposing edges of said chambers, substantially as set forth.

Witness my hand this 2d day of November, 1904.

WILLIAM H. DOPP.

Witnesses:

THEO. L. POPP,  
E. M. GRAHAM.

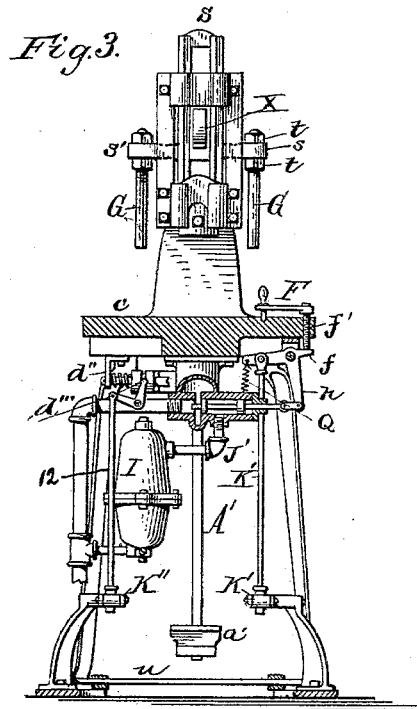
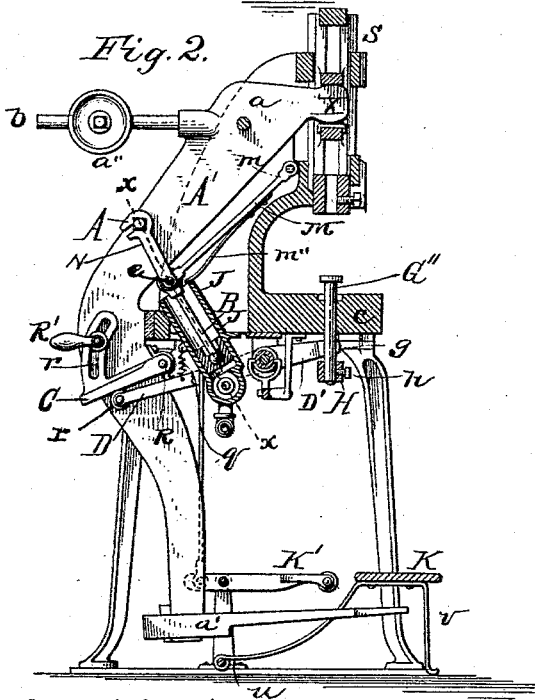
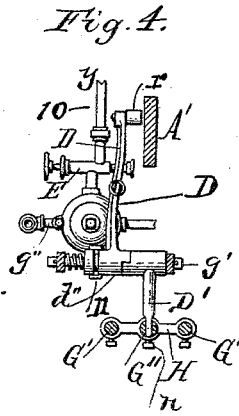
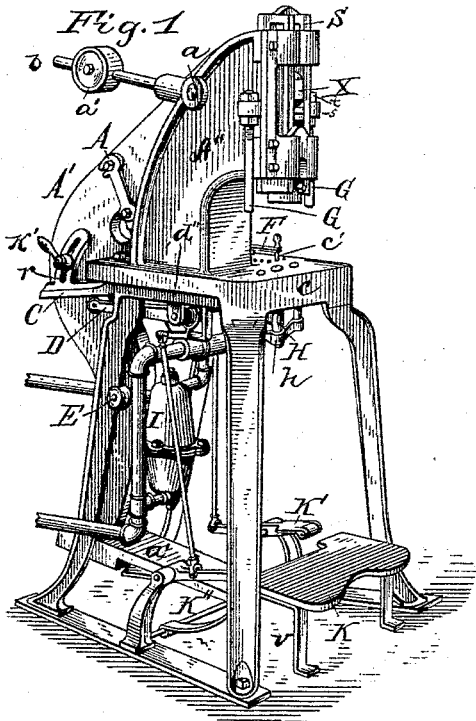
(No Model.)

2 Sheets—Sheet 1.

H. W. DOPP,  
STEAM STAMPING PRESS.

No. 414,687.

Patented Nov. 12, 1889.



*H. W. Dopp*  
*J. B. Dopp*

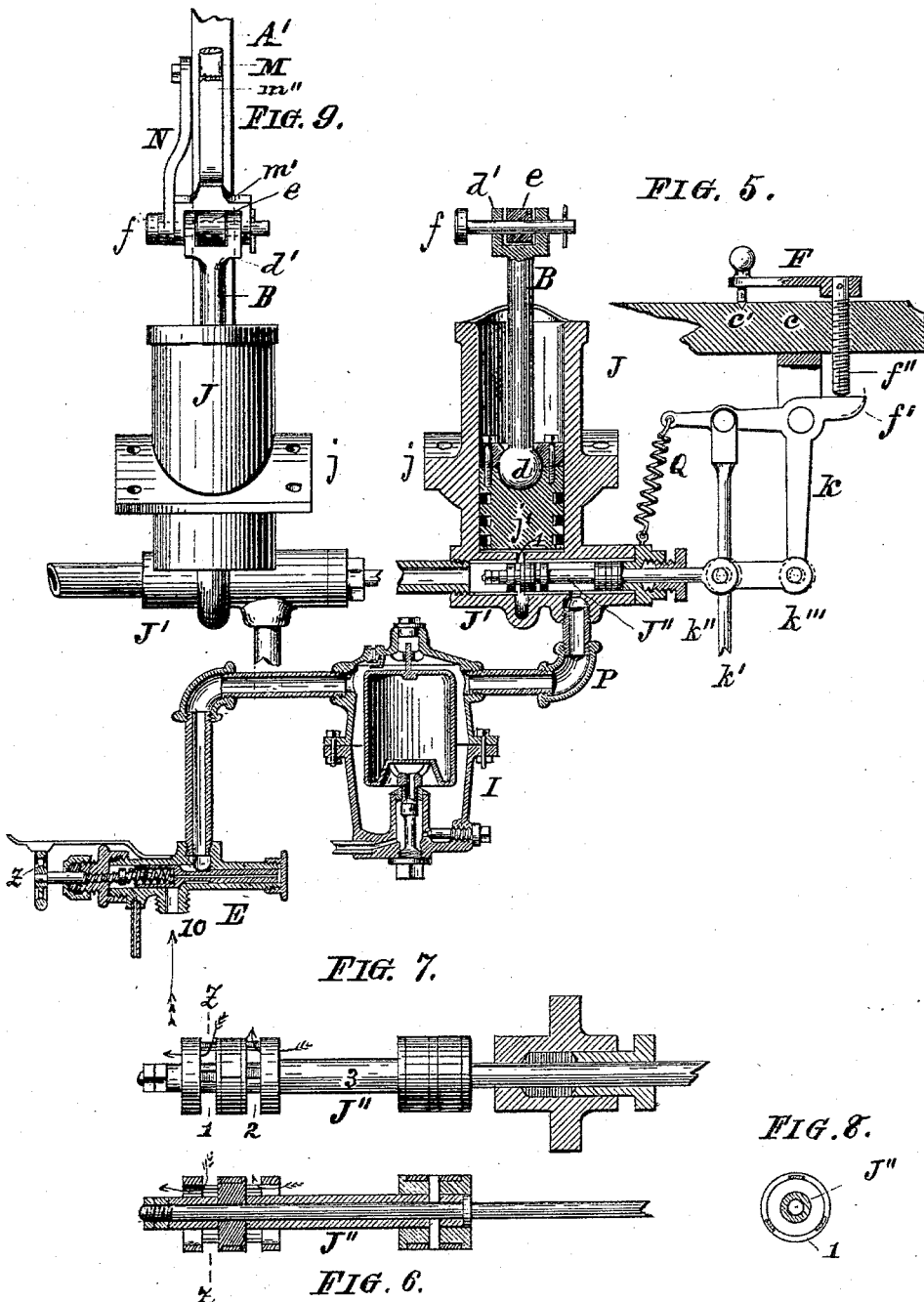
} Witnesses.

*H. W. Dopp* Inventor.

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Witnesses:  
*Wm. O. Stark*  
*Ch. Stark*

Inventor:  
*H. W. Dopp*  
 by *Michael F. Stark*,  
 Attorney.

# UNITED STATES PATENT OFFICE.

HENRY WM. DOPP, OF BUFFALO, NEW YORK; MICHAEL J. STARK AND WILLIAM H. DOPP EXECUTORS OF SAID HENRY WM. DOPP, DECEASED.

## STEAM STAMPING-PRESS.

SPECIFICATION forming part of Letters Patent No. 414,687, dated November 12, 1889.

Application filed December 1, 1887. Serial No. 256,658. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY WILLIAM DOPP, of Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Steam Stamping or Pressing Machinery for Stamping or Pressing Soaps, Metal, and the Like; and I do hereby declare that the following description, taken in connection with the accompanying drawings, forms a full, clear, and exact specification, which will enable others skilled in the art to which it appertains to make and use the same.

My present invention has general reference to combined steam and foot stamping-presses; and it consists, essentially, in the novel and peculiar combination of parts and details of construction, as hereinafter first fully set forth and described, and then pointed out in the claims.

In the drawings already mentioned, which serve to illustrate my said invention more fully, Figure 1 is a perspective view of my improved combined steam and foot power press. Fig. 2 is a longitudinal sectional elevation, and Fig. 3 a front view in vertical section. Fig. 4 is a plan of a portion of the mechanism for actuating the knock-out. Fig. 5 is a longitudinal sectional elevation through the steam-cylinder and steam-chest in line  $xx$  of Fig. 2. Fig. 6 is a plan of the balanced piston-valve. Fig. 7 is a longitudinal sectional plan, and Fig. 8 a transverse sectional elevation, of the said piston-valve. Fig. 9 is a front elevation of the steam-cylinder detached.

Like parts are designated by corresponding letters of reference in all the figures.

The object of my present invention is the production of a combined swing or pendulum foot and steam power press in such a manner that the machine can be used either as a foot-press or as a steam-power press, the steam-cylinder, piston-rod, and their connections being so arranged and disposed that the motion of the pendulum-lever is increased or decreased at certain intervals when the piston-rod in its operation acts by means of an anti-friction roller upon an inclined surface of the pendulum-lever so shaped and proportioned that the power of the steam is increased or diminished, as the exigencies of the case may

require, to deal a blow of the desired force in relation to the steam-pressure used.

Furthermore, my invention has for its object the providing of proper means of trapping the steam and ridding it of all the water of condensation prior to its entering the steam-cylinder, so that only dry steam can be supplied to the same, the admission of such steam to the trap being governed by an automatic pressure-regulator, which, when once set, will always insure a given maximum steam-pressure in the steam-cylinder, and thus a maximum blow of the press, no matter how much higher the initial steam-pressure may be than that to which said regulator is set.

The object of this invention is, furthermore, to so arrange the soap-ejecting device that it may be operated intermittently, and thus enable the operator to give any desired number of blows to the article to be stamped or pressed before the ejecting device is caused to perform its predesignated functions.

To attain these results, I construct my combined foot and power stamping-press substantially as follows:

$A''$  is the frame of any suitable stamping or punching press, having a slide  $S$ , actuated, in the present instance, by a pendulum-lever  $A'$ , fulcrumed at  $a$  in the head of said press. This lever has on its lower end a treadle  $a'$ , by means of which it is operated, a pendulum motion of said lever causing the slide to vertically reciprocate. Rearwardly-projecting from this lever is a rod  $b$ , carrying a counterpoise  $a''$ , as clearly illustrated in Figs. 1 and 2.

The parts so far described are old and well known and constitute the well-known foot stamping-press for pressing soap, punching and stamping tinware, &c., dies (not shown) being fastened to the bed  $c$  of the frame  $A''$ , and punches fitting said dies being secured to the slide  $S$  in any desirable manner.

To operate these presses requires considerable effort and muscular labor on the part of the operator, and while power-presses having crank-shafts and fly-wheels for actuating the slide are also well known, yet they are in many instances objectionable for numerous reasons, prominent of which is that the



power has to be transmitted to the press by means of shafting and belts, which are not always available and have to be procured at considerable expense. To operate such a  
 5 press by steam-power supplied to the machine by steam-pipe, steam-hose, &c., from any suitable source of steam-supply, I provide this press with a steam-motor consisting of a  
 10 steam-cylinder J, arranged underneath the bed *c*, and secured thereto by flanges *j*, Figs. 5 and 9, and suitable bolts passing through apertures in said flanges. The cylinder J is open on its upper end, and has a valve-chamber  
 15 *J'* on its lower end, said valve-chamber having a balanced regulating-valve *J''*, as hereinafter referred to.

Within the cylinder J operates a piston *j'* of suitable construction, said piston having a piston-rod B, the lower end of which is connected with said piston by a ball-and-socket  
 20 joint *d*, and the upper end of which is bifurcated at *d'* to receive an anti-friction roller *e*, which roller bears against the pendulum-lever A' at *e'*, Fig. 2, and pushes the same  
 25 away from the head when the piston rises in the cylinder, as hereinafter to be more particularly pointed out. From the fork *d'* of the piston-rod B leads a link M, Fig. 2, to a point *m* on the head, near the fulcrum *a* of the lever A', said link being pivoted to the head  
 30 at *m* and having on its opposite end a fork *m'*, Fig. 5, by means of which it is pivoted to the fork or double eye *d'* of the piston-rod, said fork *m'* straddling the fork *d'*, a bolt *f'* running  
 35 through the eyes and jointing the parts, as clearly indicated in Figs. 5 and 9. On the outside of the double eye *m'* is provided a further link N, having on its upper end a hook A, by which the pendulum-lever A' may  
 40 be connected to the piston-rod and piston. The object of this rod or link N is to prevent the lever A' from rebounding or vibrating when the press is being operated by the engine and the piston forced downward by the  
 45 reaction of said pendulum-lever assisted by the counterpoise *a''*. The object of the link M is to keep the upper end of the piston-rod carrying the anti-friction roller *e* in position, it acting as a guide, as it were, for said piston-rod. A spring *m''*, Fig. 2, secures the said  
 50 link with one end, and resting upon the upper end of the cylinder J (see Fig. 2) tends to take up backlash in the parts.

The piston in the cylinder J is actuated by  
 55 a balanced piston-valve *J''* within the valve-chamber *J'*. This piston-valve has two grooves 1 2, the latter admitting steam through the pipe P, past the valve-stem 3, into the cylinder whenever said groove 2 is brought opposite  
 60 the inlet-port 4 in the cylinder J, while the groove 1 allows of the escape of the exhaust from the said cylinder when opposite said port 4, this latter position of the valve being in all cases its normal one unless changed  
 65 by means of the actuating-treadle K', Figs. 1, 2, and 3, which treadle is connected with one arm of a bell-crank *k*, by a rod *k'*, the

other arm being connected with the valve-rod *k''* of the valve *J''* by a link *k'''*. The bell-crank has a projecting lug *f'*, Figs. 3 and  
 70 5, bearing against a set-screw *f''*, passing through the bed *c* of the press-head and having on its upper end a spring-lever F, which by means of a point *c'* engages indentations  
 75 arranged concentrically around said set-screw *f''* in the top surface of the bed *c*, the object of making the lever elastic (spring) being to enable the point *c'* to disengage the indentations, while the object of this adjusting-  
 80 screw F is to form a variable stop for the bell-crank, and through it to throttle the exhaust, so that the lever A' will return to its normal position with greater or less speed, according to the greater or less exhaust-  
 85 opening afforded by the piston-valve *J''* and a spring Q, Fig. 5, returning the parts to their normal position as soon as the treadle K' is released.

In presses used for stamping within or be-  
 90 tween male and female dies there is usually required what is called a "knock-out" to lift the work or article stamped out of the lower or female die, such being especially the case in presses used for stamping cakes or bars of  
 95 soap. The knock-out in my present device consists of one or more vertically-reciprocating rods G' G'', passing through the bed *c* of the press, said rod G'' being the principal member and having a slotted aperture with-  
 100 in which operates the head *g*, Fig. 2, of an actuating-lever D', Fig. 4. Below this slotted aperture is a yoke H, held to the rod G'' by a set-screw *h*, and having on its ends the rods G' G', securely affixed in any desirable  
 105 manner. The lever D' is loosely fitted to a shaft *g'*, Fig. 4, suitably journaled in bearings *d''* and movably connected with a further lever D, also loosely arranged upon said shaft *g'* by a clutch mechanism *d'''*, in such  
 110 a manner that by depressing the lever K'' the said levers D D' are disconnected, while a spiral spring *g''* forces the levers into connection when the said treadle is released. To the pendulum-lever A' is pivoted a bell-crank  
 115 device C, Fig. 2, at R, one member of which is slotted at *r* and provided with a handle-screw R'. The under surface of the member C is an inclined one—that is to say, when the pendulum-lever A' returns from a stroke the  
 120 under surface of said bell-crank C first reaches the extreme end of the lever D at or near the point of attachment R, and as the movement of the pendulum-lever continues the member C will move a greater or less dis-  
 125 tance over the end of said lever D, and, owing to its inclination, force the same downward, the degree of motion being governed by the inclination of the said member C, and the latter may be changed by turning the hand-  
 130 screw R' and moving the member C up or down, as the case may be, a spiral spring *q* keeping the lever D in contact with the incline C, and a roller *r*, journaled in a fork on

the end of said lever D, serving to reduce friction of the moving parts. It will now be observed that the vertically-reciprocating motion of the extreme end of the lever D causes a corresponding motion of the extreme end of the lever D', and with it of the lifting or knock-out rods G' G' G''. If it is desired to operate but one of these rods, then the set-screw *h* in the yoke H is loosened, which disconnects said yoke H, and with it the two rods G' G'.

The slide S of the press has two laterally-projecting lugs *s s'*, which are provided with pendent rods G. These rods serve as supports for long male dies, especially soap-dies, to prevent them from bending under pressure. The rods are vertically adjustable by means of nuts *tt* on top and bottom of the said lugs.

K is a foot-board pivoted to a rod *u* and provided with supporting-legs *v*. Its purpose is to serve as a rest for the feet of the operator when actuating the treadles K' and K'', and it may be swung upward and rearward out of the way of the operator whenever it is desired to use the press as a foot-press by means of the treadle *a'*.

The forward side of the pendulum-lever A' is straight from near the head X down to and beyond the point of contact with the anti-friction roller *e* of the piston-rod B when in its normal position, the center line of the cylinder J forming an obtuse angle to said forward side, as can be seen by an inspection of Fig. 2. It will therefore be observed that as the piston of the cylinder J moves outward and the pendulum-lever A' backward the point of contact *e'* of the friction-roller *e* shifts upward, and therefore decreases the long arm of a lever (of which the portion from said fulcrum to the said head X forms the short arm) and thereby increases the speed and momentum of said lever. This is a desirable feature in presses, resulting in saving of steam and a more uniform and maximum blow of the machine.

The steam used in the steam-cylinder first enters a pressure regulator or reducer E through the pipe *y*, Figs. 4 and 5. This pressure-regulator consists, essentially, of a cylindrical shell having a double piston of different area, connected so that both may act simultaneously. Steam enters the shell between the two pistons at the nipple 10, Figs. 4 and 5, and forces the larger one outward, thereby tending to close the said passage for the steam. This action of said piston is counteracted by a spring acting upon the piston, which spring may be tensioned by turning a hand-wheel affixed to the screw-spindle, as clearly shown in Fig. 5. The initial steam-pressure may therefore be reduced to any lower pressure by simply turning the hand-wheel *z*, as described, and will then remain constant as long as the tension of the spring is not changed. After leaving the pressure-

regulator the steam passes to a trap I, where it leaves its water of condensation and passes to the steam-cylinder J through the valve-chamber J''. The pressure-regulator is old, it having been used by me for several years in connection with other devices, and the trap is covered by Letters Patent No. 287,424, granted to me on the 30th day of October, 1883, to which patent I refer for a detailed description of the construction and operation of the same.

To operate the press, disconnect the piston-rod B from pendulum-lever A' by throwing back the link N with the hook A. Turn up the foot-rest K and secure it in an upright position by means of a hook or other suitable device, (not shown,) and set the die to be operated the same as in any other press. If such die happens to be a soap-die for small cakes, remove supporting-rods G G from the projecting lugs of the slide of the press and release the yoke H by turning the set-screw *h* so that the lifting-pin G'' only will be in operation. If it should be a die, say, ten inches or longer, then use the three lifting-pins G' G' G'' and both supporting-rods G G, bringing them firmly down upon the die-block and securing them to the lugs of the slide by the lock-nuts. Now adjust the knock-out by unclamping inclined arm C and setting it so that it will lift the lower die-block just flush with the top of mold-box when the pendulum-lever A' is in its normal position of rest. Having thus properly set the die, proceed to operate the press the same as an ordinary foot-press. To change the machine to a steam-press, turn down foot-rest K, connect link N to pendulum-lever A', and open a valve placed in the steam-pipe near the press. (Not shown.) If, now, the treadle K' be quickly depressed and released, steam will be admitted to the cylinder through the valve-chamber and force the piston outward to deliver a blow of the press, when the pendulum-lever will immediately return to its normal position by gravitation. If the blow delivered is not of the proper strength, adjust pressure-regulator E by its hand-wheel till the desired result is secured. A different adjustment will be necessary for different classes of work; but when once set the press will give the same maximum blow, no matter how high the initial or boiler pressure may be, provided only it is high enough to give a blow of the desired power. Should the pendulum-lever A' come back with too much or not enough speed, adjust by lever F till the desired result is reached. By shifting the weight *a''* the force with which the lever comes back may also be regulated.

If it is desired to give the article to be stamped several blows without lifting it out of the die, operate treadle K'', which will disconnect the ejecting device until the treadle is released and the two levers D D' clutched, as heretofore described.

Having thus fully described my invention, I claim as new and desire to secure to me by Letters Patent of the United States—

1. In steam stamping-presses, the combination of a frame, a pendulum-lever, the slide operated thereby, a steam motor operating said pendulum, and means whereby the steam may be admitted to said motor independently of the motor mechanism, as set forth.

2. In steam stamping-presses, the combination of a frame, a pendulum-lever, the die-carrying slide operated thereby, a steam-motor operating said lever in one direction only, and means whereby the steam may be admitted to said motor independently of the motor mechanism, as set forth.

3. The combination, in steam stamping-presses, of a frame, a pendulum-lever, the die-carrying slide operated thereby, a steam-motor operating the pendulum in one direction only, and means, as described, whereby the steam may be cut off and the pendulum allowed to return to its normal position by gravity, as set forth.

4. In stamping-presses, the combination, with a frame and slide, of a lever actuating said slide, a steam-motor operating said lever in one direction only, and a valve operated by mechanism and a treadle entirely independent of the press and motor mechanism, as set forth.

5. In stamping-presses, the combination, with a frame, of a slide, mechanism for operating the same, a knock-out mechanism, and means, substantially as described, for engaging and disengaging the said knock-out mechanism with the mechanism operating said slide, as set forth.

6. In stamping-presses, the combination, with the pendulum-lever A', of the cylinder J, piston j', swiveled piston-rod B, and link N to detachably connect said piston with the pendulum-lever, as set forth.

7. In stamping-presses, the combination, with the pendulum-lever A', fulcrumed in the press-frame, of the steam-motor, the valve-chamber having the valve actuated by the treadle, rod, and bell-crank connected therewith, as set forth.

8. In stamping-presses, the combination, with the frame, of the lever and slide, the steam-motor, the steam-admission valve, and mechanism for actuating said valve, consist-

ing of a treadle, rod, and bell-crank, and adjustable stop to limit the back motion of the steam-admission valve, as set forth.

9. In stamping-presses, the combination, with the valve J'', of the bell-crank k, having the lug j', the treadle having the rod K', and the adjustable stop F, as stated.

10. The combination of the cylinder J, piston j', piston-rod B, having yoke d', friction-roller e, pendulum-lever A', and the link N, as set forth.

11. The combination, with the cylinder J, of the piston j', piston-rod B, and the link M, pivoted to said rod at one end and to the frame at the other end, as set forth.

12. The combination, with the cylinder J, of the piston-rod B, roller e, link M, pivoted to said rod with one end and the frame with its other end, and the link N, hooked to the pendulum-lever A', as set forth.

13. The combination, with the pendulum-lever, of the adjustable inclined guide thereon, the knock-out bar or bars, and the lever actuated by said adjustable guide, as set forth.

14. The combination, with the pendulum-lever, of the adjustable inclined guide thereon, the knock-out bars, and the jointed levers actuated by said inclined guide, as set forth.

15. The combination, with the inclined guide on the pendulum-lever, of the jointed levers operating the knock-out bars, and mechanism, substantially as described, for engaging and disengaging the jointed levers, as set forth.

16. The combination, with the lever A', having the adjustable inclined guide, of the levers D D', secured together by clutch mechanism, as stated, consisting of the forked bell-crank engaging the lever 11, rod 12, and treadle K'', as set forth.

17. The combination, with the levers D and D', of the clutch d''', as described, said lever D being movably affixed to the shaft g', and caused to slide into and out of contact with the lever D' by the treadle, rod, and forked bell-crank, as set forth.

In testimony that I claim the foregoing as my invention I have hereto set my hand in presence of two subscribing witnesses.

H. WM. DOPP.

Attest:

C. BAER,  
CONRAD L. BAER.

(No Model.)

2 Sheets—Sheet 1.

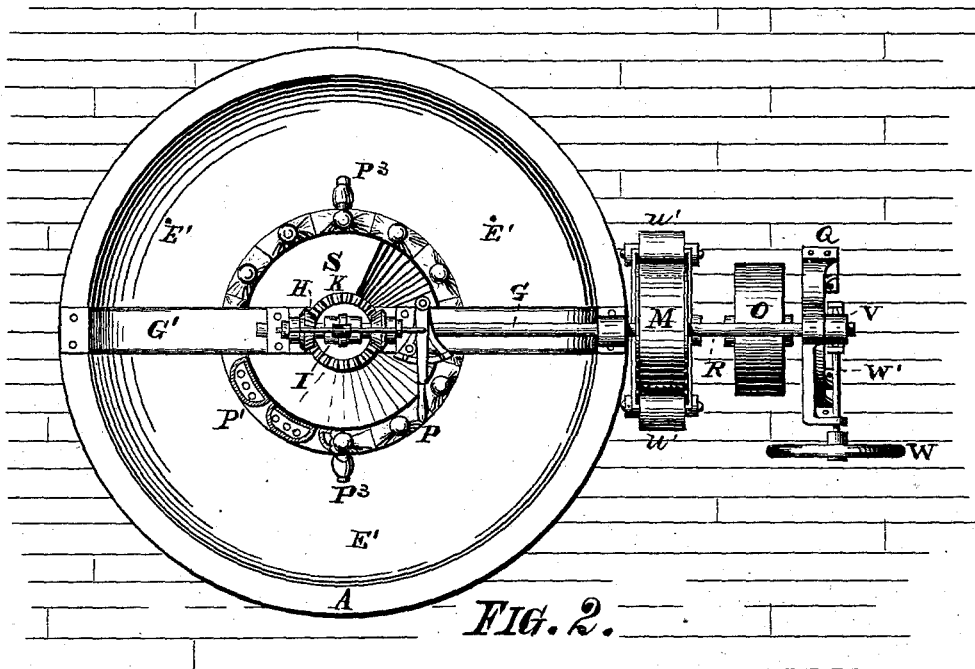
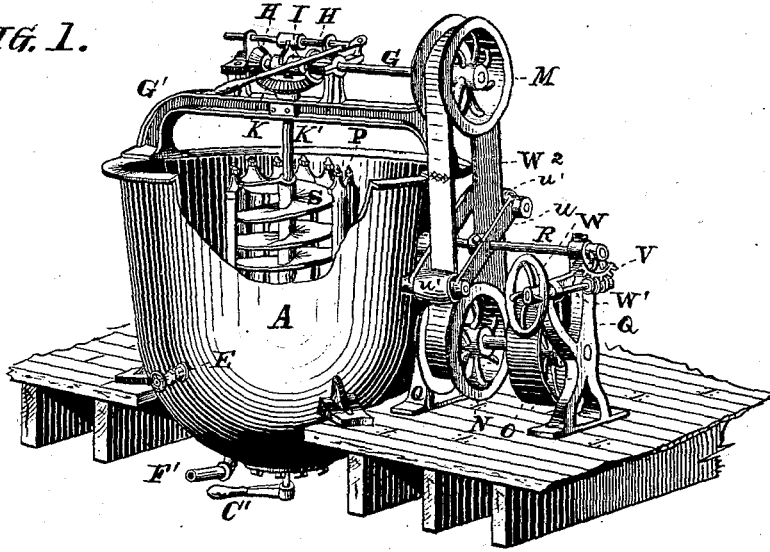
H. W. DOPP.

SOAP REMELTING AND CRUTCHING APPARATUS.

No. 285,736.

Patented Sept. 25, 1883.

FIG. 1.



Witnesses:

*Michael J. Black*  
*Willie C. Stark*

Inventor:

*H. W. Dopp*

(No Model.)

2 Sheets—Sheet 2.

H. W. DOPP.

SOAP REMELTING AND CRUTCHING APPARATUS.

No. 285,736.

Patented Sept. 25, 1883.

FIG. 3.

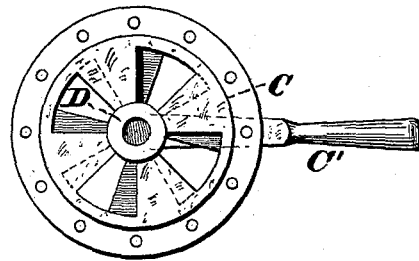
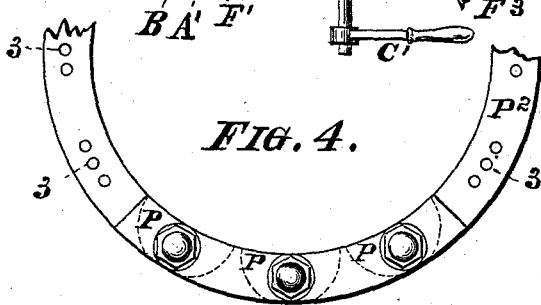
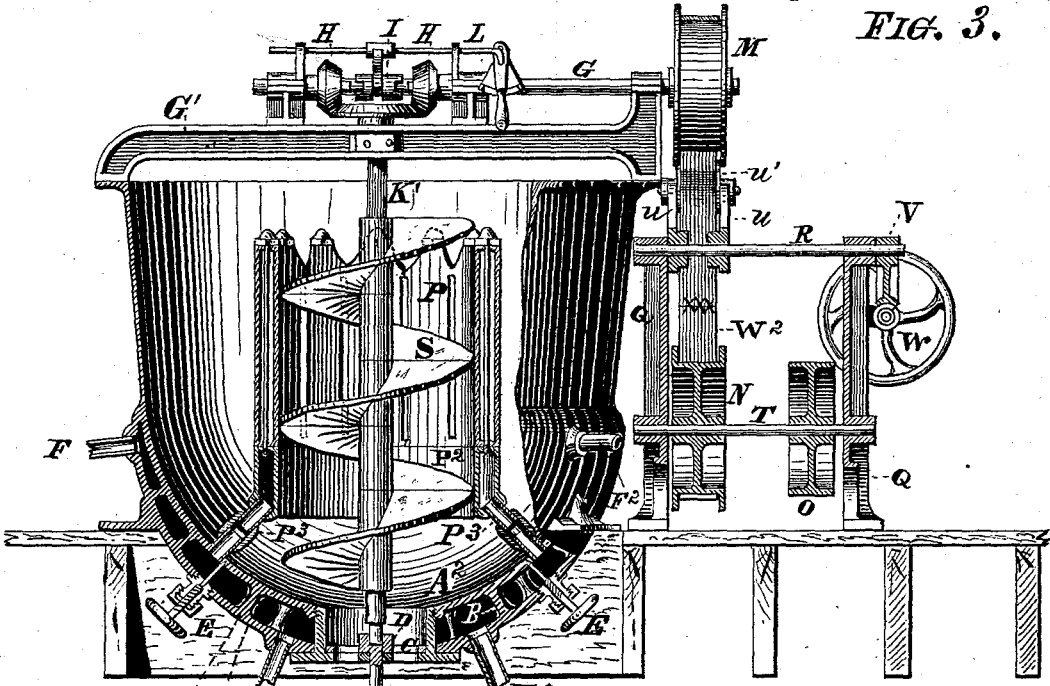
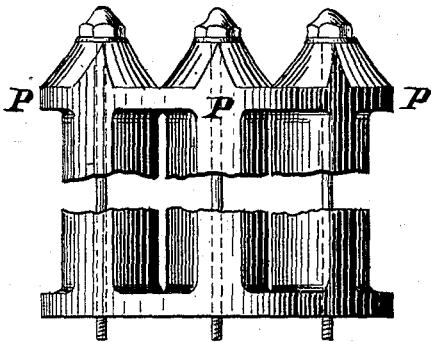


FIG. 6.



Witnesses: FIG. 5.

*Michael Stark*  
*Willie O. Stark*

Inventor:

*H. W. Dopp*

# UNITED STATES PATENT OFFICE.

H. WILLIAM DOPP, OF BUFFALO, NEW YORK.

## SOAP REMELTING AND CRUTCHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 285,736, dated September 25, 1883.

Application filed March 23, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, H. WILLIAM DOPP, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Soap Remelting and Crutching Apparatus, and for the use of rendering purposes; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

The nature of my invention consists in the construction of an apparatus designed for various purposes—such as rendering and refining tallow, lard, or the like; for the manufacture of soap by the so-called "cold process;" for the manufacture of washing compounds, washing-crystals, &c.; for transforming old soap scraps into new soap by agitating the same when in process of remelting and steaming, and for many other purposes. I refer to the annexed specification and two sheets of drawings, with letters of reference marked thereon, which illustrate and explain my invention more fully.

Figure 1 is a perspective view of my apparatus as set up for use, having a section cut out for illustrating the agitating device, composed of a radiator of upright pipes, P, arranged in a circular line, in the center of which is placed a conveyer-screw, S. The whole is secured within the center of a steam-jacketed kettle, A. Fig. 2 is a plan view of my apparatus shown in Fig. 1. Two of the radiating-pipes (marked P') are shown in section. The radiating-pipes are arranged so as to leave a space of about five-eighths of an inch between each of them, the purpose of which will be hereinafter more fully explained. Fig. 3 is a partial perpendicular sectional cut through the center. Fig. 4 is a plan section of the lower portion (marked P<sup>2</sup>) of the radiator, to which pipes P are secured by means of bolts running through their center and screwing into the base of P<sup>2</sup> at holes marked 3. The remaining holes are for the steam communication to pipes P'. P<sup>2</sup> is constructed in shape of a hollow ring, and is secured, by means of four hollow studs, P<sup>3</sup>, (see Figs. 2 and 3,) in the center of the jacketed steam-kettle, to the

inner shell, leaving sufficient room between the bottom or inner shell, B, of the steam-kettle A and the lower portion of the radiator-rising P<sup>2</sup>, so that the conveyer may be easily fed when the screw is set in motion. A supply of steam is constantly conveyed from the jacket part of the kettle through the hollow studs P<sup>3</sup> into the radiator P<sup>2</sup> P. Fig. 5 is a perpendicular view of three of the radiator-pipes P. They are cast in one piece. Four of these complete a full circle. Fig. 6 is a plan view of a register discharge-valve. It is secured in the center of the kettle A and passes through the inner and outer shells, A<sup>2</sup> and A', as plainly illustrated in Fig. 3. The conveyer screw-spindle K' has its step D in center of said valve.

A is a steam-jacketed kettle.

A' is the steam-jacket, surrounding the inner shell, A<sup>2</sup>. These terminate into one shell at the upper portion of the kettle.

Between the jacket and the inner shell are a number of stays, B B, cast together with the jacket and inner shell, so as to secure strength to the jacket and to cause the jacket to convey some heat over to the inner shell, and therefore utilize the heat of the steam more fully.

C is a register-valve passing through the jacket A and screwing into the inner shell, right in the center of the kettle, as seen in Fig. 3. The step D for the spindle of conveyer-screw S is arranged in the center of register-valve.

E E are four screw-valves screwed into the steam-jacket A. They have their valve-seats at E' in the shell A<sup>2</sup>, at which place a hole for each valve is drilled in and through said shell and tapered out on the side next to the valve-spindle E. The spindles are turned taper, so as to fit close into said tapered holes E'. The object of said arrangement is to enable the passing of steam with pressure out of the jacket into the inner part of kettle A. When the valves E E are opened, the steam passes out with force in shape of jets. These jets are used for rendering and deodorizing purposes, for heating water quickly, or other like substances, when it is desired to be done faster than it could be by means of the steam-jacket alone.

F is a gas-pipe of one inch in diameter, through which steam is led into the steam-jacket from an ordinary steam-boiler.

F' is the discharge-pipe for the condensed water.

F<sup>2</sup> and F<sup>3</sup> are pipes of same size as F F'. They may be used, in connection with cold water, for cooling purposes after steam has been used. Either of these pipes are closed or shut with respective valves that are not shown here. When the kettle is used for cooling, the steam and discharge pipe F F' are to be closed. Cold water is then let into the jacket and radiator P through pipe F<sup>3</sup> and escapes through pipe F<sup>2</sup>.

G is a shaft, having its bearings on a bracket, G', which runs across the center and top of kettle A, to which said bracket is secured, as seen in Figs. 1, 2, and 3. Said shaft is provided with two bevel-pinions, H H, and a movable clutch, I, which causes either one or the other of the pinions H H to run in the direction of the shaft G, or to set both of them free or at rest when shaft G is in motion.

K is a bevel-wheel, into which match the bevel-pinions H H. Said bevel-wheel K is fitted and keyed onto the end of the conveyer-screw spindle K'. The whole arrangement is for the purpose of transmitting motion to the conveyer-screw, and to make it turn either right or left, as may be desired.

I is the clutch-shifting rig.

M is a pulley secured on shaft G.

N and O are pulleys like pulley M. They are secured on a shaft, T, which has its bearings in bracket-stands Q Q, as plainly illustrated in Figs. 1 and 3.

R is a shaft having its bearings in top part of bracket Q Q. To said shaft R are secured two double levers, *u u*, and a worm-wheel segment, U.

*u'* are two friction-rollers, arranged in the end of levers *u u*, where they have their bearings. (See Fig. 1.)

W is a hand-wheel secured to a shaft provided with a worm-screw, W'. Said shaft is secured in bearings arranged on brackets Q Q, so as to make connection with the worm-wheel segment U, as seen in Fig. 1. The whole of this arrangement is designed to produce more or less friction upon the belt W<sup>2</sup> by means of the friction-rollers *u' u'*, so that the pulley M, shaft G, &c., may be driven fast or slow, or be put at rest by reducing the pressure upon the belt W sufficiently so that it will slip and not drive the machinery any longer. It will be observed that by manipulating the worm-and-wheel arrangement when motion is conveyed by means of a belt to pulley O any desired speed may be obtained.

It may be observed that the mechanical devices may be materially changed and still obtain the result that my invention has in view. So, for instance, a coiled pipe could substitute the radiator P; or a jacketed cylinder, made either in segments or in a whole, may to the full extent perform the radiating purpose. In

place of the conveyer-screw a series of inclined blades or buckets, of screw shape, secured to spindle K', will answer the purpose of agitating and cutting soap scraps in the process of remelting. Furthermore, a steam-jacketed cylinder may be placed in a horizontal or vertical position, or the like, with an agitating arrangement inside the cylinder, and the application of a steam jet or jets, described under letters E E E' E', would certainly produce within a little longer time a like result, as is the object of my invention.

The object of shaping the radiator P at its upper end similar to a picket-fence is to facilitate the process of remelting by shearing and cutting up the soap scraps and chunks. Be it observed that when the conveyer-screw, blades, or buckets are in motion, revolving within the stationary radiator, passing the ports left between the pickets, they will act as shears, and any coarse scraps or chunks brought up by the conveyer-screw, inclined blades, or buckets, if such be used in place of the screw, will pass through these ports, and if met by the blade or screw will become cut up. The same follows to some extent by the arrangement of leaving the radiator-pipes P' apart, as before mentioned. Furthermore, the object of leaving the radiator-pipes P', or their substitutes, separate is to enable to work successfully much smaller quantities than the machine is designed for, and to produce by the centrifugal force of the screw, or its substitutes, a lateral current besides the upward and downward current. This adds largely to speeding the process of mixing or agitating the materials placed within the apparatus for that purpose; besides, it obviates the splashing of the liquid soap, or the like, which so frequently happens with other soap-mixing machines, even when running at a moderate speed.

To operate my machine for rendering purposes, fill the kettle up to the top with suets, turn on steam conveyed from an ordinary steam-boiler, and as soon as sufficient of the suet is melted give slow motion to the conveyer-screw by means heretofore described. The melted lard or tallow may be drawn off from time to time with a siphon or a faucet, that is to be placed into the side of kettle A at sufficient height from the bottom, so as to guarantee that nothing but the pure lard or tallow will be drawn off from the same. Said faucet is not shown in drawings. The scraps of the suets and the salt-water, which is frequently used for purifying the melted lard or tallow, which will settle at the bottom of the kettle, are to be drawn off through the outlet register-valve C by operating the handle C'.

For making new soap, washing compounds, &c., put fats, oil, or the like, into the kettle A. Melt the fats or heat up the oils to the desired temperature. Then put the agitator to work. Now add the necessary amount of alkali and other articles desirable, and as soon as the whole mass has become what is desired turn off the steam and turn on the cold water

to circulate through the jacket and radiator, so as to cool the contents of the kettle in a short time. The conveyer-screw is to be kept in motion. When the desired low temperature is reached, essential oils or other ingredients may be added, and when sufficiently mixed draw off through the valve C by operating handle C'.

For remelting soap scraps, fill the kettle A well with soap scraps and turn on steam, as before mentioned. Cover the top of kettle with two semicircular wooden covers. Now open valves E E, so that the steam with pressure, in shape of jets, will penetrate and cut up the scraps to some extent. In course of from ten to fifteen minutes set the agitator in motion, add more scraps until the kettle is filled up again, and cover the kettle, as before, and let the steam-jets work, as before, until the soap has attained the required amount of moisture. Now shut off the valves E E and keep the agitator at work until the soap has reached the perfection of new soap. By this process fourteen hundred to sixteen hundred pounds of soap can be worked over into new soap, ready for framing, in the space of twenty to thirty minutes. The soap is to be drawn off through valve C, as before mentioned. The motion of the conveyer-screw should be reversed and reduced to a moderate speed, so as to cause the thick soap to be forced downward and out through the valve C.

Be it observed that whenever steam is turned on (steam is used in jacket B) the outlet of the condensed water must be left open to some extent, so as to allow the condensed water a free discharge from the jacket. An automatic device may be applied to answer this purpose

fully, for which I have made application, and which is now pending before the Patent Office. 40

Having thus fully described my invention and the operation thereof, I beg leave to state what I desire to claim as new and useful and to be granted to me in Letters Patent.

1. In combination with a steam-jacketed kettle, pan; tub, or the like, a radiator, P, inclosing a conveyer-screw, S, or its equivalents, arranged in the center of a steam-jacketed structure, for purposes specified, or substantially the same. 45 50

2. With an agitator provided with a surface-heating device or devices, and in no other way, the moistening of the ingredients contained in said agitator by the introduction of saturated steam, for the purposes heretofore specified. 55

3. In combination with a conveyer-screw, or its equivalents, for agitation, a skeleton casing surrounding the screw, constructed with the view of producing, when the conveyer or agitator is in motion, a lateral and upward and downward motion to the mass agitated, as set forth. 60

4. In combination with a conveyer-screw, or its equivalents, a casing picketed either at one or at both ends, for the purposes named. 65

5. The conveyer-screw in an agitating device, for purposes specified, in combination with the two bevel-pinions H H, bevel-wheel K, and clutch I, for the purpose set forth.

6. The combination of register-valve C, step D, and spindle K', as set forth. 70

H. WM. DOPP.

Witnesses:

J. H. DOPP,  
MICHAEL J. STARK.



(No Model.)

H. W. DOPP.

JACKETED STEAM KETTLE FOR RENDERING FATS, BOILING SOAP,  
AND FOR OTHER USES.

No. 287,424.

Patented Oct. 30, 1883.

FIG. 1.

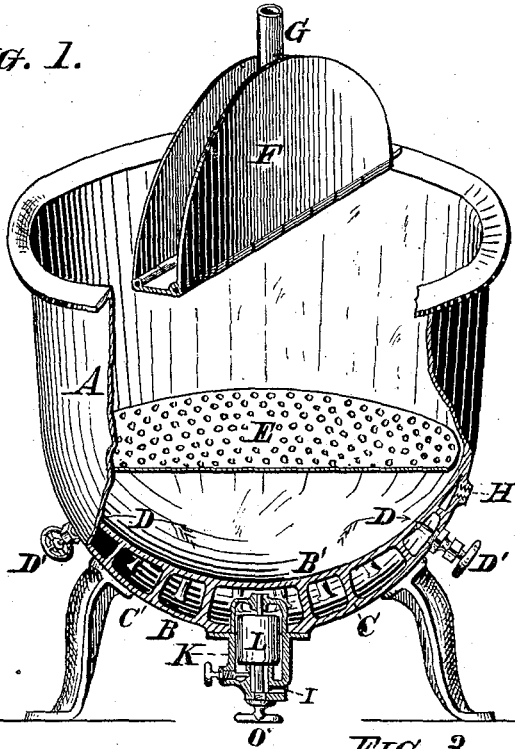


FIG. 2.

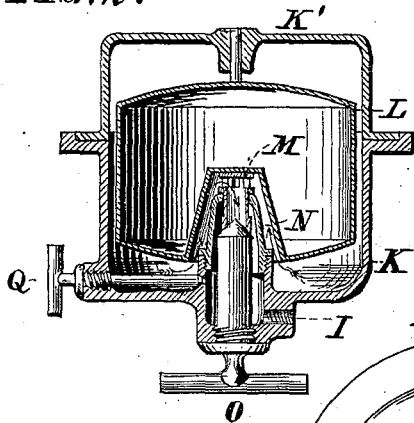


FIG. 3.

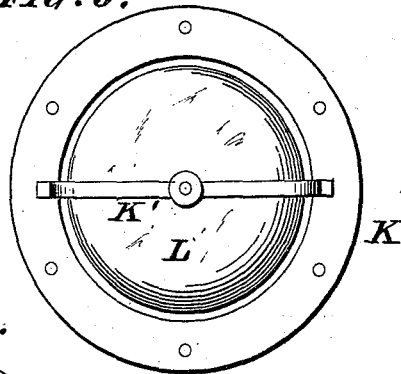
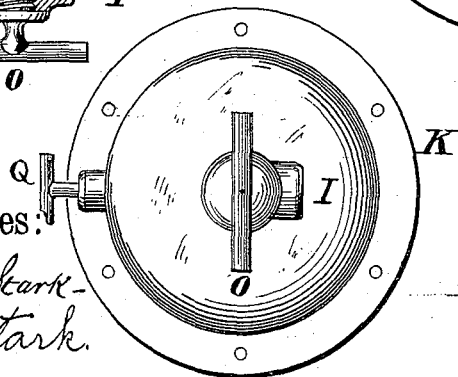


FIG. 4.



Witnesses:

Michael J. Stark-  
Willielm Stark.

Inventor:

H. W. Dopp.

# UNITED STATES PATENT OFFICE.

HENRY W. DOPP, OF BUFFALO, NEW YORK.

JACKETED STEAM-KETTLE FOR RENDERING FATS, BOILING SOAP, AND FOR OTHER USES.

SPECIFICATION forming part of Letters Patent No. 287,424, dated October 30, 1883.

Application filed April 27, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY W. DOPP, of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Jacketed Steam-Kettles for Rendering Fats, Boiling Soap, and for other Uses; and I do hereby declare that the following description of my said invention, taken in connection with the accompanying sheet of drawings, forms a full, clear, and exact specification, which will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in arranging and constructing a steam jacketed kettle, pan, tub, or the like, so as to answer various purposes, and so that the discharge of the water from the condensed steam of the steam in the jacket shall be controlled automatically at the lower part of the steam-jacket by means of a float and balance-valve.

I refer to the accompanying drawings with letters of reference and specification, which explain my invention more fully.

Figure I represents my invention in a cast-iron kettle cast in one piece, shown in a perspective view having a section cut out to illustrate the steam-jacket and parts hereinafter to be mentioned. Fig. II is a section of the automatic water-discharge of steam-jacket B. Fig. III is a plan or top view of the automatic water-discharge shown in Fig. II. Fig. IV is a plan or bottom view of the automatic water-discharge shown in Fig. II.

A is a cast-iron kettle, with steam-jacket cast in one piece, and so constructed that the appearance of the inner and outer shape of the kettle will not vary from a single shell kettle or pan, with the exception of an opening left at the bottom in the center of the outer shell for renewing a skeleton core, which is to be inserted into the mold for a jacket-kettle, so that the melted iron, when poured into the mold, will surround the skeleton core, and so form two shells that will gradually run into one shell. Be it observed that by the use of a skeleton core a number of stays or connections, C C, are produced, uniting the two shells, so as to produce a jacketed kettle that will stand a pressure of one hundred and fifty pounds with safety and with comparatively light metal.

B B' are the inner and outer shells constituting the steam-jacket.

C C are a number of stays securing strength to the jacket B B.

D' D' are screw-valves secured into the outer shell of jacket B. These valves or their valve-spindle are provided on one end with a hand-wheel, and on the other end with a conical round shape, so as to fit into conical holes drilled in and through the inner shell at D D. The object of D' D' and D D is to enable the introduction of a steam jet or jets from the jacket into the inside of the kettle or the contents thereof, for purposes hereinafter to be mentioned.

E is a perforated false bottom or diaphragm, which may be removed or introduced at pleasure. Its object is to make the kettle applicable either for boiling or steaming purposes.

F are two semicircular covers to cover the top when the kettle is used as a steamer, in order to boil several kinds of vegetables at the same time, when placed on the false bottom E, which is arranged above the steam-jets D D.

G is a pipe to carry off any surplus of steam which might be obtained.

H is the steam-inlet, steam to be introduced from a steam-boiler.

I is a hole in the bottom of casing K, through which the condensed water from the steam-jacket makes its escape.

K is a casing provided with a flange that fits onto the opening in the center of outer shell, B. Said casing incloses the automatic water-discharge, which is composed of a float, L, to which a hollow valve is attached, somewhat resembling a short tube, being perforated around its circumference at the upper end. Through these openings the condensed water makes its escape. The lower end is left open. When the valve is closed it has its seats on the cone of stem O and cap N. A valve, M, is guided by N in sliding up or down when the float rises or falls. The two bearings or valve-seats before mentioned are obtained by the combination of M, N, and O. They are of equal area, and are therefore perfectly balanced, so that there is no pressure acting upon the valve when closed or open.

K is a cross-bar secured to casing K. It serves to guide the float L when rising or falling.

O is a stem screwed through the lower body of casing K right beneath and centrally with M, N, and L. Its upper end is made conical,

so that valve M can make its seat thereon. The lower end is provided with a handle or equivalent, so that at pleasure the conical top end or valve-seat may be withdrawn from the valve, to cause the condensed water, steam, or obstruction caused by residue left from the sand-core or the like within the jacket to be blown out through the valve M and outlet I.

Q is a stem similar to the stem O. It screws into the side of lower part of casing K, and is conical at the end nearest to the stem O. The compartment inclosing stem O is drilled through in order to make an outlet for residue collected below the level-line of valve M at the bottom of casing K. Q is designed to stop up this outlet or to open the same whenever it is thought desirable. If the sediments are to be blown off in this way, they make their escape through the discharge of the condensed water-outlet at letter I.

It will be observed that no inconvenience occurs from the steam-pressure within the jacket and casing K when either of the stems O or Q is withdrawn or opened in order to get rid of the sediments that clog up the condensed-water-discharge passage. Nor will there be any annoyance of live steam constantly blowing off from the jacket, as is the case when the discharge of the water is controlled by a common faucet or valve, for no person can regulate the discharge so nicely that the jacket will not be filled with water after a while, so that a constant stream of live steam will not issue from the jacket and the steam be only partially utilized.

To operate this steam-kettle, a few words will suffice. A steam-conduit is led from a steam-boiler to make connections at letter H. Sufficient steam is turned on just to answer the

want. The discharge of condensed water takes care of itself. If the kettle is to be used for boiling water, rendering fats, boiling soap, or the like, the diaphragm E may be taken out. Should it be used as a steamer, the steam-jets D D are to be opened, &c.

Having thus fully described my invention, I wish to state that I am aware that modifications may be made without altering the nature of my invention.

What I desire to secure as new and useful to me by Letters Patent is—

1. The construction of the jacketed part of the kettle A, having stays securing the steam-jacket to the inner shell and a central opening in the bottom of the jacket, for the purpose specified.

2. The combination of a steam jacket kettle, pan, tub, or the like, with the steam-jets D D, passing from the steam-jacket through the inner shell, B, into the open kettle, for boiling, steaming, or rendering purposes, or in substance the same.

3. The combination, with a steam-jacketed kettle, of a false bottom, E, steam jet or jets D D, and controlling-valves D' D'.

4. The combination of the casing K with the jacket B.

5. The combination of casing K, float L, and valve M, with its seats N and O, to operate for purposes set forth.

6. The combination, with the valve M, the movable seat or stem O, and discharge-outlet I.

7. The combination of outlet I with valve-stem Q.

H. WM. DOPP.

Witnesses:

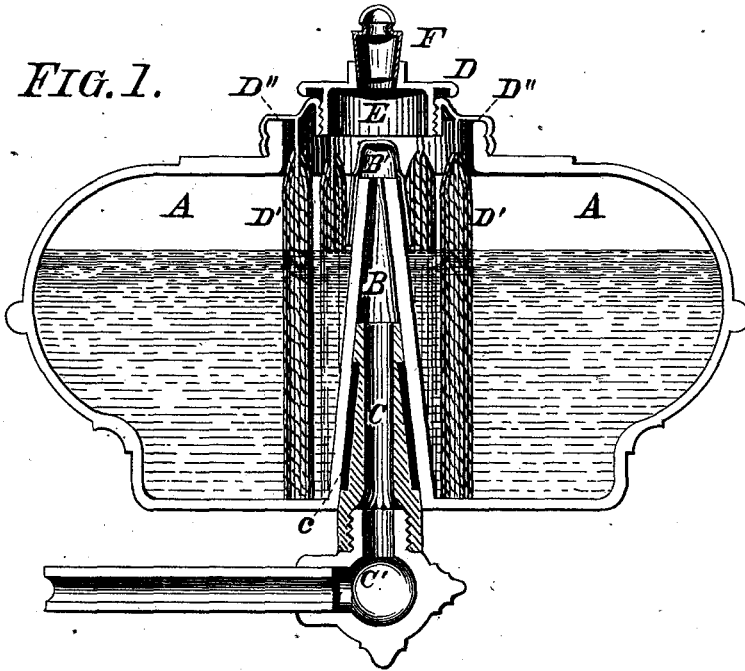
J. W. DOPP,  
WM. H. DOPP.

H. W. DOPP.

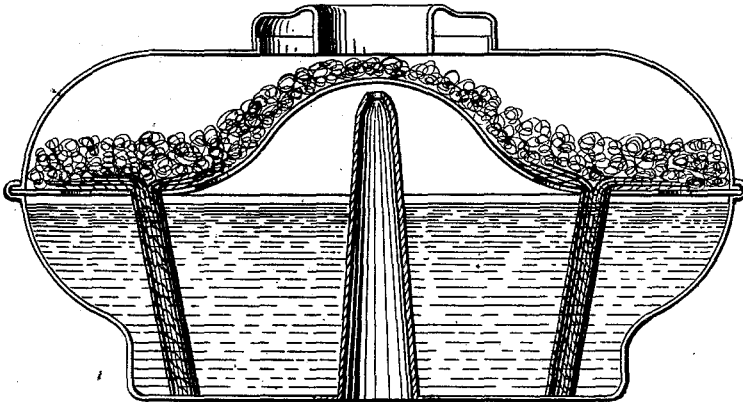
HYDROCARBON LIQUID ATTACHMENT FOR GAS-BURNERS.

No. 190,673.

Patented May 15, 1877.



*FIG. 2.*



Witnesses:

*Michael J. Stark*  
*Frank Hirsch*

Inventor:

*H. W. Dopp*

# UNITED STATES PATENT OFFICE.

H. WILLIAM DOPP, OF BUFFALO, NEW YORK.

## IMPROVEMENT IN HYDROCARBON-LIQUID ATTACHMENTS FOR GAS-BURNERS.

Specification forming part of Letters Patent No. **190,673**, dated May 15, 1877; application filed March 26, 1877.

*To all whom it may concern:*

Be it known that I, H. WILLIAM DOPP, of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements on a Hydrocarbon-Liquid Attachment to Common Gas-Burners; and I do hereby declare that the following description of my said invention, taken in connection with the accompanying sheet of drawings, forms a full, clear, and exact specification, which will enable others skilled in the art to which it appertains to make and use the same.

This invention has special reference to a hydrocarbon-liquid attachment to common gas-burners; and it consists in the arrangement, with a hydrocarbon-reservoir, having a gas-tip in its cap, of a heat-conducting device, to transport heat from the flame to an evaporator within said reservoir, whereby the evaporation of the liquid is accelerated and increased, and thereby a larger quantity of hydrocarbon-vapor mixed with common coal-gas passing through said reservoir than can otherwise be obtained.

The object of my said invention is to increase the volume of the common coal-gas, and thereby to considerably reduce the expense of burning coal-gas, as hereinafter fully set forth and explained.

In the drawings, Figure 1 is a longitudinal transverse section of my improved carbureted-hydrogen gas lamp attachment to common gas-fixtures. Fig. 2 is a modified form of the same.

A is the reservoir for the hydrocarbon liquid provided with a central tapering tube, B, made either in one piece with the body of A, or permanently affixed thereto. This body A is provided with a common lamp-collar, D, as found on all kerosene, &c., lamps, attached thereto in the usual manner, care being taken to make a tight joint to prevent the escape of gas around said collar D. The tube B is provided with a cap, B', so arranged that the gas, passing through the said tube, can readily escape without allowing liquid to enter the same when the lamp is filled, corrugations on the exterior of the tube or collar being provided for this purpose. The larger end of the

tube B is fitted with a tapering tube, C, having a screw-socket on its lower extremity for attachment to the common screw-base C' of a gas-bracket, pendant, chandelier, &c. This tube is either ground into the tube B to make a tight joint, or it is provided with a suitable packing, c, for this purpose. Attached to the collar D are a series of pendant conductors, D'', made of metal having a high heat conducting power, and they are surrounded with a liquid absorbent, D', such as cotton wicking, &c., extending down to the bottom of the reservoir A. The collar D is closed by a screw-cap, E, having centrally a preferably metallic burner-tip, F.

To operate this lamp, fill it with hydrocarbon oil to the usual height of a common lamp, and place it on a gas-fixture upon the tube C previously screwed thereon. Now, open the gas-supply and ignite the gas on the burner-tip F. As soon as the flame is burning its heat will cause the lamp collar to become elevated in temperature, and thereby to convey heat to the pendant conductors D'', which will cause the hydrocarbon liquid raised by capillary attraction of the absorbent D' to evaporate and commingle with the passing coal-gas, the volume of which is thereby increased in proportion to the evaporating capacity of the liquid absorbent and exposed surface thereof.

In Fig. 2 I have illustrated a modified form of my lamp, in which a metallic diaphragm is substituted for the metallic pendant conductors, and the liquid absorbent placed upon said diaphragm, the liquid being carried up by capillary attraction, the same as in the lamp heretofore described. In this case the body of the lamp, which, in the one shown in Fig. 1 is made of glass, should be made of metal, to conduct heat from the flame to assist in the evaporation of the hydrocarbon oil.

It is obvious that in my lamp all the hydrocarbon oils can be burned with equal facility, particularly the heavier oils, because they are readily vaporized in my lamp, on account of the introduction of heat within. These oils cannot otherwise be successfully vaporized, and my lamp is, therefore, perfectly safe and harmless as compared with others in which

only the very lightest hydrocarbon oils, such as naphtha, gasoline, &c., can be successfully converted into vapor.

Having thus fully described my invention, I desire to secure to me by Letters Patent of the United States—

1. A hydrocarbon-oil reservoir, having a gas-burner in its cap, provided with a series of pendant metallic strips attached to said burner, and surrounded by a liquid absorbent, whereby the oil is rapidly vaporized within said reservoir, substantially as hereinbefore set forth and described.

2. The combination, with a hydrocarbon-oil reservoir, of a common gas-burner and a liquid-evaporating device, arranged to effect the vaporization of the liquid within by means of conductors leading the heat from the flame to the said evaporating device, substantially in the manner and for the use and purpose specified.

3. The combination, with the cap D pro-

vided with a burner-tip, of the metallic heat-conductors D'', surrounded with a liquid absorbent, whereby the heat from the burner is conducted into the reservoir, to accelerate and increase the evaporation of the hydrocarbon liquid within, in a manner as and for the purpose heretofore stated.

4. The combination, with the tube B, of the cap B', as described, said tube or cap being corrugated, to prevent the liquid from entering said tube when the reservoir is filled without interfering with the escape of the gas from said tube B, as stated.

In testimony that I claim the foregoing as my invention, I have hereunto set my hand and affixed my seal in the presence of two subscribing witnesses.

H. WM. DOPP. [L.S.]

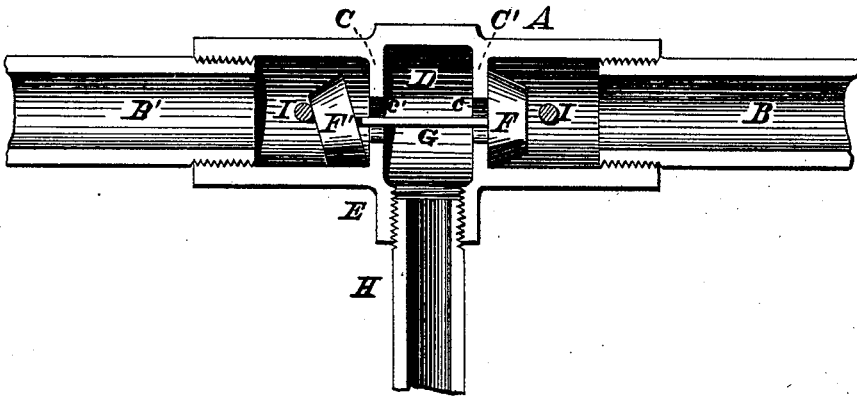
Attest:

MICHAEL J. STARK,  
FRANK HIRSCH.

H. W. DOPP.  
AUTOMATIC-CYLINDER COCKS.

No. 195,108.

Patented Sept. 11, 1877.



Witnesses:

*Michael J. Stark*  
*Frank Hirsch*

Inventor:

*H. W. Dopp*

# UNITED STATES PATENT OFFICE.

H. WILLIAM DOPP, OF BUFFALO, NEW YORK.

## IMPROVEMENT IN AUTOMATIC CYLINDER-COCKS.

Specification forming part of Letters Patent No. 195,108, dated September 11, 1877; application filed July 6, 1877.

*To all whom it may concern:*

Be it known that I, H. WILLIAM DOPP, of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Automatic Cylinder-Cocks; and I do hereby declare that the following description of my said invention, taken in connection with the accompanying sheet of drawings, forms a full, clear, and exact specification, which will enable others skilled in the art to which it appertains to make and use the same.

My present invention has special reference to automatically-acting cylinder-cocks, for continually draining engine-cylinders, &c., from the water of condensation; and it consists in the peculiar arrangement, with a cylindrical or otherwise shaped shell having two valve-seats, of two valves operating alternately to open and close communication between the exhaust side of said cylinder and the atmosphere, said valves being so arranged as to be automatically opened when not under pressure, substantially in the manner as hereinafter more fully described, and subsequently pointed out in the claims.

The drawing heretofore mentioned, to which reference is had in the following description, represents my improved cylinder-cock in a longitudinal sectional view.

A is a pipe, of any desired diameter and length, having its extremities either internally or externally screw-threaded, for attachment of the pipes B B', leading to the cylinder-heads of an engine. This pipe has, near its center, two centrally-perforated valve-seats, C C', forming between them a chamber, D, from which leads a discharge-branch, E.

Upon the seats C C' are alternately bearing two valves, F F', placed on the outer side of the seats C C'.

G is a flat bar, placed centrally into the apertures *c c'*, and made of a length slightly in excess of the distance between the seats C C'.

The branch E is either internally or externally screw-threaded, for attachment of the discharge-pipe H.

The operation of this device is as follows: The pipes B B' being connected with the respective cylinder-heads, the live steam, acting upon one side of the piston—say, that to which

pipe B is attached to the respective head—enters the pipe A and forces the valve F against the seat C', and thus closes communication between the steam side of the cylinder and the atmosphere, and opens communication with the exhausting side by the rod G pushing the valve F' from its seat, so that any condensed water will escape by being ejected through the pipe B' and discharge-pipe H. The valve F' remains open as long as the valve F is under pressure; but as soon as the piston commences its back stroke and live steam enters the pipe B', the valve F' will be forced upon its seat and push F to open communication on the then exhausting side, exactly as hereinbefore described with reference to the valve F.

In cylinder drain-cocks, as heretofore made, several serious objections exist, which have, so far as I am aware, rendered them useless in a short space of time; and these objections are, first, that when no pressure is acting upon any one of their valves—as, for instance, during temporary stoppage of the engine—that one of them having been last under the influence of live steam or pressure will remain closed, so that the water of condensation accumulating on the respective side of the cylinder cannot be all discharged when the engine starts again, and thus causes frequent and serious damages to the engine; second, that all the valves employed in such cocks are provided with guide-stems, to properly seat them, which stems, no matter how strongly they may have been made, will be fractured or severed from the disks in a very short time, owing to the momentum of the valves when seating, and thus be suddenly arrested in their motion, which momentum or inertia in the case of an engine operating under a pressure of, say, from one hundred to two hundred pounds per square inch, is actually enormous.

These two principal objections I have overcome by the peculiar construction of my valves, which consist of plain disks whose diameter is considerably less on one side than on the other, they being, in fact, a frustum of a cone whose base forms the seat. These valves bearing upon, or rather against, a vertical seat, rest upon the edge of the base, and their center of gravity being outside of the base



causes them to fall over, and thereby to remain open until a current of sufficient velocity, passing through either one of the pipes B B', causes the respective one to close.

By this arrangement both valves will open automatically as soon as released from pressure tending to close them, so that both sides of the cylinder to which my device is attached will be drained during stoppage, and the first of the above-mentioned objections avoided, while, there being no stems on my valves, they are not open to the second criticism referred to.

It will be readily observed that the principal feature of my cylinder-cock consists in the introduction of stemless valves, which are opened automatically by gravitation and closed by pressure. Such valves can be constructed in various manners, such as balls rolling down inclines when receding from their seat and forced up by pressure, or flap-valves pivoted within bearings, and having their center of gravity so located that they will travel from the seat under the influence of gravity. All such and many similar arrangements will be mechanical equivalents of my device, and answer the purpose more or less satisfactory.

To prevent my valves from falling entirely over, I place stops I a suitable distance from them, against which the valves drop.

Having thus fully described my invention, I desire to secure by Letters Patent of the United States—

1. A cylinder-cock having two valve-seats and two alternately-acting stemless valves, and the separate bar interposed between said valves, as and for the purpose stated.

2. A valve arranged to bear against a vertical seat, consisting of a frustum of a cone whose base forms the valve-seat, and whose base edge is the point of support of said valve, substantially as described, in virtue of which arrangement said valve, when not under pressure, is caused to open by gravitation, as specified.

3. As an improved article of manufacture, a cylinder-cock consisting of a suitable casing having two valve-seats, provided with valves arranged to open and close under the influence of pressure acting alternately upon them in virtue of their arrangement, and an intermediate mechanism, substantially as described, interposed between said valves, and to open automatically when pressure ceases, as and for the purpose specified.

4. As an improved article of manufacture, a cylinder-cock consisting of a suitable casing having two valve-seats, provided with valves arranged to open and close under the influence of pressure acting alternately upon them in virtue of their arrangement, and an intermediate mechanism, substantially as described, interposed between said valves, and to open automatically by gravitation when pressure ceases, as and for the purpose specified.

5. As an improved article of manufacture, a cylinder-cock consisting of a suitable casing having two valve-seats, provided with valves arranged to open and close under the influence of pressure acting alternately upon them in virtue of their arrangement, and an intermediate mechanism, substantially as described, interposed between said valves, said valves having their center of gravity located outside of their point of support, in virtue whereof said valves will open automatically when pressure ceases, substantially as and for the purpose specified.

6. The cylinder-cock hereinbefore described, consisting, essentially, of the pipe A, having the two seats C C', valves F F', arranged to open automatically, when not under pressure, by their own gravity, and the discharge-pipe E, as stated, as and for the purpose mentioned.

7. A cylinder-cock, substantially as heretofore described, consisting, essentially, of the pipe A, having the seats C C' and the valves F F', arranged to open automatically when not under pressure, as and for the purpose stated.

8. The combination, with the pipe A, having the double valve-seats C C' and the branch E, of the valves F F' and the pins I, said valves being arranged with capability of automatically opening when not under pressure, as and for the purpose stated.

9. The combination, with the two vertical valves F F', of the separate bar G, as stated.

In testimony that I claim the foregoing as my invention I have hereto set my hand and affixed my seal in the presence of two subscribing witnesses.

H. WM. DOPP. [L. s.]

Attest:

MICHAEL J. STARK,  
FRANK HIRSCH.

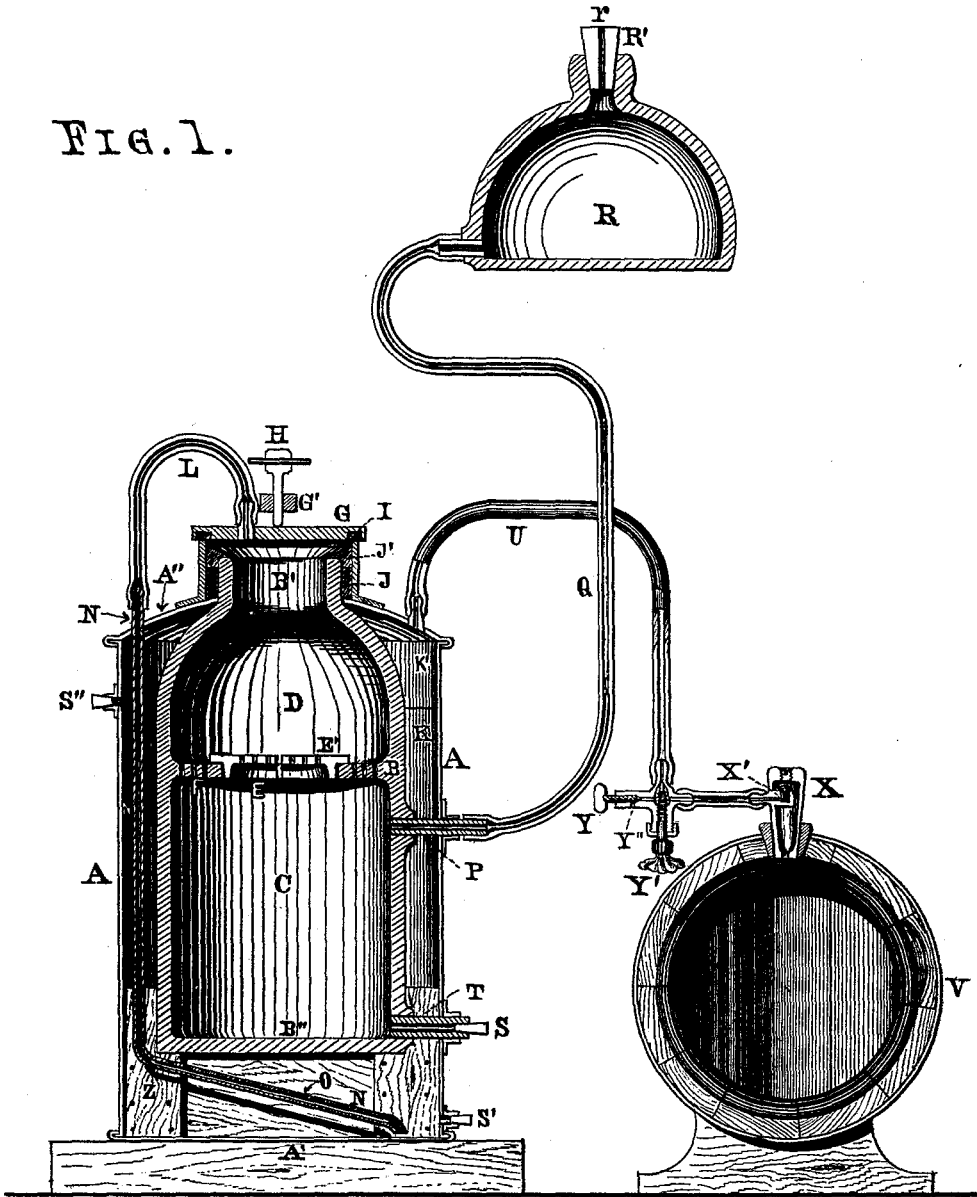
H. W. DOPP.

CARBONIC-ACID GAS GENERATOR.

No. 175,342.

Patented March 28, 1876.

FIG. 1.



WITNESSES:

*Michael J. Stark.*

*Frank Nirsch.*

INVENTOR:

*H. William Dopp.*

H. W. DOPP.

CARBONIC-ACID GAS GENERATOR.

No. 175,342.

Patented March 28, 1876.

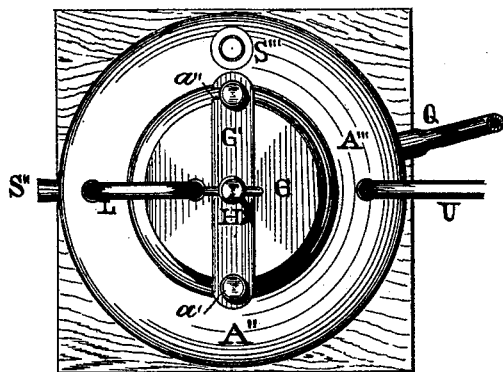


FIG. 2.

FIG. 3.

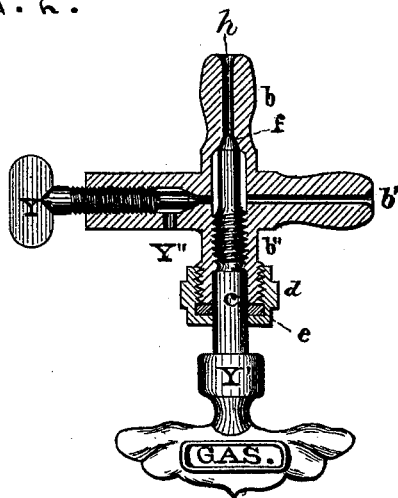
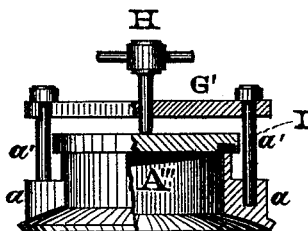


FIG. 4.

WITNESSES:

*Michael J. Stark*  
*Frank Nirsch*

INVENTOR:

*H. William Dopp*

# UNITED STATES PATENT OFFICE.

H. WILLIAM DOPP, OF BUFFALO, NEW YORK, ASSIGNOR TO DOPP MANUFACTURING COMPANY, OF SAME PLACE.

## IMPROVEMENT IN CARBONIC-ACID-GAS GENERATORS.

Specification forming part of Letters Patent No. **175,342**, dated March 28, 1876; application filed January 11, 1876.

*To all whom it may concern:*

Be it known that I, H. WILLIAM DOPP, of Buffalo, in the county of Erie and State of New York, have invented an Automatically-Operating Carbonic-Acid-Gas Generator, for preserving fermented liquors or other perishable substances; and I do hereby declare that the following description, taken in connection with the accompanying sheets of drawings, forms a full, clear, and exact specification, wherein are set forth the nature and object of my invention, and the best mode by which it is carried into effect.

My present invention relates to one of a series of improvements on carbonic-acid-gas generators with which I am at present engaged; and it consists of the arrangement of parts and details of construction, as will hereinafter more fully appear, and be pointed out in the claims.

In the annexed sheets of drawings, which form a part of this specification and illustrate my invention more fully, Figure 1 is a longitudinal sectional elevation of my improved generator and its connections and appurtenants. Fig. 2 is a plan of the generator; Fig. 3, a transverse section through its closing device. Fig. 4 is a longitudinal section through the compound valve Y.

Like letters of reference are placed on like parts in the various figures.

A is a cylindrical sheet-metal shell of proper dimensions, having the flat or slightly-curved bottom A' and the concavo-convex top A''. Within this shell is situated a compound acid and limestone reservoir, B, made of a material neutral and impervious to acids, such as glass, china, or pottery-ware, the latter being preferred on account of its cheapness. This reservoir or vessel B is of a bottle-like shape, its upper end being contracted to form the neck B'. Its vertical and horizontal dimensions are less than that of the shell A, and it is inserted therein in such manner that its neck B' passes through the centrally-perforated top A'', and its bottom be a few inches above that of the shell A, upon which it is supported by the cross-pieces or frame Z.

Within the vessel B I provide, at a proper

distance above its bottom, a perforated diaphragm, consisting of an annular collar, F, and two semicircular plates, E E', so as to divide the interior of said vessel into an acid-chamber, C, and a limestone or marble chamber, D.

The vessel B being of less diameter externally than the interior of the shell A, I obtain an annular space, K K', between these parts, and this space I connect with the chamber D by means of the flexible tube L and the pending washer-tube N.

The shell A is provided with a collar, A''', in its apex, of a diameter larger than the perforation in said top, and the neck B' of the vessel B is tightly packed therein by a rubber ring or band, J, pressed into the annular space between said neck and collar. A layer, J', of a composition consisting of asphaltum and bees-wax, or a similar compound, is poured upon this rubber ring J, to make a perfect but elastic joint.

The collar A''', and with it the vessel B, is closed by a device consisting of the lugs a on said collar, provided with screw-bolts a', extending upwardly through the transverse bar G'. Said transverse bar has on one of its ends a slot-hole, a'', and turns around the bolt a' opposite. A set-screw, H, passes through the center of said bar G', and presses upon a plate, G, resting upon the upper edge of the band A''', a rubber packing-ring, I, being interposed to make a perfect and reliable joint. To remove the plate G the set-screw H is unscrewed and the bar G' swung over.

N is the washer and conveyer-tube. It enters the annular space K K' on the top, and passes vertically downward to the bottom of the vessel B, where it has a bend, and thence inclines, traversing the space between the two bottoms radially until it reaches the bottom of the shell A. It is provided with a series of very small openings, O, in the upper side of the inclining part, arranged at suitable distance apart.

The chamber C has communication with the exterior of the shell A by the tube P, inserted into a nozzle in vessel B, and tightly fitting a like nozzle on the shell A. A flexible tube or

hose, Q, is attached to this tube P with one of its extremities, and with its other end fastened to the pressure-regulator and safety-valve R, situated above the generator.

S is a plug closing the discharge-opening of the tube T from the acid-chamber C. S' is a like device, serving to close the draw-off opening near the base of the shell A, and S'' is a gage-plug for the liquid contents of the space K K'. U is a flexible tube connecting the shell A with the vessel V through the compound valve Y and the spigot X.

The operation of my device is as follows, to wit: The apparatus being arranged as described and illustrated, pieces of limestone or marble of not too large size are placed upon the perforated diaphragm, and the cap securely fastened by the set-screw H. Now water is poured into the space K, through the feed-opening S''' in the top A'', until it flows out of the gage-opening S'', when both openings will be closed after a suitable quantity of soda is put into the water. The charge being so far advanced, the chamber C is filled with diluted muriatic acid up to the tube P, and the pressure-regulator and safety-valve R nearly full, when the apparatus is ready for action by elevating said pressure-regulator R to a height corresponding with its hydrostatic pressure, to the maximum tension which the carbonic-acid gas to be generated is to acquire. The contents of the pressure-regulator R will now pass into the chambers C and D, and there, coming in contact with the limestone or marble chips, liberate carbonic acid gas, which, ascending, will pass through the tubes L and N, and escape through the perforations O in fine bubbles. Passing through the weak solution of soda, the gas will assemble in the space K' above said soda solution, and there, as well as in the chamber D, gradually attain tension. This tension will have the effect of forcing the acid in the chamber D downward and through the tubes P and Q up into the pressure-regulator R. By the time the acid shall all have been forced back into the regulator R, that has previously entered the chambers D and C, the pressure in the chamber D will be equal to the superincumbent column of acid, and this will be kept suspended until a diminished tension of gas in the chamber D will allow the acid to enter again, and thus recommence to generate gas. As a matter of course, the apparatus will cease to generate gas as soon or soon after the acid has left the chamber D. The pressure-regulator R serves the purpose as such, and also that of a safety-valve—the first by its variable elevation above the apparatus, which will determine the ultimate and preascertainable tension of the carbonic acid gas generated in the compartment D, and that of a safety-valve by allowing the superfluous or excess of gas to escape through the tubes P and Q, and through the acid contained in said pressure-regulator R as soon as said acid has been forced back. The tube P

enters the chamber C an inch or two below the diaphragm E. This arrangement is an essential feature of my apparatus, and necessitated by the salts formed by the muriatic acid and limestone being soluble in water, which, being contained in the acid, dissolves said salts, and the resultant solution, being of a higher specific gravity than the acid, settling on the bottom of the chamber C.

With many practical trials with an acid-chamber, C, having the tube P entering near the bottom, I found that when all the acid contained in said chamber had dissolved as much of the limestone as to saturate the acid the apparatus would cease to work, although the regulator R be full of pure acid; and this was the result of the acid being lighter than the solution in the chamber C, and thereby prevented from entering said chamber.

In practice the level of the acid in the chamber C is nearly constant, the variation being very slight, and the forcing up of the said acid into the regulator may not take place for a very long space of time, so that the acid in the chamber C will become saturated and the apparatus stop its action, as heretofore explained. Furthermore, I found, when the tube P was in the bottom of the chamber C, the pressure-regulator R would not act as a safety-valve, since by the time the contents of the chamber C are forced up into the regulator R, (which takes place very slowly on account of the small tube O and the small exit in the apex of the regulator R,) the tension of the gas generated during this time would be so high as to endanger the apparatus. In this case, also, the regulator R must necessarily be of a greater capacity than the chamber C, which, in practice, is impracticable.

In order to prevent a momentary or sudden generation of gas when the apparatus has been newly charged, or a large amount of the carbonic-acid gas drawn off from the space K', the regulator R is provided with a plug, R', having a minute passage, *r*, to connect the interior with the exterior atmosphere, which has the effect of retarding the downward movement of the acid into the chamber D, and vice versa.

It will be observed that the carbonic-acid gas generated in the chamber D is led through the perforated tube N into the weak solution of soda. This I do to wash said gas and to neutralize any of the hydro-chloride vapors that may have passed over with the gas. The tube N is inclined below the bottom B'', and the perforations O commence in this tube below its bend, and stop within a short distance from its end. This arrangement I make to compel the gas to escape through all the perforations in small bubbles and at different places, according to the pressure existing on account of the superincumbent column of liquid above the inclined tube, which becomes higher as the tube N slopes, and thus offers

additional resistance to the gas. The end of the tube N is curved and open, to allow a sufficient exit in case the apparatus has suddenly been brought into action and a large quantity of gas generated in a short space of time.

The pressure of the gas in the chamber D is higher than that in the space K' to an amount equal to a column of liquid of a height of the vertical distance from the first perforation O to the surface of the liquid contents of said space K', and the gas, passing from the chamber D to the space K', must first displace the column of water in the tube N before it can escape. The difference between the pressure in the compartment D and the space K' constitutes the only internal pressure the vessel B has to sustain, and this is so little that no apprehension of breakage of said vessel need be entertained; and since the exterior shell A, which sustains all the pressure, is made accordingly, this apparatus is as safe as any designated to a purpose similar to mine.

The vessel B is provided with the perforated flange F internally, upon which the two semicircular perforated plates E E' are placed.

I devised this arrangement in order to enable the potter to properly join the two parts of which this vessel is made in the center previous to baking, which could not be done were the diaphragm made solid. In this case I would be compelled to make the vessel in two parts, and joint them with flanges and packing, or the like, which would be liable to leakage and other drawbacks, or to breakage on the slightest occasion. It is furthermore done to enable the proper cleaning of the vessel from the residue of silica precipitated from the chloride of lime. The arrangement as described is, therefore, very essential to a perfectly reliable apparatus.

The generated gas is taken from the apparatus through the tube U, compound faucet Y, and spigot X, and thus lead into the interior of the cask V, or other compartment where perishable substances are to be preserved.

If the apparatus is designed to be used in the preservation of beer or other fermented liquor on draft, which is the principal but not the only purpose to which it is adapted, and it is desired to draw liquor without the application of the carbonic-acid gas, use is made of the compound valve Y and spigot X—the former to allow the entrance of the atmosphere through the opening Y'', and the latter to prevent the exit of gas from the interior of the cask by means of the valve X' in said spigot. This valve will be opened by the atmosphere when liquor is drawn from the cask, and allow the air to enter; but as soon as the draft ceases it will drop upon its seat, and thus shut off the communication. In this case the valve Y', establishing connection with the carbonic-acid-gas generator, must be closed previous to the opening of the valve Y. This compound valve is constructed of two tubes

intersecting each other at right angles, and its arrangements are clearly indicated in Fig. 4 of the drawings, where *b* is a branch connecting with the gas-generator; *b'*, a like branch leading to the spigot X. *c* is a screw-valve, having its exterior thread engaging with a corresponding thread in the interior of the branch *b''*, on the outside of which screws a nut, *d*, having a suitable packing, *e*. The point of this screw beds into a corresponding seat, *f*, to close and open the passage *h*. The arrangement of the valve Y is similar to that of Y', except that it has no nut *d*, and that its branch has a passage, Y'', for the ingress of air.

Having thus fully described my invention, in order to enable others skilled in the art to which it pertains to make and use the same, I desire to secure to me by Letters Patent of the United States the following:

1. The combination, with the acid-chamber C and the limestone-chamber D, of the exterior closed shell A and the annular washer K K', substantially as described, for the use and purpose set forth.
2. The combination, with the vessel B, having the annular inwardly-projecting perforated flange F, of the perforated plates E E', substantially as described, for the purpose set forth.
3. The combination, with the acid-chamber C and the elevated acid-reservoir R, of the connecting-tube Q, said tube being connected with one extremity to the acid-reservoir in its lowest point, and with the other end to the acid-chamber C near its top, and immediately below the diaphragm, substantially as described, for the use and purpose set forth.
4. The combination, with the washer K K', of the pendent perforated washer-tube N, when constructed and arranged in a manner substantially as described, for the purpose stated.
5. The combination, with the shell A, of the collar A''', having the lugs *a*, provided with the bolts *a'*, cap-plate G, transverse bar G', having the slot-hole *a''*, and the set-screw H, substantially as described.
6. The combination, with a carbonic-acid-gas generator, of the connecting-tube U and the compound valve Y, having the valves Y' and Y, arranged to operate substantially as described, for the purpose set forth.
7. The combination, with a carbonic-acid-gas generator, of the tube U, compound valves Y and Y', and the spigot X, as described, for the object stated.
8. The combination, with the vessel B and the collar A''', of the flexible packing composed of the elastic packing-ring J and the upper layer of a pliable composition, substantially as described, for the purpose set forth.

H. WILLIAM DOPP.

Witnesses:

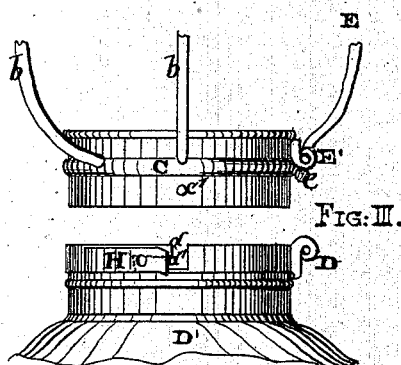
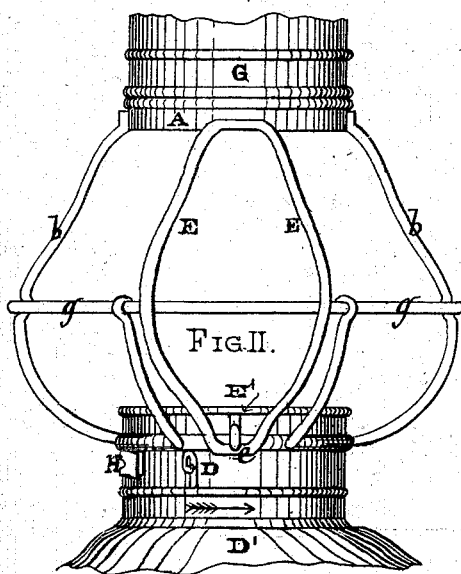
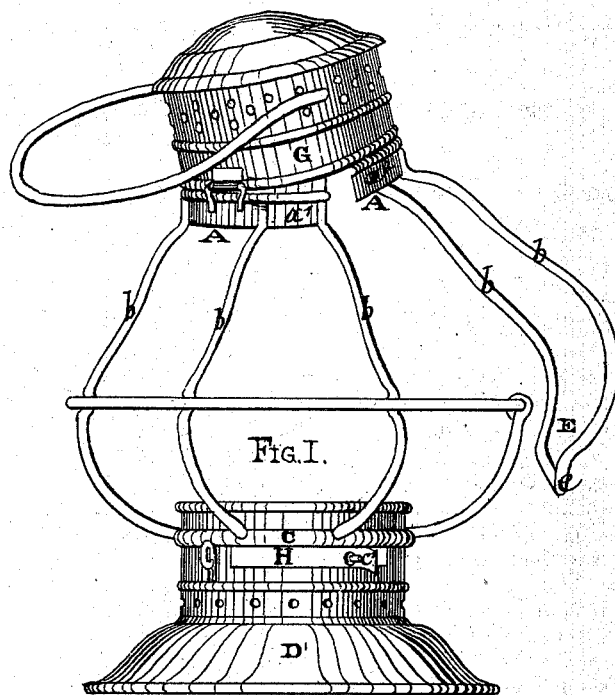
MICHAEL J. STARK,  
FRANK HIRSCH.

L. J. CARPENTER & H. W. DOPP.

Lanterns.

No. 146,379.

Patented Jan. 13, 1874.



WITNESSES

Michael J. Blank  
Pet. Mensch.

INVENTORS

Lewis J. Carpenter  
H. William Dopp

# UNITED STATES PATENT OFFICE.

LEWIS J. CARPENTER AND H. WILLIAM DOPP, OF BUFFALO, NEW YORK,  
ASSIGNORS TO HORACE PARMELEE AND WILLIAM H. BONNELL, OF  
SAME PLACE.

## IMPROVEMENT IN LANTERNS.

Specification forming part of Letters Patent No. 146,379, dated January 13, 1874; application filed  
April 4, 1873.

*To all whom it may concern:*

Be it known that we, LEWIS J. CARPENTER and H. WILLIAM DOPP, jointly, both of the city of Buffalo, in the county of Erie and State of New York, have invented certain Improvements in Lanterns, of which the following is a specification:

Our invention relates to improvements in the construction of lanterns, whereby the various parts may be readily movable, and the globe capable of being removed and replaced when desired.

In carrying out our invention according to one modification of the same, the top band or ring which surrounds and holds the globe in position is formed in two halves, one of which is secured to the upper ends of four, or other number, of the vertical wires of the lantern-guard, which at their lower ends are secured to a band or ring into which fits and rests the lower end of the globe. The other half of the top band or ring is secured to the dome of the lantern, and to it a wire is connected, which is so bent as to form a section of the wire-guard, and at the lower end to be received and held, when required, by a catch, soldered or otherwise affixed to the lower band. The dome is hinged to the half of the top band, supported by the vertical wires, and the lower band is provided with a pair of pins or studs on opposite sides capable of passing into vertical and horizontal slots in the base of the lantern, so that by placing the lower ring over the base in position for the pins to pass into the horizontal portion of the slots of the base, and turning the base or the upper portion of the lantern so that the pins may pass into the horizontal portions of the slots, the base will be firmly held to the lantern by an arrangement similar to a bayonet-joint. A spring passes over the head of one of the pins, and secures the base from being accidentally turned. Projections are formed on or affixed to the opposite sides of the base, in position to come over and lock the lower portion of the movable section of the wire-guard in position; but that our invention may be fully understood, we will proceed to

describe the same in detail by aid of the accompanying drawings.

Figure 1 shows a side elevation of our improved lantern, partly open. Fig. 2 is a different elevation of a portion of the same; and Fig. 3 represents parts separately.

A represents the top band or ring of a lantern, surrounding and holding the globe in position, which is formed in two halves,  $a^1 a^2$ . The part  $a^1$  is secured to the upper ends of the vertical wires  $b$  of the lantern-guard, which, at their lower ends, are secured to the band or ring C, in which fits and rests the lower end of the globe. The half  $a^2$  of the top band or ring A is secured to the dome G, and to it a wire, E, is connected, which is so bent as to form a section of the guard, and at its lower end  $e$  to be received and held, when required, by a catch, E', soldered or otherwise secured to the lower band C. The dome G is hinged to the half  $a^1$  of the band A, and the lower band C is provided with pins or studs  $c'$  on opposite sides, capable of passing into vertical and horizontal slots  $d d'$  in the opposite sides of the base D, so that by placing the lower ring C over the base D' in position for the pins  $c'$  to pass into the vertical portion  $d$  of the slots in the base D', and turning the base or the upper part of the lantern in the direction of the arrow in Fig. 2, so that the pins  $c'$  may pass into the horizontal portion  $d'$  of the slots, the base D' will be firmly held to the lantern by an arrangement similar to a bayonet-joint. D are projections formed on or affixed to the opposite sides of the base D' in position to come over and lock the lower end  $e$  of the movable portion E of the guard, between it and the projection E'. A spring, H, passes over the head of whichever of the studs  $c'$  may, for the time, come under it, when the parts of the lantern are put into position, thereby preventing the parts from being accidentally turned.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. A lantern, in which the top band or rim A is divided into two halves,  $a^1 a^2$ , one half,



$a^1$ , being secured to vertical guard-wires  $b$ , which, at their lower ends, are connected to a band or ring, C, the opposite half  $a^2$  being affixed to a hinged dome, G, and having applied to it a section, E of the guard, the lower end  $e$  of which is retained in position by catches D E', substantially as shown and described.

2. The combination of the ring C, studs  $c'$ ,

base D', slots  $d d'$ , spring H, and projections or catches D and E', substantially as and for the purposes set forth.

LEWIS J. CARPENTER.  
H. WILLIAM DOPP.

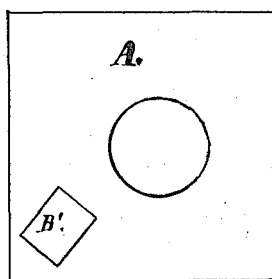
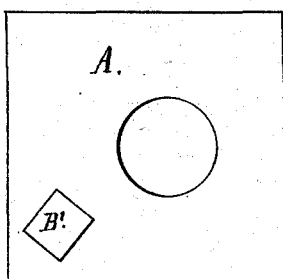
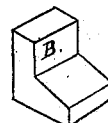
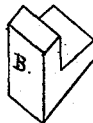
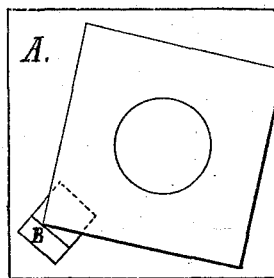
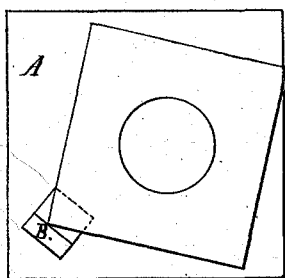
Witnesses:

MICHAEL J. STARK,  
PET. WUNSCH.

H. W. DOPP.  
Nut-Locks.

No. 142,215.

Patented August 26, 1873.



WITNESSES.

*Henry Babbitt*  
*A. T. Dopp*

INVENTOR.

*H. William Dopp*

# UNITED STATES PATENT OFFICE.

H. WILLIAM DOPP, OF BUFFALO, ASSIGNOR OF TWO-THIRDS HIS RIGHT  
TO FERNANDO C. CANDEE, OF NEW YORK, N. Y.

## IMPROVEMENT IN NUT-LOCKS.

Specification forming part of Letters Patent No. **142,215**, dated August 26, 1873; application filed  
January 8, 1873.

*To all whom it may concern:*

Be it known that I, H. WILLIAM DOPP, of the city of Buffalo, in the county of Erie and State of New York, have invented certain Improvements in Lock-Washers, of which the following is a specification:

The nature of my invention consists in the construction of a lock-washer so arranged that the same may be produced of wrought-iron, ready punched. The lock-washer consists of two parts—a plate having two holes, one in about the center for the bolt to pass through, and one on the side for the reception of a post with a foot. After the bolt is passed through the washer and the nut screwed up the post or projection is inserted into the hole or slot on the side of the plate and partly covered by the nut. Said post or projection is so shaped that if the nut is slightly turned back on the foot it will prevent the post from coming out and the nut from unscrewing. I refer to the annexed drawing, which makes part of this specification, and in which—

A represents the washer-plate, provided with two holes—one in about the center for the passage of the bolt, while the outer hole is to receive the lock-post B. This post or projection B is to be inserted after the bolt passing through the center-hole is fastened

by means of a nut. B represents the nut-locking post, which, when inserted into the hole or slot B', projects out of the same in order to prevent the nut from unscrewing. It is so shaped that when in its place the nut can pass partly over the foot so as to prevent it from coming out of its place, but still projecting sufficiently above A to answer the purpose already stated.

Be it observed that B may be of any form or shape, with the foot in a wedging shape, as illustrated in the figures of the drawing.

The object of my invention is to produce a reliable, durable, and cheap wrought-iron lock-washer to prevent nuts from turning off.

Having thus fully described my invention, I claim and desire to secure by Letters Patent the following:

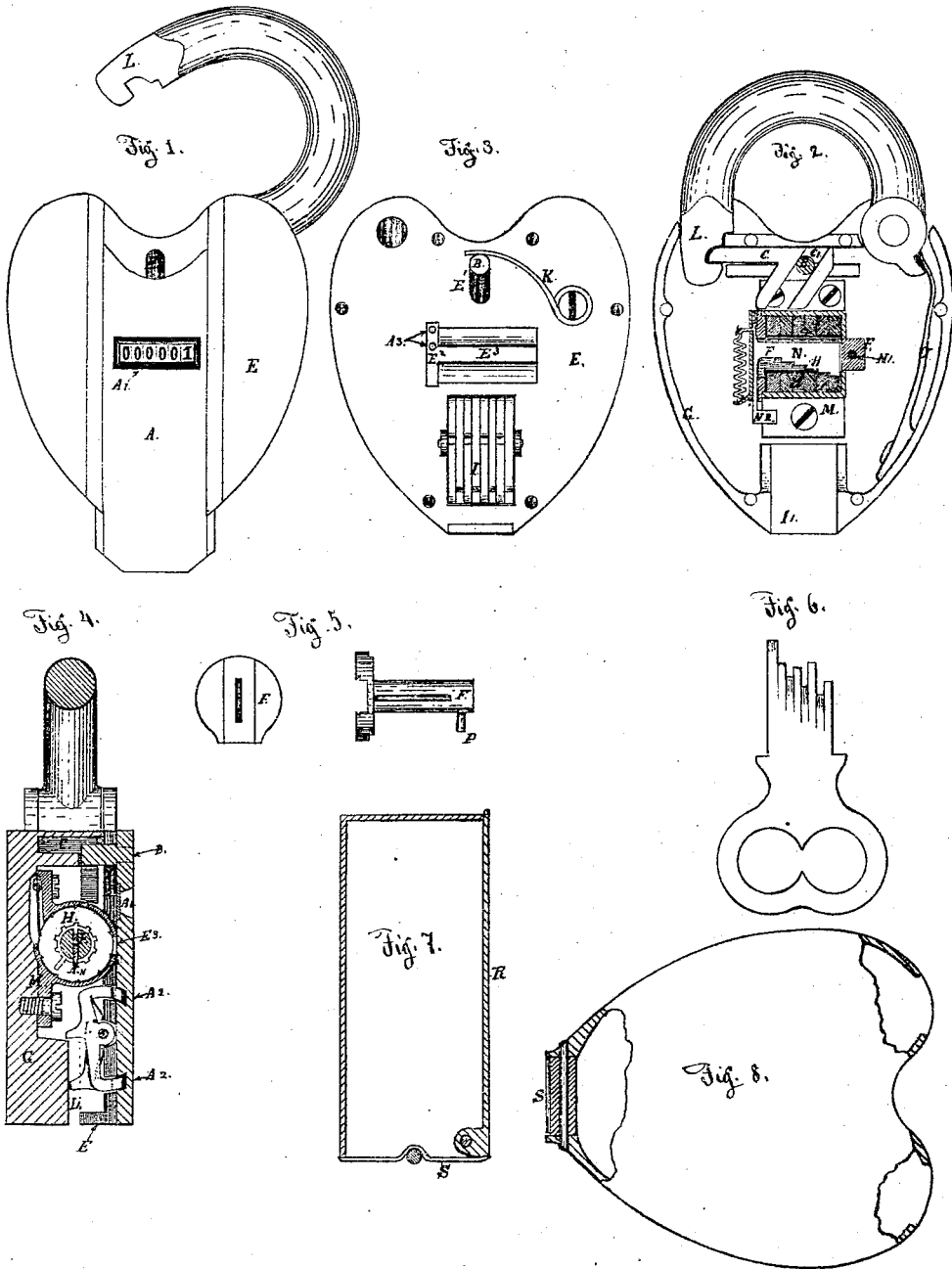
In a nut-locking device the combination of a nut-washer with a post, B, constructed as described, and inserted in a hole of said washer after the nut is screwed up, and secured in place by a slight backward movement of the nut, substantially as described, and for the purpose set forth.

H. WILLIAM DOPP.

Witnesses:

HENRY BALTHIG,  
A. F. DOPP.

H. W. DOPP.  
 Improvement in Indicator Pad Locks.  
 No. 123,558. Patented Feb. 13, 1872.



Witnesses  
 Michael J. Stark  
 J. M. Madden

Inventor  
 H. William Dopp

# UNITED STATES PATENT OFFICE.

H. WILLIAM DOPP, OF BUFFALO, NEW YORK.

## IMPROVEMENT IN INDICATOR-PADLOCKS:

Specification forming part of Letters Patent No. 123,558, dated February 13, 1872.

Specification describing certain Improvements in Padlocks, invented by H. WILLIAM DOPP, of the city of Buffalo, in the State of New York.

First, the first part of my invention consists in the manufacture of a padlock, in which is an indicator, composed of a series of rings or wheels, each of which is provided with ten figures on its periphery; and they are placed in a row, so that a number may be produced in the manner substantially as shown in the drawing. Second, in the arrangement of a slide on the face side of the lock, said slide being locked and unlocked by a series of tumblers beneath it, and engaging with the lock-bolt. Third, the casing for the padlock, as shown, consisting of a box, a hinged door or cover, and a blade-spring, arranged and operated as shown.

I refer to the annexed drawing, which explains my invention more fully, and in which like letters of reference indicate like parts.

Figure 1 represents a face view of my padlock when unlocked. Fig. 2 represents an interior view, part in section. Fig. 3 is a view of the under side of the face-plate. Fig. 4 is a vertical section. Fig. 5 is an end and side view of the register rocking shaft; said rocking shaft is provided with a slot which runs nearly through its entire length. Fig. 6 is a plan of the key. The fingers of said key are on their end alternately of wedge-shape, or so that when the key is inserted into the lock they enter beneath and wedge up their respective tumblers. The other fingers are square on their ends. Fig. 7 is a section of a metal casing, intended to inclose the padlock so as to protect it against snow, ice, &c. Fig. 8 is a front view of the same with portions of the cover removed. The cover or door R is hinged to the box part of casing, and is kept shut or open by a blade-spring, S, acting upon said hinged cover, as plainly illustrated in Fig. 7.

A is a slide plate, provided with an opening, A<sup>1</sup>, of such size as to expose one figure of each of the register-wheels or rings H. It is also provided with a pin or stud, B, which connects with the lock-bolt C by means of cam-groove C<sup>1</sup>, and two grooves, A<sup>2</sup> A<sup>2</sup>, sunk in its under side for the tumblers I to engage in. It is further provided on its under side with two pins, A<sup>3</sup>, by means of which motion is given to the rock-shaft F. Slide A is secured to the

face-plate E by means of a dovetail, in which it slides up and down. The pin or stud B, and the pins A<sup>3</sup> reach through slot-holes E<sup>1</sup> and E<sup>2</sup> in face-plate E, so as to connect with lock-bolt C and rocking shaft F. E is the face-plate or cover of the lock. It is provided with a series of tumblers, I, on its under side, which tumblers reach through two corresponding slot-holes of face-plate (Fig. 4) into the two grooves A<sup>2</sup>, thus locking A to E. The face-plate E is also provided with an opening, so as to expose a figure of each of the register-wheels or rings H; also, with a coiled spring, K, secured to a projecting stud on its under side, which spring acts on the stud B to force the slide-plate A downward as soon as it is released from the tumblers I.

It will be observed that, as the slide-plate is connected to lock-bolt C by means of the stud B and cam-groove C<sup>1</sup>, the lock-bolt C will move backward or forward whenever the plate A is moved downward or upward. When A is forced down by means of the coiled spring K, lock-bolt C withdraws out of the hook of the shackle, and the lock is unlocked; but when the slide-plate A is moved upward, the lock-bolt C will move forward, and if the shackle-hook has been inserted in the lock, bolt C will move into hook L; and the tumblers I, as soon as slide A is entirely moved up, will enter the grooves A<sup>2</sup> of slide A and remain in this locked position until the slide is released from the tumblers I by means of a key inserted in the key-hole I'. F is the register rocking shaft, which has its bearings in the register-casing M. A series of rings, H, surround said rocking shaft, as seen in Figs. 2 and 4. F is provided with a slot-hole for the reception of a sliding bar, N, and with a round hole, N', through its end for the reception of a pin, P, by means of which motion is transmitted from the slide A to the shaft F. Said pin P matches in between two similar pins, A<sup>3</sup>, secured to slide A, so that if A is moved downward and upward, they will rock the shaft F. H is a series of wheels or rings, each provided with ten square notches inside, one of which is much deeper than the rest; and with ten ratchet-notches on their periphery. Between each of these notches is stamped a figure, from 1 to 0, consecutively. Said wheels or rings H are placed into their casing M, in which they re-

volve. For every rocking motion of shaft F the unit-wheel at right hand will revolve the distance from one notch to another; the tens-wheel revolves the distance of one notch for every entire revolution of the unit-wheels; the hundreds-wheel moves the distance of one notch for every one entire revolution of the tens-wheel, and so on. M is the casing of the decimal register. An opening is cut through at E<sup>3</sup>, in Fig. 4, so as to expose one figure of each of the wheels or rings H. An opening is also cut through nearly opposite of E<sup>3</sup>, so as to expose one notch of each of the rings H. A series of small spring-pawls, one for each ring, engages with the notches on their periphery, as is plainly shown in Fig. 4. Said springs and notches serve to keep the wheels H in place. N is a sliding bar placed in the rocking shaft F, in which it slides up and down. It is kept within F by means of a cover, secured in dovetailed grooves of F, as seen in Fig. 5. A small coiled spring is secured at one end to said cover, and the other end to sliding bar N, as illustrated in Fig. 2. Said coiled spring serves to make the bar N engage with the square notches inside of wheels H, so that whenever the shaft F and bar N are set in motion, the wheel or wheels engaged with the bar N will also move.

It will be observed, first, that the shaft F receives its motion from slide plate A; second, that slide A is set in motion whenever the lock is to be locked or unlocked; third, that the shaft F, by means of bar N, engages with one or more of the wheels or rings H by means of the inside square notches; it is therefore that the register will count one for every time the lock is locked; and be it further observed, that the key, as represented in Fig. 6, is provided on its left side with a longer finger, long enough to reach projection N<sup>2</sup> of the bar N, thus disengaging N from H, so that N may engage with the next square notch in one of the rings H. The bar N is disengaged from H by means of the key, but it engages again with H at the moment the key is withdrawn and the lock becomes unlocked. So it will be seen that the register remains undisturbed during the process of unlocking; but revolves the distance of one number every time the lock is closed, although the respective number will not appear until it is unlocked again, because the slide A must be in the position shown in Fig. 1, in order to show the register; and be it further observed, that the rings H are each provided, on their inside, with nine shallow square notches and one deep square notch. Now, suppose that the whole series of wheels H are

placed so as to bring the deep notches all in one line when the register shows but naughts; the consequence will be that, on account of the step-shape of bar N, which now engages with all the deep notches, it will, by the next movement or change engage in the next shallow notch of the unit-wheel, which is at the right; but as soon as the unit-wheel makes its tenth move, N will engage the unit and tens-wheel for one move, on account of the deep notch and the step shape of N, until the unit-wheel has made another whole revolution, and so on. This applies to all of the wheels H.

O is a spring, secured to the casing G, and engages with the shackle of the lock, as seen in Fig. 2, to throw or force the hook end of shackle out of the lock whenever the lock-bolt C disengages from hook L.

In order to lock the lock, press the shackle down into the lock, and the slide A up. In order to unlock, insert the key with its long finger to the left into the key-hole I' until it comes to a stop. This disengages the tumblers from A, when the springs K and O will open the lock.

Having thus fully described my invention, what I desire to secure by Letters Patent, is—

#### Claims.

1. I claim, in a padlock, an indicator composed of a series of rings or wheels H, provided each with ten fingers on their periphery, and placed in a row, so that a number may be produced in the manner substantially as shown and described.
2. I claim, in a padlock, the combination of the register-casing M, decimal-wheels H, sliding bar N, and shaft F, as and for the purpose set forth.
3. I claim the arrangement of a slide A on the face outside of a padlock engaged with the lock-bolt C, coiled spring K, and a series of tumblers beneath it, for the use and purpose set forth.
4. I claim, the combination of slide A and coiled spring K, or its equivalent, with a decimal-register, when operated as specified.
5. I claim a decimal-indicator, in combination with the sliding bar N, and a key or equivalent, as set forth.
6. I claim a casing for padlocks, consisting of a box, a hinged door or cover, and a blade-spring, arranged and operated substantially as shown and described.

H. WILLIAM DOPP.

Witnesses:

MICHAEL J. STARK,  
JOS. W. MADDEN.

H. W. DOPP & M. J. STARK.

Hydro-Carbon Vapor Burner.

No. 124,425.

Patented March 12, 1872.

Fig. 1.

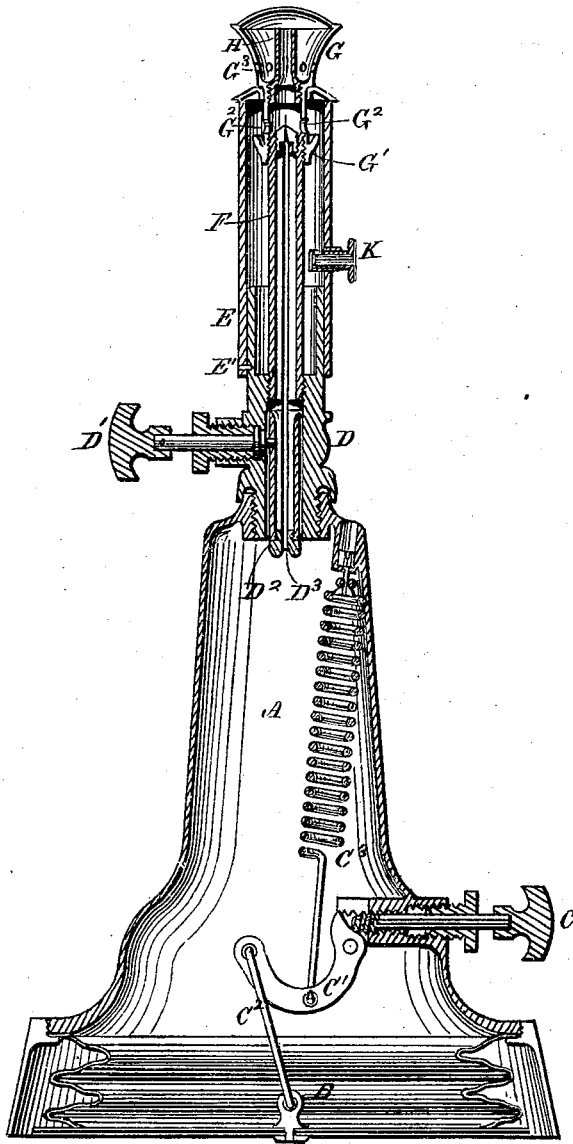
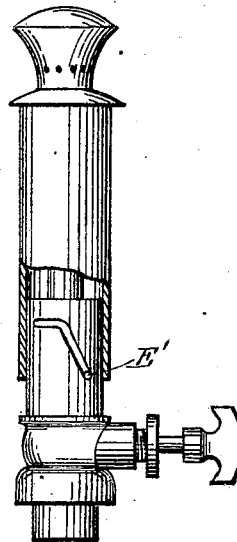


Fig. 2.



Witnesses

Wm. Sampson  
Ed. W. Lee

Inventors.

H. William Dopp  
Michael J. Stark.

# UNITED STATES PATENT OFFICE.

H. WILLIAM DOPP AND MICHAEL J. STARK, OF BUFFALO, NEW YORK,  
ASSIGNORS TO WILLIAM S. MEAD, OF NEW YORK CITY.

## IMPROVEMENT IN HYDROCARBON-VAPOR BURNERS.

Specification forming part of Letters Patent No. 124,425, dated March 12, 1872.

Specification describing certain Improvements in Hydrocarbon-Vapor Lamps, invented by H. WILLIAM DOPP and MICHAEL J. STARK, both of Buffalo, county of Erie and State of New York.

The nature of our invention consists in constructing a hydrocarbon-vapor lamp so that the hydrocarbon liquid be contained in a metal bag or a diaphragm, being constructed of one or more corrugated disks or rings, from where it is to be forced, by means of uniform power, up into generating-tube; and in providing a simple mechanism for equalizing the power aforesaid; for producing pressure from a spring; also, in constructing the burner in such a manner that the supplying and controlling of the air may be easily effected, and steady and white jet blazes be obtained.

The annexed drawing fully illustrates our invention. Figure 1 represents a vertical section of our hydrocarbon-vapor lamp; and Fig. 2 represents a perspective view of the burner, sliding tube, and faucet, with a portion of the tube broken away to show the cam-groove.

Letter A in the drawing represents a base or stand, of either metal or other suitable material. Within this stand A is placed a metallic bag, B, constructed of one or more sheet-metal corrugated disks or rings, joined in such a manner as to form a variable air-tight receptacle for the hydrocarbon liquid. It is expanded for the reception of the liquid by means of a stop-screw and handle, C, compound lever C<sup>1</sup>, and connecting-rod C<sup>2</sup>, and contracted for the discharge of the liquid by means of a coiled spring, C<sup>3</sup>, in combination with compound lever C<sup>1</sup>. It will be observed that when the stop-screw is screwed in it will strike the elbow of compound lever C<sup>1</sup> and push it forward, thereby expanding metal bag B and also coiled spring C<sup>3</sup>. D is a faucet screwed upon stand A, and serves the purpose to facilitate adjusting the jet blazes by means of a crank-shaft and handle, D<sup>1</sup>, socket D<sup>2</sup>, and needle-rod D<sup>3</sup>. E is a tube sliding up and down upon faucet D by means of a cam-groove, E', milled within the periphery of faucet D, and a pin fastened in tube E and sliding in cam E' of faucet D. F is a generating-tube screwed upon faucet D. It is provided on its upper extremity with the hydrocarbon-vapor

generator G screwed upon its outside and a plug, F', within its bore. Plug F' is bored out in such a manner as to leave an opening of such a diminished size as to be scarcely perceptible. Through this opening of plug F', and closing it up entirely, extends the point of the needle of needle-rod D<sup>3</sup>. G is the hydrocarbon-vapor generator. It is provided with the igniting-cup G<sup>1</sup> on its lower end, and also with two openings, G<sup>2</sup> G<sup>2</sup>, for the admittance of air into the generator G, to be commingled there with the vapor arising through the orifice of plug F'. H is a center tube within generator G, and is for the purpose to diminish the sound of the current of vapor in commingling with the air, and to check the commingled gases before they reach the jet-holes G<sup>3</sup> within the periphery of generator G. K is a regulator, consisting of an outer shell and a plug, said plug being open on one side, and having an outlet through its side and the outer shell. This outlet may be diminished by turning the plug. This regulator has the object to regulate the supply of air to be commingled with the vapor.

To operate this lamp the metallic bag B is expanded by means of stop-screw and handle C, the faucet D taken off, and hydrocarbon liquid poured within stand A and bag B till filled; then faucet D is replaced, and tube E lowered to expose the igniting-cup; also is stop-screw C turned back to allow spring C<sup>3</sup> to act upon bag B, and give pressure to the liquid contained therein. If, now, handle D<sup>1</sup> is turned it will draw down socket D<sup>2</sup> with the needle-rod D<sup>3</sup> attached to it, and open the orifice of plug F' sufficient to allow hydrocarbon liquid to flow out and run into igniting-cup G<sup>1</sup>. This moving of socket D<sup>2</sup> by means of handle and shaft D<sup>1</sup> is accomplished by the shaft being provided on its extremity with a pin placed so far out of the center of the shaft as to form a crank of sufficient throw to move the socket, in which the crank-pin turns in a corresponding bearing, as far down as necessary to withdraw the needle-point of needle-rod D<sup>3</sup> from plug F' enough to allow the liquid to pass through orifice of plug F' and run into the igniting-cup G<sup>1</sup>. If this liquid be ignited the flame will heat the generator G sufficiently to vaporize the hydrocarbon liquid, which vapor



will rise and, becoming commingled with the air entering openings  $G^2 G^2$ , will pass through center tube H and jet-openings  $G^3$  to burn in steady white blazes as soon as tube E is raised and the supply of air regulated by means of regulator K. In order to retain the flow of hydrocarbon liquid to the generator the needle-rod  $D^3$  is surrounded with wicking, which, when used up, may be easily removed and replaced by a new one, as the needle-rod  $D^3$  can be easily screwed out of socket  $D^2$  (needle-bar  $D^3$  having two ears similar to those of thumb-screws) and put back again. To turn off the light, may be done either by turning handle  $D^2$ , which will force the needle-rod  $D^3$  into plug  $F'$  and stop the flow of vapor, or by turning stop-screw and handle C, which will expand bag B and relieve the liquid from pressure of spring  $C^3$ . Be it observed that the hydrocarbon liquid is forced to the generator G by means of coiled spring  $C^3$  attached to lever  $C^1$  and connecting-rod  $C^2$ ; but, as this spring is of gradually-diminishing power, and as it is required to have an equal pressure acting upon the hydrocarbon liquid, the lever  $C^1$  is, in regard to this point, so constructed that the two points where spring  $C^3$  and connecting-rod  $C^2$  are connected to it bear such relation to each other that when spring  $C^3$  is gradually losing its power its point where attached to lever  $C^1$  will always travel further from the fulcrum of lever  $C^1$ , thus increasing its leverage, while the point where connecting-rod  $C^2$  is attached to lever  $C^1$  will always travel nearer the fulcrum of lever  $C^1$ , thus diminishing its leverage, and the result of this compound action will be the equalizing of the power of spring  $C^3$  when acting upon the hydrocarbon liquid. Be it further observed that the peculiar construction of bag B and its device for producing pressure within the lamp does away with the use of atmospheric pressure and such like contrivances of a very

inconvenient character for producing pressure upon the liquid within the lamp, and that, although being very simple in its construction, it is by far superior to anything heretofore used in hydrocarbon-vapor lamps.

*Claims.*

Having thus fully described our invention, what we desire to secure by Letters Patent is—

1. We claim, in a hydrocarbon-vapor burner, the combination, with crank  $D^1$  and needle-rod  $D^3$ , of the socket  $D^2$ , as and for the purposes described.

2. We claim, in the construction of artificial pressure lamps, for the purpose of equalizing the power of the coiled spring  $C^3$ , acting in conjunction with the metallic bag B, to force up the liquid, the combination of the coiled spring  $C^3$ , compound lever  $C^1$ , and bag B, constructed substantially as described.

3. We claim, in combination with coiled spring  $C^3$ , lever  $C^1$ , and metal bag B, the stop-screw C, for the purpose set forth.

4. We claim, for the purpose of dispensing with the use of atmosphere confined in a bag and acting upon the surface of the liquid to be forced to the burner, &c., in combination with a hydrocarbon aero-vapor burner, a metal bag constructed of one or more corrugated disks or rings to receive the liquid, substantially as set forth.

5. The faucet D, provided with cam-groove E, in combination with the tube F, regulator K, and burner G, all constructed as described, and for the purposes set forth.

H. WILLIAM DOPP.  
MICHAEL J. STARK.

Witnesses:

WARREN LAMPMAN,  
EDWARD LEE.

W. R. SHAW.

Improvement in Lubricators.

No. 131,570.

Patented Sep. 24, 1872.

Fig. 1.

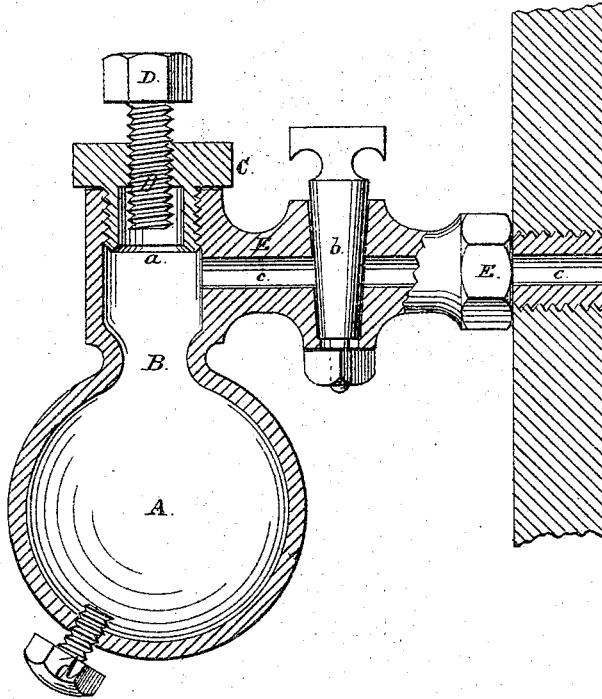
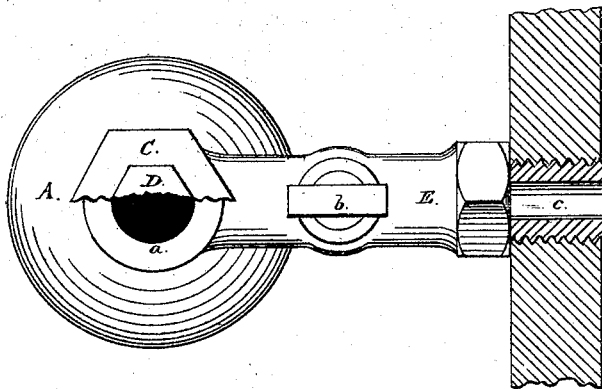


Fig. 2.



Witnesses

H. W. Dopp.  
Michael J. Stark

Inventor

Wm R. Shaw

# UNITED STATES PATENT OFFICE.

WILLIAM R. SHAW, OF BUFFALO, NEW YORK, ASSIGNOR TO HIMSELF,  
PETER EBY, AND ANNA WILSON, OF SAME PLACE.

## IMPROVEMENT IN LUBRICATORS.

Specification forming part of Letters Patent No. **131,570**, dated September 24, 1872.

*To all whom it may concern:*

Be it known that I, WILLIAM R. SHAW, of Buffalo, in the county of Erie and State of New York, have invented certain Improvements in Lubricators, of which the following is a specification:

The nature of my invention consists, first, in the manner in which the lubricant is stored and carried to the places of lubrication; second, in the simplicity of construction, all parts being of easy access and control; third, in the economy and certainty of its action.

I refer to the accompanying drawing, with letters of reference marked thereon, which makes part of this specification and explains my invention more fully.

The drawing represents my automatic continuous lubricator in a partial section and in a plan view.

A is a globe or chamber having a neck, B, which is fitted with a screw-head, C. Said screw-head C is provided with a screw-plug, D, fitting screw-head C, and leaving a cavity, *a*, in the bottom of same, as shown. Attached to the side of neck B is a projection or shank, E, which screws into a steam-chest, pump, or other part where lubrication is to be applied. Said shank E is provided with a stop-cock, *b*, to stop lubrication whenever desirable; it is, however, not a necessary part in the construction of my lubricator, but a mere matter of convenience. *c* is a channel running throughout the entire length of shank E, terminating in cavity *a* of neck B, as plainly shown. *d* is a plug for drawing off the condensed water and residue of the lubricant absorbed.

The operation and action of the above-described apparatus are as follows: The screw-head C is taken out and globe A filled with oil, tallow, or like; the plug D is then set to regulate the flow of oil. The cavity *a*, by being made larger or smaller, causes the oil to flow in a larger or smaller quantity, as here-

inafter described. The head C is then inserted and the stop-cock *b* opened, which allows the steam to pass into the neck B, and, condensing there, continually falls down upon the oil, and of course sinks to the bottom, thus displacing its equal in oil, which causes the oil to rise and gradually flow through channel *c* into the steam-chest, where it becomes heated by steam, converting it into a vapory state, and, commingling with the steam, is carried to all the parts to be lubricated.

The steam passing through the channel *c* into the cavity of neck B and cavity *a* does not interfere with the flow of oil through channel *c*, because steam, being of much less density, by enlarging the cavity *a* a greater volume of steam is condensed, because the volume and radiating surface of cavity *a* is increased, and in consequence a larger and continual flow of oil is obtained.

### *Claims.*

Having thus fully described my invention, I desire to secure by Letters Patent—

1. In combination with the head C, with or without its screw-thread, the regulating-screw D, recess or cavity *a*, neck B, and globe or chamber A, substantially as set forth.
2. The globe or chamber A, plug *d* or its equivalent, neck B, head C, and recess or cavity *a*, in combination with a channel, *c*, shank or projection E, and plug *b*, as specified.
3. The regulating-screw D or its equivalent for controlling the volume of steam to be condensed by varying the size of cavity *a* and the flow of oil through the channel *c*, in combination with channel *c*, to operate as described, and for the use and purpose set forth.

WILLIAM R. SHAW.

Witnesses:

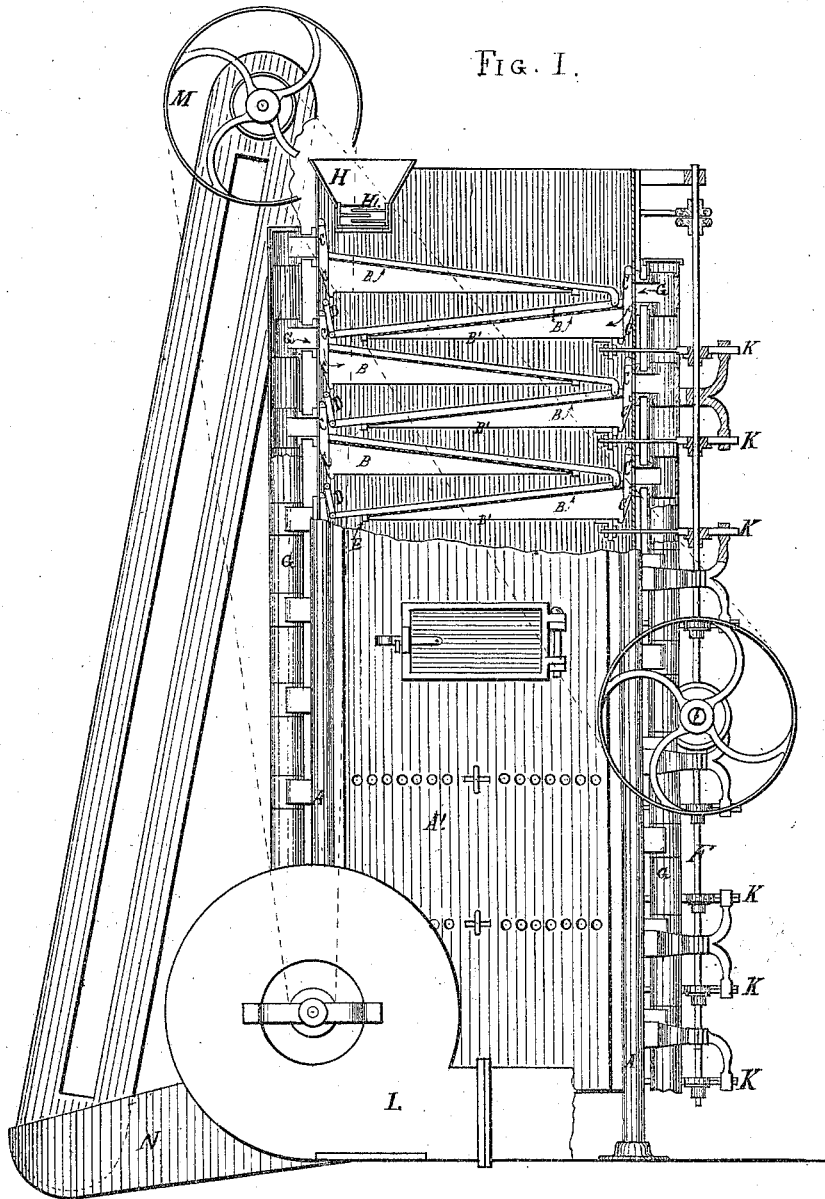
H. WM. DOPP,  
MICHAEL J. STARK.

F. H. C. MEY & H. W. DOPP.

Grain-Drier.

No. 133,590.

Patented Dec. 3, 1872.



Witnesses:

*Michael J. Stark*  
*Philip H. Gibson*

Inventors:

*Fred. H. C. Mey*  
*H. William Dopp*

F. H. C. MEY & H. W. DOPP.

Grain-Drier.

No. 133,590.

Patented Dec. 3, 1872.

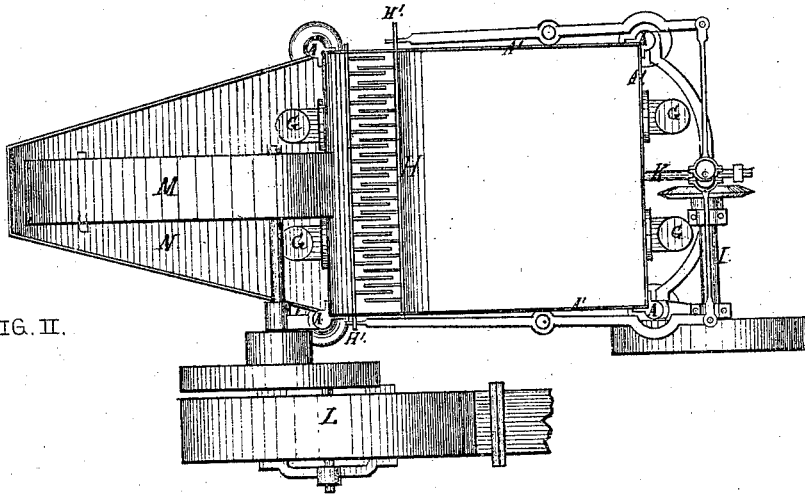


FIG. II.

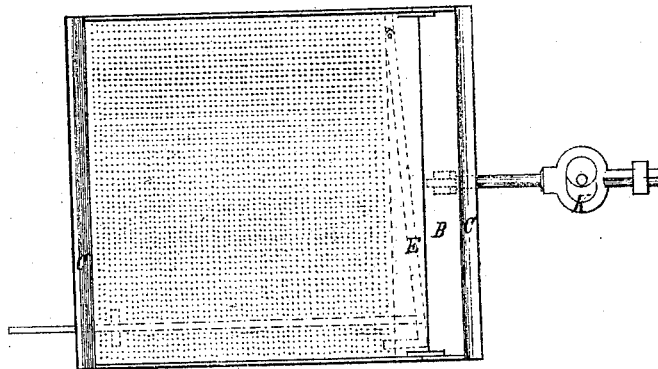


FIG. III.

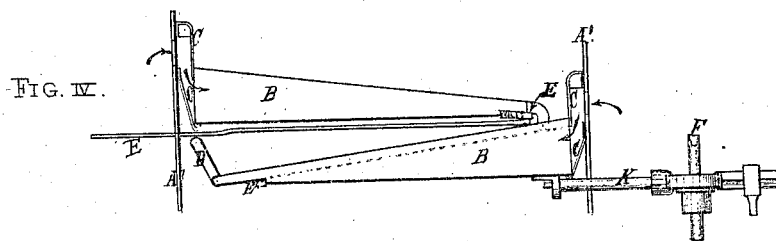


FIG. IV.

Witnesses:  
*Michael J. Stark.*  
*Philip W. Glasner*

Inventors:  
*Fred. H. C. Mey*  
*H. William Dopp*

# UNITED STATES PATENT OFFICE.

FRED. H. C. MEY AND H. WILLIAM DOPP, OF BUFFALO, NEW YORK; SAID DOPP ASSIGNOR OF HIS RIGHT TO SAID MEY.

## IMPROVEMENT IN GRAIN-DRIERS.

Specification forming part of Letters Patent No. 133,590, dated December 3, 1872.

*To all whom it may concern:*

Be it known that we, FRED. H. C. MEY and H. WILLIAM DOPP, jointly, both of the city of Buffalo, county of Erie and State of New York, have invented certain Improvements in Grain-Driers, of which the following is a specification:

The nature of our invention consists in the construction of a grain-drier provided with a number of inclined perforated tables or shelves suspended from uprights so arranged that the wet grain fed upon the top shelf or table will work or slide down from table to table until it has passed over all the tables and drops from the last table into a receiver, from which an elevator removes it for storage, &c., as soon as the tables are shaken. Furthermore, it is so arranged that if hot or cold air is blown through the apparatus it will absolutely have to pass through the perforated tables and the grain thereon from beneath. Also, in connection with the aforesaid arrangement, a spreader or separator, through which the wet grain, malt, or like has to pass before it reaches the first or top shelf or table of the series of perforated tables.

We refer to the annexed drawing, with letters of reference marked thereon, which illustrates our invention more fully and which makes part of this specification.

Figure 1, Plate I, is a sectional side elevation of our grain-drier. Fig. 2, Plate II, is a plan view of our apparatus. Fig. 3, Plate II, is a plan view of one set (two) of the perforated drying-tables provided with a yoke and eccentric, K, by means of which the tables B are shaken or operated. Each table is also provided with a shutter, E, which provides for getting rid of the screenings, &c., that collect in the cavity below perforated plates of tables B. Fig. 4, Plate II, is a side view of tables B B, shown in Fig. 3. It illustrates the mode of suspending said tables, &c.

A A A are four pillars or uprights, which constitute the main support for all the perforated tables, the mechanism for shaking or operating the same, the air-conducting pipes, the spreader or separator, &c.; in fact, the whole apparatus, as to its various parts, is carried or supported by said pillars. B B is a series of perforated tables suspended mainly

from pillars A. The surface of perforation on which the grain or malt to be dried or cooled, as the case may be, is on an incline, so as to cause the grain, &c., to slide or work down from table to table as soon as tables B are operated (shaken) by means of yokes and eccentrics K K. Said tables are connected together two and two so that one yoke and eccentric will operate two tables. They are suspended one above another, as seen in Fig. 1. Each of the tables B is provided with a bottom and sides, B', of sheet metal, so as to form a tapering box-like cavity beneath the perforation. Both ends (ends where suspended) of said cavity are open, the purpose of which will hereafter be shown. B B are also provided at C C each with two strips of thin sheet-brass equal in length to the whole width of tables B. The tables are suspended by means of this sheet-brass, which is flexible so as to allow tables B to swing back and forth whenever F and K are set in motion. The lower table of each set is suspended at one end by two links, D, as seen in Fig. 1 and Fig. 4. The main object of suspending tables B, by means of flexible sheet-brass or like running across the whole width of tables B, is to enable cold or hot air (as the case may be) to be blown directly through the perforated tables B and the grain thereon. The tables B and their suspenders C C fit closely within the inclosing shell or frame A' of the tables B. A direct and perfect communication between air-conducting pipes G and tapering box-like cavities beneath the perforated surface of tables B is obtained. (See Fig. 1 and Fig. 4.) E is a shutter (one for each table) arranged to open or shut the tapering base-like cavity of B, where it terminates in a narrow slot opening, as seen in Fig. 3 and Fig. 4. Said shutters have to be opened from time to time in order to blow the screenings or dust collected beneath the perforated tables out of said base-like cavity. Said shutters are operated by means of rods E', which extend through the inclosing shell or frame A'. F is an upright shaft provided with a number of eccentrics, the upper two of which give motion to the spreader or separator H. (See Fig. 2.) The rest of the eccentrics give a shaking motion to tables B. F is further provided with a bevel-gear, by means

of which it receives motion from main shaft I. G are the air-conducting pipes, through which hot or cold air is blown, as required, by means of blower or blowers L. From G the air is conducted through branches into tables B right beneath and through the perforation and grain lying thereon into the inclosing-shell A', from where it finally escapes through a series of registers in A', as seen in Fig. 1. H is the hopper, into which the elevator delivers the grain that is to be passed over the tables B, (either for cooling or drying.) Within said hopper are arranged two bars, H', each provided with a series of fingers. The bars H' are placed opposite each other, with their fingers arranged so that they can pass one another, leaving room for grain to pass through easily. The bottom of hopper H is provided with holes so as to answer for a register to control the feeding to tables B. Bars H' move in opposite direction with respect to each other. Motion is transferred to H' from shaft F by means of eccentrics and levers, as seen in Fig. 2. The object of the spreader or separator is to produce a uniform feed of grain over the whole width of top table B, and to break up and separate any grain or malt that may have formed into lumps. I is the main shaft. Motion is transferred from this shaft to shaft F, elevator M, and blower L, as indicated in Fig. 1. I may receive its motion from any motor. N is the receiver, which the grain reaches after passing through the apparatus. From this receiver it may be elevated for again passing through the drier, or else it may be taken away for storage. Now, be it observed that it is a mere matter of choice that tables B are moved (shaken) rectilinearly with the inclination of perforated surface of tables B. The whole (suspending and operating the tables B) might just as well be reversed, and still the same result would be obtained.

In referring to the operation of the afore-described apparatus a few words will suffice to show how to proceed. In order to dry wet grain the air to be blown through the apparatus must pass through a heater before reaching into pipes G, so as to become well heated. The grain is to be delivered into hopper H, from where it will pass over the tables B when the apparatus is in motion.

Having thus fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In the construction of a grain-drier, the series of vibrating inclined perforated tables B, suspended by means of flexible sheet metal running across the whole width of the tables, instead of hinges, chains, or the like, as set forth.

2. The inclined vibrating suspended perforated tables B, constructed with a cavity of box-like shape vibrating with B by means of B', and so arranged as to form a conduit between conducting-pipes G and beneath and through the perforations of tables B, (B and B' constituting one table,) as and for the purpose specified.

3. The vibrating inclined perforated tables B B', suspended by means of flexible sheet metal or equivalent, when used as a means to form a conduit between the conducting-pipes G and the cavity below the perforations of tables B when in motion, as set forth.

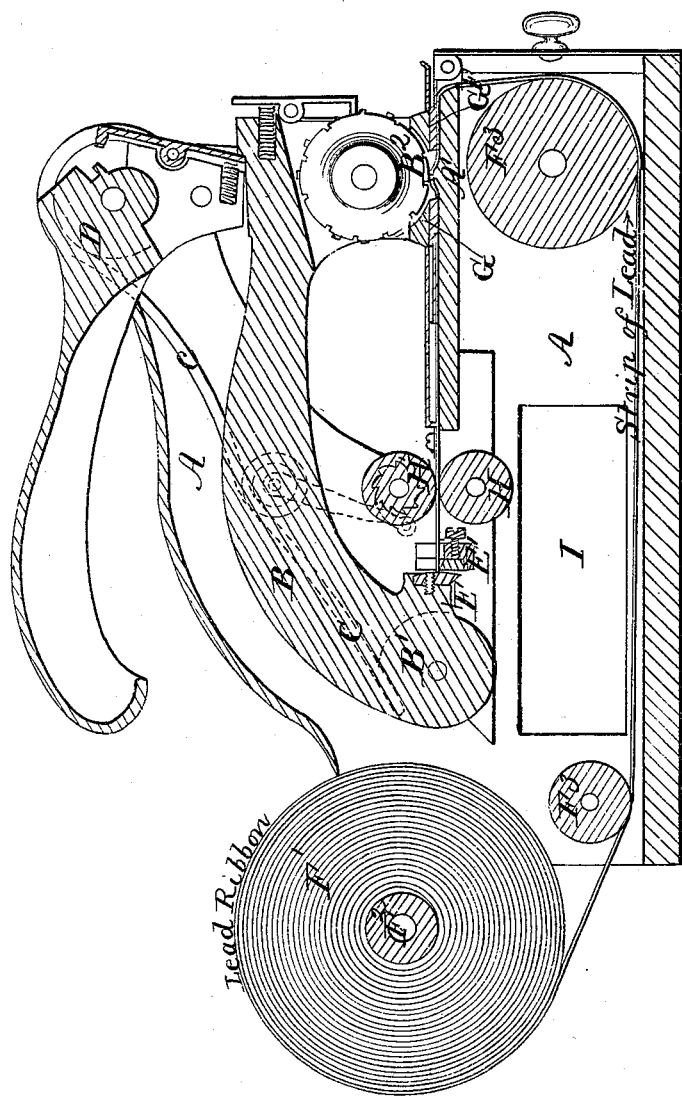
4. In combination with a grain-drier, the spreader or separator H, arranged and provided with bars and fingers H' to operate as and for the purpose set forth.

FRED. H. C. MEY.  
H. WILLIAM DOPP.

Witnesses:

MICHAEL J. STARK,  
PHILIP W. GLEASON.

*H. W. Dopp.*  
*Canceling Stamp.*  
*N<sup>o</sup> 105,052. Patented Jul 5, 1870.*



*Witnesses*  
*Michael J. Hart*  
*William Fox.*

*Inventor;*  
*H. W. Dopp.*



# United States Patent Office.

H. WILLIAM DOPP, OF BUFFALO, NEW YORK, ASSIGNOR TO HIMSELF AND  
JAMES E. THOMSON, OF SAME PLACE.

Letters Patent No. 105,052, dated July 5, 1870.

## IMPROVEMENT IN STAMP-CANCELERS.

The Schedule referred to in these Letters Patent and making part of the same.

I, H. WILLIAM DOPP, of Buffalo, in the county of Erie and State of New York, have invented a new Device for Canceling Adhesive and other Stamps; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing and the letters of reference marked thereon.

The nature of my invention consists in cutting or punching the characters of the date, day, month, and year, clear out and through the paper stamp, and document to which the stamp may be attached, by the application of male dies or punches of the shape of the characters, as desired, the same to operate in combination with a strip of soft metal, pasteboard, or other suitable material, so that the stamp to be canceled is to be placed between the male punches and the soft metal, pasteboard, or other suitable material, and the said punches to punch through the paper stamp, and document into the soft metal or pasteboard, in order to dispense with corresponding female dies.

I refer to the drawing which makes part of the following specification, and in which a canceling-machine is represented in a longitudinal section.

Letter A is the main body or frame of the machine.

B is the die-wheel lever. It is secured to frame A at B<sup>1</sup> by means of two pivots set-screws, and is provided with two wire springs, C, one on each side.

These springs have for their object bringing or raising the lever up again after it has been depressed by the action of the lever and eccentric D.

B is also provided with a cutter, E, which makes, in conjunction with cutter E<sup>1</sup>, a pair of shears, for the purpose of cutting up the strip of soft metal or pasteboard that has already served for the punching or cutting of characters at B<sup>2</sup>.

B<sup>2</sup> is a set of wheels, having on their faces raised figures, of such shape as to answer for cutting through several sheets of paper whenever B is depressed by means of D.

F is a tape of soft metal or pasteboard, of about forty feet in length, which is wound up to a roll of about four inches in diameter, which roll is secured upon a mandrel, F<sup>2</sup>, and to the rear part of frame A. Said tape runs from F<sup>1</sup> over two guide-rollers, F<sup>3</sup> F<sup>3</sup>, up to the bed A<sup>1</sup>, and along underneath the embossing-plate G. Of said embossing-plate a portion is cut

out in the center, so as to expose the tape F to the figures or punches of wheels B<sup>2</sup>.

The bed at A<sup>1</sup> is somewhat raised, so that the tape F will be about even with the top of the embossing-plate G, as plainly seen.

The tape F is grasped by two feed-rollers, H and H<sup>1</sup>, of which H<sup>1</sup> is fluted or roughened on its periphery, in order to impinge better upon tape F, and to secure a more reliable feed; it is also provided with a ratchet-wheel and pawl and connecting-rod, by means of which motion is transferred from lever B, as plainly illustrated by dotted lines in the drawing.

The roller H is smooth on its periphery and not in direct connection with H<sup>1</sup>; it acts more as a support and anti-friction roller than as feed-roller.

F is pulled along successively the length of one figure or of wheels B<sup>2</sup>, so that the figures or punches of B<sup>2</sup> will always meet a blank spot on the tape not yet defaced by the action of the punches, whenever the same are depressed to produce a new cancellation.

It will be observed that as the feed-rollers H and H<sup>1</sup> pull the tape along, it will run into the shears E, and be cut up successively as the tape feeds along, in order to get rid of the portion of the tape F already used; the chips to drop down into a receiving-box, I, from where they may be removed whenever it becomes necessary.

### Claim.

Having thus fully described my invention,

What I desire to secure to me by Letters Patent is—

For the purpose of producing a canceling-stamp, that will cut or punch characters out and through a paper stamp, check, or other documents, without the application of corresponding female dies and punches, the soft metal, pasteboard, or other suitable strip of material, in combination with male dies or punches, automatically fed forward, substantially as described, and as and for the purposes set forth.

H. WILLIAM DOPP.

Witnesses:

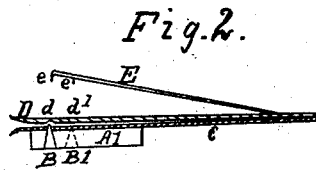
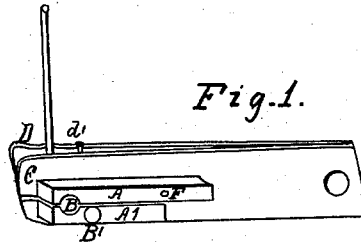
MICHAEL J. STARK,  
WILLIAM FOX.

H. W. DOPP.

Needle Threader for Sewing Machines.

No. 88,699.

Patented April 6, 1869.



Witnesses

*Thomas Grant*  
*John H. Miller*

Inventor

*H. W. Dopp.*

# United States Patent Office.

H. WILLIAM DOPP, OF BUFFALO, NEW YORK.

Letters Patent No. 88,699, dated April 6, 1869.

## IMPROVEMENT IN NEEDLE-THREADER FOR SEWING-MACHINES.

The Schedule referred to in these Letters Patent and making part of the same.

### To all whom it may concern:

Be it known that I, H. WILLIAM DOPP, of the city of Buffalo, county of Erie, in the State of New York, have invented a new Device for Facilitating the Threading of Sewing-Machines, as well as Hand-Sewing Needles; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Figure 1 is a perspective view of the needle-threading apparatus.

Figure 2 is a cross-section of fig. 1.

A is a small metallic block, secured to C by means of a small pin or rivet, F, on which said block has its fulcrum.

It is provided with a half round conical notch, B, the purpose of which will be hereafter described.

A' is also a small metallic block, secured to C right beneath A.

It is provided with a conical hole, B', and a half round notch, B, corresponding with the notch A, so that, in conjunction with that of A, it will form a funnel-shaped hole.

When the blocks are placed together, the conical openings B B' guide the thread to and through the eye of the needle.

C is a steel plate, to which are secured A and A'; also, the needle-holder D.

Said plate is provided with a small slot, the same running from the end into the thread-passage B, having for its object to let out the thread that runs to the bobbin when the needle is threaded.

D is the needle-holder. It is provided with two grooves; one corresponding with B, the other with B'.

These grooves run at right angles with blocks A and A'. They are for the purpose of determining the position of the needle.

C and D are flexible.

E is a flexible strip of metal, secured, with one end, to D, and is provided on the other end with two feelers, or pointed projections, right opposite to and corresponding with B and B'.

These feelers have for their purpose to determine the position of the eye of the needle before the same is to be threaded.

In order to operate this needle-threading apparatus, the needle has to be slid into one of the grooves of needle-holder D, (in between C and D.) E is then slightly pressed against D, and the needle drawn partially through the groove until the feeler *e* will find the eye of the needle. Then let loose E, and pass the thread through B or B'.

B is for threading sewing-machine needles, and B' for hand-sewing needles.

### Claim.

I claim the combination, with the blocks A A', or equivalent, having a conical opening, B, of the grooved holding-plate D and pointed plate E *e*, substantially as and for the purpose set forth.

H. WILLIAM DOPP.

Witnesses:

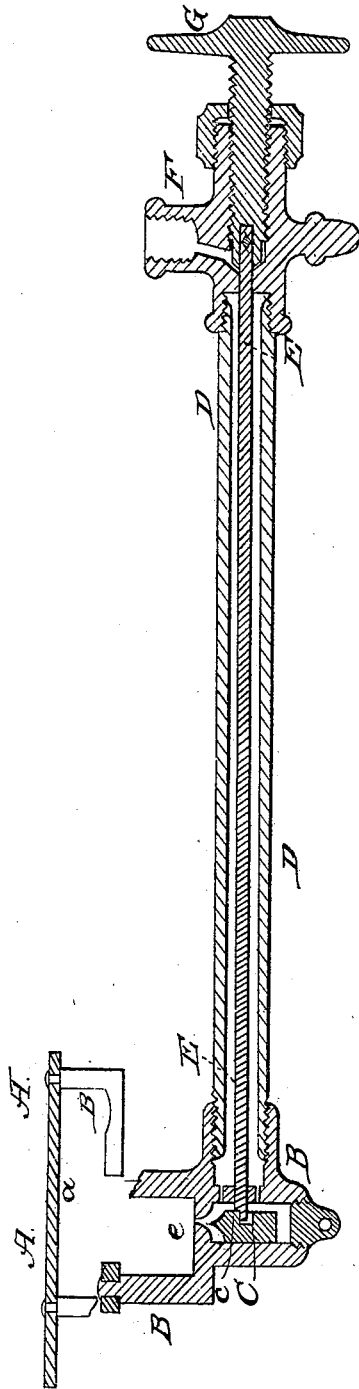
FRANCIS JUST,  
JOHN H. MILLER.

H. W. DOPP.

Apparatus for Burning Coal Oil.

No. 37,436.

Patented Jan. 20, 1863.



Witnesses  
*J. Forsyth*  
*Theodore Meyer*

Inventor  
*H. W. Dopp*

# UNITED STATES PATENT OFFICE.

H. WILLIAM DOPP, OF BUFFALO, NEW YORK.

IMPROVEMENT IN APPARATUS FOR BURNING COAL-OIL FOR HEATING PURPOSES.

Specification forming part of Letters Patent No. 37,436, dated January 20, 1863.

*To all whom it may concern:*

Be it known that I, H. W. DOPP, of the city of Buffalo, county of Erie, and State of New York, have invented a new and Improved Mode of Burning Coal-Oil for Heating Purposes; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing, and to the letters of reference marked thereon.

A is a distributing-plate, perforated, but having a solid center, *a*, by which the vapor to be burned is arrested.

B is a generator, conducting heat to the generating-tube D.

C is a valve, provided with a needle point in its center for graduating purposes. This valve is operated by means of a crank-pin playing into a groove running across said valve, as seen at C.

D is a vaporizing-tube, which receives sufficient heat to produce vaporization by conduction from the distributing-plate A and generator B.

E is a shaft provided with a crank-pin on one end and a square pin on the other end. This crank-pin lies in a cam-groove in valve C, and the square pin is connected with the screw-valve G by means of a square hole in the center of the valve G, so arranged that the square pin may slide in or out. By turning the shaft by means of the screw-valve G an up-and-down motion is transferred to valve C, through the crank-pin operating in the cam-groove in said valve C.

F is a throttle-valve body, to which is attached the generating-tube D.

G is a throttle-screw or screw-valve which controls the supply of oil, and being provided with a square hole in its center couples or connects large E and G, and transfers motion to shaft E and valve C.

To operate this heating apparatus, a reservoir of coal-oil is placed in connection with it by means of ordinary tubing, at an altitude of two or more feet, and leading to the throttle-valve F. Sufficient heat is then to be applied to the generator B and tube D by means of an alcohol torch till vaporization is effected. This is ascertained by partially opening the screw-valve G, and thus admit-

ting a slight flow of oil from the reservoir above into the tube D, which, if there be sufficient heat, is immediately converted into vapor, and at the same time passes through the small orifice *e*, which is left partly open by the partial withdrawal of the needle-point attached to valve C, when the screw-valve G is first partially opened. This vapor, as it rises from the orifice, mingles with the atmosphere, and is ignited at *e* by means of the alcohol torch used for the first vaporization, and burns with great rapidity and power, free from smell or smoke, underneath the distributing-plate A. The plate A thus becomes thoroughly heated by the action of the burning vapor immediately beneath it, and conducts sufficient heat now to the generator B and generating-tube D to keep up a steady supply of vapor. And now the valve G, which was at first but partially opened, is to be opened to its full capacity, and the orifice *e*, by the same means and at the same time, is also left fully open by the total withdrawal of the needle-point, and thus a full flow of oil is admitted into the tube D, which is gradually converted into vapor by the accumulated and sustained heat obtained in the mode above described.

I wish to be understood as not claiming any particular mode or mechanical device, for my improvement may be varied without changing the principle of my invention.

I claim—

1. The distributing plate A, with solid center *a*, and generator B, or their equivalent, so arranged that the vapor shall escape from one or more small orifices into the unconfined atmosphere, and be arrested by means of the solid part of plate A, or its equivalent, for the purpose of causing its combustion after it is thus arrested, sufficient heat being obtained thereby to keep up continuous vaporization, substantially as described.

2. The combination of the crank-pin and the cam-groove to obtain an up-and-down motion of the graduating-valve C, substantially as and for the purpose herein described.

H. WM. DOPP.

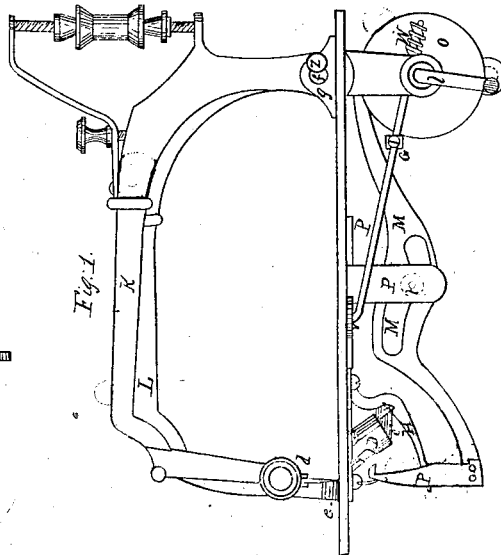
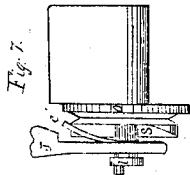
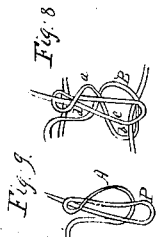
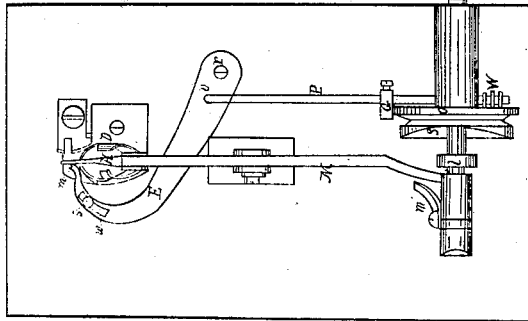
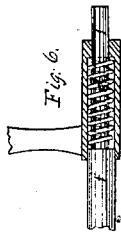
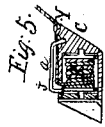
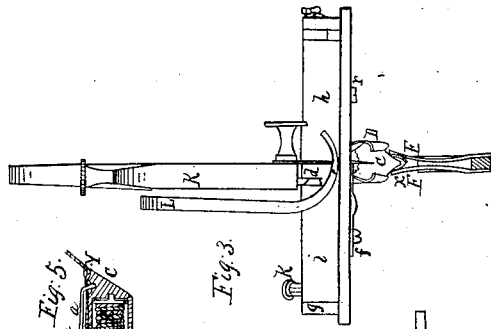
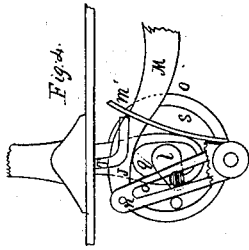
Witnesses:

J. FORSYTH,  
TH. MEYER.

*H. W. Dopp.*  
*Sewing Machine.*

N<sup>o</sup> 27279

Patented Feb. 28, 1860.



Witnesses.

*W. M. Alexander*  
*A. G. Eastman*

Inventor

*H. W. Dopp*

# UNITED STATES PATENT OFFICE.

H. WILLIAM DOPP, OF BUFFALO, NEW YORK.

## IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 27,279, dated February 28, 1860.

*To all whom it may concern:*

Be it known that I, H. W. DOPP, of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a side elevation of a sewing-machine embracing my improvements. Fig. 2 represents a plan of the under side of the same. Fig. 3 represents a front elevation of the same without the working part, showing the looper spread open over the wedge-shaped prong on which the shuttle rests. Fig. 4 represents a side elevation of the working parts detached from the machine. Fig. 5 represents a longitudinal section through the center of the shuttle, showing the bobbin therein. Fig. 6 represents a longitudinal section through the pipe-box of the needle-arm, showing the shaft or bolt on which it turns, and the spiral spring that moves the arm laterally on said bolt or shaft. Fig. 7 represents a front elevation of the cam-wheel and bracket in which it has its bearing, and the end of the needle-arm with the spring *e'* bearing against the cam by which the arm is moved outward. Fig. 8 represents the formation of the stitch, showing the shuttle-thread which preserves the twist in the loop after it is crossed to receive the succeeding loop. Fig. 9 represents the same, showing the first loop partially drawn up around the succeeding one without the shuttle-thread.

The nature of my invention consists, first, in combining a stationary bobbin-case, certain hook-stretchers, and a thumb and finger in such a manner that the needle-thread will be crossed after it has passed over the bobbin, so that the needle may pass down into this cross or loop of its own thread at each subsequent downward movement for the purpose of running the under thread in a spiral form through a loop-stitch, as will be hereinafter described.

It also consists in the employment of a yielding tooth in combination with a vibrating bar when used as a relief-feed, as will be described.

In the accompanying drawings is represented a sewing-machine embracing my improvements, consisting of a table, A, and the working and stationary parts it supports. The gen-

eral arrangement and construction of this machine are similar to those in common use, and therefore my description will be confined more particularly to the improvements I desire to secure by Letters Patent.

The needle-arm K and the arm L, whose front end forms the pressure-pad *e*, are connected at the rear of the table by means of a bolt, *f*, having its bearings in brackets *g g*, raised on either side of the table. These arms are provided with pipe-boxes *h i*, through which said bolt passes. The one, *i*, is confined to the bolt by a screw, *k*, and turns with it. The other one, *h*, turns on the bolt when it is held stationary by the arm L. The rear end or elbow, J, of arm K extends below the table, and is operated by crank *l*, working in an oval-shaped slot, *q*, with which it is provided. The rear end or elbow, T, of arm L also extends below the table, and is forced backward by a spring, *m'*, so that the pressure-pad on its opposite end is held against the bed-plate, and is pushed forward, so that the pressure-pad will be raised by a short arm, *n*, which is operated by the crank *l*, working in a long straight slot, *o*, and is connected and gives motion to the crooked arm M, to which the spreading-looper is secured. This arm M is provided at its center with a curved slot, N, through which it is connected to a bracket, *p*, projecting from the bottom of the table by means of a short screw-bolt furnished with a friction-roller, *t*, on which the top and bottom of said slot bear when in operation, and the arm M is thus guided upward and downward as it is drawn back and forth by the crank.

The curved arm E, which is provided with a thumb and finger, *m*, whose office is to cross one side of the loop over the other after it is formed, is pivoted to the bottom of the table at the point *v*, about which it turns, and is supported near its opposite end by the head of screw *s*, which passes through the curved slot *u*. Motion is given to this arm by means of the cam-wheel O through a rod, P, which is connected at one end to said arm at the point *v*, and is provided with a dock or shoulder, G, secured to it against the cam by a screw. The opposite end of this rod passes through and extends beyond the bracket in which the shaft of the cam-wheel turns, and is provided with a spiral spring, W, which is compressed when

the cam forces the rod forward, and serves to draw the rod back when released. By this means a reciprocating motion is given to arm E. This arm is arranged to operate in conjunction with the spreading-looper F, and the thumb and finger *m*, with which it is provided, meet the hooked point or end of the looper directly below the needle-entrance in the table after the needle is withdrawn, and on giving motion to the crank which draws the looper backward and downward the needle-thread is drawn in that direction and spread into a loop around and under the shuttle C. One side of the loop thus formed of the needle-thread passes between the thumb and finger *m* of arm E as it is being drawn down and spread by the looper, during which operation the arm E is at rest; but before the looper again rises the arm E is pushed forward, carrying between its thumb and finger that side of the loop which passed between them when the loop was drawn down and spread by the looper, which crosses or twists the loop and draws it up behind the shuttle, after which the needle enters through the loop thus crossed, one side over the other, and the thread it carries with it is drawn into another loop, as before, and while it is being drawn down and spread by the looper the needle-arm rises, so that by the downward movement of the looper and the upward movement of the needle-arm the first loop is drawn up and tightened around the second loop before it (the second loop) is crossed by the thumb and finger.

When not desired to operate the arm E, it is only necessary to loosen the screw which confines the dock to the rod P, in which case the ordinary lock-stitch will be formed by the machine. By cutting off or removing the shuttle-thread and using the arm E for crossing the loop the machine will form the "chain-stitch."

The looper is spread open as it moves backward by means of a wedge-shaped prong, H, whose point extends forward to the needle-entrance in the table, and between the spring-jaws FF, of which the looper is formed. This prong is fixed stationary to the under side of the table, and forms the bearing in which the lower end of the shuttle rests, so that as the loop is drawn down by the looper it is spread over the shuttle, between it and the casing in which it is inclosed, and forced against the end and raises the shuttle, under which it is carried before the looper is withdrawn.

The body of the shuttle C is cylindrical in shape; but its lower end tapers to a point on one side, and this point rests lightly on the upper side of the prong H in a groove, *a*, formed therein for the purpose. This peculiar shape is given to the end of the shuttle so as to allow the loop to pass freely over and under it, and this end is screwed onto the shuttle so that it can be easily removed for the purpose of inserting the bobbin R. The upper end of the shuttle is rounded and terminates in a point, *y*, on one side, through which

the bobbin-thread passes. The shuttle is inclosed within a casing, D, fixed on the under side of the table, and is provided with one or more holes, *j*, for the passage of the bobbin-thread, which is wound round the pin *a'*, to regulate its tension. The casing D is open in front, so that the thread, when formed into a loop, may enter on either side of the shuttle, between it and the casing.

The needle-arm K has play on the bolt *f*, and the distance or length of its lateral movement on this bolt is regulated by the screw *z*, according to the length of stitch required. The elbow J of the needle-arm, extending below the table, is provided with a straight spring, *e'*, which bears against and is compressed by the cam S, formed on the side of cam-wheel O, when the arm is being forced outward, so that when the range of the arm's lateral vibration is limited to a greater or less degree than the depth of cam S the cam will be accommodated to the movement of the arm by the action of the spring.

A spiral spring, *d'*, is arranged around and fitted to the bolt *f*, within the pipe-box *h* of the needle-arm, whose office is to force the arm back when released by the cam, by which means a lateral reciprocating movement or vibration is given to the arm in the direction of the line of sewing. When the needle-arm is raised to its full height, it is forced or pushed outward the distance at which it is set by the adjusting-screw *z*, to regulate the length of the stitch, and after the needle descends and enters through the fabric the tooth *d*, taking hold and pressing on the same, the pressure-pad is raised and the needle-arm forced back by the action of the spring *d'*, carrying with it the fabric, thus feeding it by the action of spring *d'*. The needle-arm is provided with a tooth, *d*, on the side of the needle ahead of the stitching, which takes hold of the fabric when the needle enters through it, and the employment of this tooth or equivalent device effects a uniformity in the length of the stitches, inasmuch as it overcomes the liability of the needles being bent or strained, as when it alone is used for the purpose of feeding the material, in which case, it will be observed, the material would not be fed uniformly the distance of the needle-arm's lateral vibration, but only when the strain on it was insufficient to overcome its resistance or bend it.

It will be seen from Figs. 8 and 9 that the stitch is formed by drawing one loop through another; but in order to effect this it is necessary to use the thumb and finger *m*, which crosses one side, *a*, of the loop over the other side, *d*, after it is passed over the shuttle, as seen at Fig. 8. When the loop *c* is drawn down and spread by the looper, the needle-arm rises, and by the upward movement of the arm and the downward movement of the looper the first loop, B, is drawn up and tightened around the second loop, assuming the form of A, Fig. 9: The loop thus represented is formed without the shuttle-thread. With the shuttle-



thread *b* the twist of the loop is preserved, as seen from the manner in which it passes through and interlocks with the loop, Fig. 8.

Having thus described my improvements, what I claim therein as new, and desire to secure by Letters Patent, is—

1. The combination of the stationary bobbin-case, the hook-stretchers, and the thumb and finger, or their equivalents, so arranged as to cross the needle-thread after it has been passed over the bobbin, so that the needle may pass down into this cross or loop of its own

thread at each subsequent downward movement, for the purpose of running the under thread in a spiral form through a loop-stitch, substantially as herein shown.

2. The employment of the yielding tooth *d*, in combination with the vibrating bar *K*, when the same is used as a relief-feed, substantially as specified.

H. WM. DOPP.

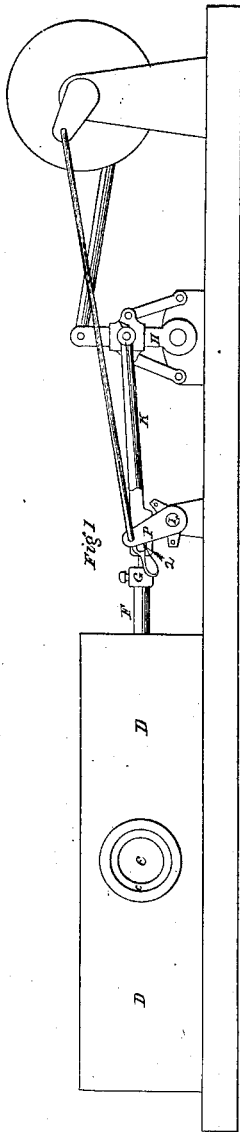
Witnesses:

CHARLES HUTTER,  
S. BACTH.

*H. W. Dopp,*  
*Steam Cut-Off.*

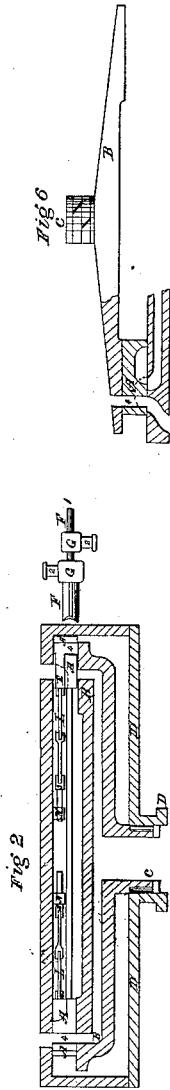
*N<sup>o</sup> 27,355.*

*Patented Mar. 6, 1860*



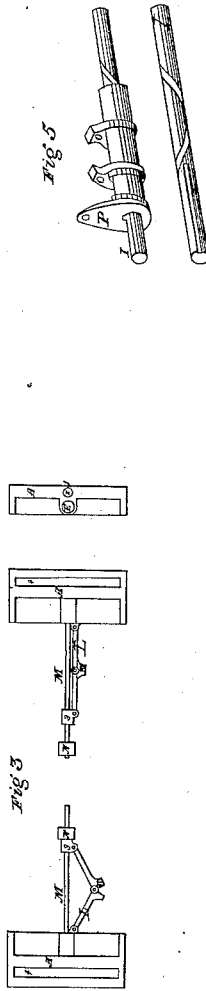
*Witnesses:*

*L. L. Lewis*  
*Charles Hutton*



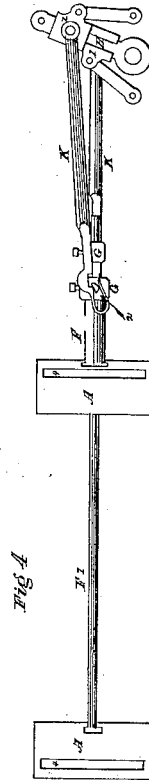
*Fig 6*

*Fig 2*



*Fig 5*

*Fig 3*



*Fig 4*

*Inventor*

*H. William Dopp.*

# UNITED STATES PATENT OFFICE.

H. W. DOPP, OF BUFFALO, NEW YORK.

## STEAM-ENGINE.

Specification of Letters Patent No. 27,355, dated March 6, 1860.

To all whom it may concern:

Be it known that I, H. W. DOPP, of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawings and the letters of reference marked thereon.

The nature of my invention consists in providing the valve balance with a piston or packing, said valve balance being stationary, but so arranged that it may by the action of the steam be kept in contact with the valves. Also a variable cut off which consists of a cam groove to disconnect the valves from their respective motions, and also other devices, the peculiarities of which, will be hereinafter fully set forth.

To enable others skilled in the art to make and use my invention I will proceed to describe its construction and operation.

In the accompanying drawings Figure (1) is a side elevation. Fig. (2) is a sectional view of the steam chest or valve box, showing also the peculiar construction and arrangement of the valve balance, and valves. Fig. (3) is a view of the sliding valves, which are provided with cylinders and pistons, for the purpose of cutting off steam. It will be observed that the three figures, included in Fig. (3) are really such as are required to show different positions of the same device. Fig. (4) shows the sliding valves operated by means of two rods, in a manner which will be hereafter fully explained. Fig. (5) is a perspective of the rockshaft and rocking arm showing also the cut off and knock off toes. Fig. (6) is merely for the purpose of exhibiting a modification of Fig. (2) and therefore no reference will be had to it in the following description.

In Figs. (2, 3 and 4) (A A) represents two sliding valves.

(B) is a valve or steam balance, shown in Fig. (2).

(D) represents the steam chest or valve box. Said chest or box is provided with a circular hole in its side for the admission of the balance piston (C), as fully seen in Figs. (1) and (2). The steam chest (D) also serves as cylinder for balance piston (C).

(E) represents a hole, or cylinder in the valves (A A) for the purpose of closing the valves, when they are disconnected from

(K K). Said valves are also provided with ports, which run at right angles, with the hole (E), and opens into it, in order that the steam passing through the ports, may act upon the pistons in holes (E). It should be observed, that this hole (E) is represented only in one valve though they both are constructed precisely in the same manner.

The valve balance (B) is constructed, or may be constructed, so that it will serve as a side pipe, through which the steam is conducted into the cylinder. Said balance (B) is provided with packing, at the point marked (C).

(F) and (F') are two valve rods, which are attached to the valves (A A). Said rods, are so constructed, that the one, which is attached to valve nearest the hooks, is hollow, while the others must pass through it, as shown in Fig. (4). This is done to enable the two valves to work at different speeds.

(G G) represent two docks, which are secured to the valve rods.

(2, 2) are two catchpins on docks (G G), the object of which will be more fully seen hereafter.

(H) represents a combined rocking valve gear, the motion of which is communicated to the valves (A A) by means of the hooks (K K).

(I I) represent two cross heads, which slide upon rock arm (H), and to which the two hooks are connected by means of a pin (Y).

(X X) represent two links, attached at one end to the cross heads, and at their other end to steady pins—as fully shown in Fig. (1).

(I) represents a shaft which is provided with two grooves, which resemble a right and left screw. Said shaft is also provided with a straight groove.

As shown in Fig. (5), (P) is a rock arm by which the shaft receives motion from eccentric or any other device.

(O O) are two knock off toes, fastened on the shaft (I) by means of the right and left cam grooves. The object of the straight groove already referred to, is to secure the rock arm. It will be observed that the shaft (I) is so arranged that it can be moved in and out of rock arm (P) and knock off toes (O O)—in order that it may accommodate itself to the stroke of the engine.

(L) represents a joint link as shown in Fig. (3) which is secured at one end to the valve (A) and at the other to the piston (M) by means of a dock, marked (3). The object of this link is to regulate the stroke of the valves, when they are disconnected by means of the knock off toes, O O, which are fully represented in Figs. (1 and 5). Said joint link (L) also guards against sudden concussions.

(N N) are two stationary guides, designed to guide the pistons (M M), and also for the purpose of stopping the pistons (M M), when the valves commence to open the steam ports, and enable the pistons (M M) to push the valves (A A) from itself, the moment they are disconnected, in order to cut off the steam.

The operation of my invention is as follows: The steam being let on from the throttle valve, passes into the valve box through the balance (B B) which is hollow as is seen. The object in making this balance hollow is to prevent too much pressure and consequent friction upon the valves. When the area of the port leading to the balance is the same as the area of the openings in the two valves, the pressure upon the valves will amount to nothing; but when the area of the port is larger than the sum of the other two areas, then there will be pressure upon the valves in proportion to the difference of the two areas. The steam passes through the balance and to the valves—one valve being open the steam rushes into the cylinders and acting upon the piston head forces it back. The steam may be cut off at one quarter, one half, or at full stroke, according as the rock off toes (O, O), are set when the piston has made its full stroke. The valve which has just been admitting steam moves back with a quick movement and opens the exhaust ports instantly. At the same time the valve at the other end of the box opens and admits the steam on the other side of the piston head, which brings it back again. As soon as it has made its full stroke, the exhaust port behind is opened instantly and the steam escapes as soon as it is admitted at the other end again, and thus the operation continues. It will be seen that the

steam is admitted to the cylinder by the short motion of the valve gear, and that the exhausts are opened by the long motion of said gear—this being the case the exhaust ports are opened quicker than the steam ports.

In this engine the steam ports, as well as the exhaust ports, are opened and closed quicker than they are in the ordinary engine because I have two motions from the valve gear. It will be seen that when the steam is cut off by the rock off toes (O O) the steam in the valve pressing against the valve and against the piston (M) the valve is caused to slide upon said piston and close the opening through which the steam is admitted to the cylinder. The valve is prevented from going too far in one direction by means of the stationary guide (N) and in the other direction by means of the link (L). It appears then that by this arrangement the steam ports are opened and the exhaust ports are opened and closed by means of the hooks (K K), while the steam ports are closed by means of a pressure of steam itself against the valves and pistons (M M) after the valves are disconnected.

Having thus fully described my invention, what I claim and desire to secure by Letters Patent is—

1. The stationary valve balance (B) constructed as described, in combination with steam valves (A A) or their equivalents.
2. I claim sliding valves (A A) when the same are constructed and used in the manner and for the purpose set forth.
3. I claim the employment of link, crank or arm as shown by link (*l*), in combination with pistons (M M) and valves (A A) as constructed.
4. I claim the combined rocking valve gear, when the same shall be constructed substantially as and for the purpose set forth.
5. I claim the employment of cam groove around the shaft (I) in combination with hooks (K K).

Dated Buffalo May 20, 1858.

H. WILLIAM DOPP.

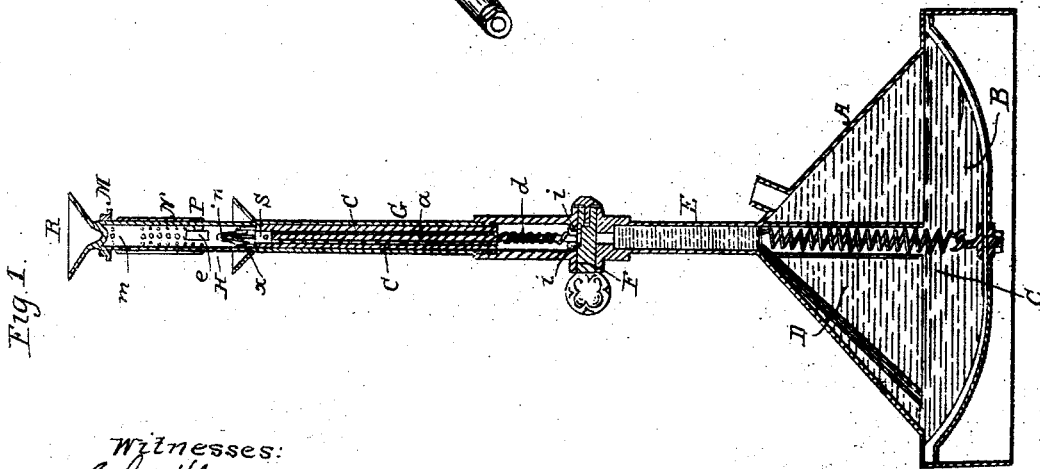
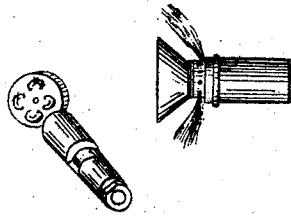
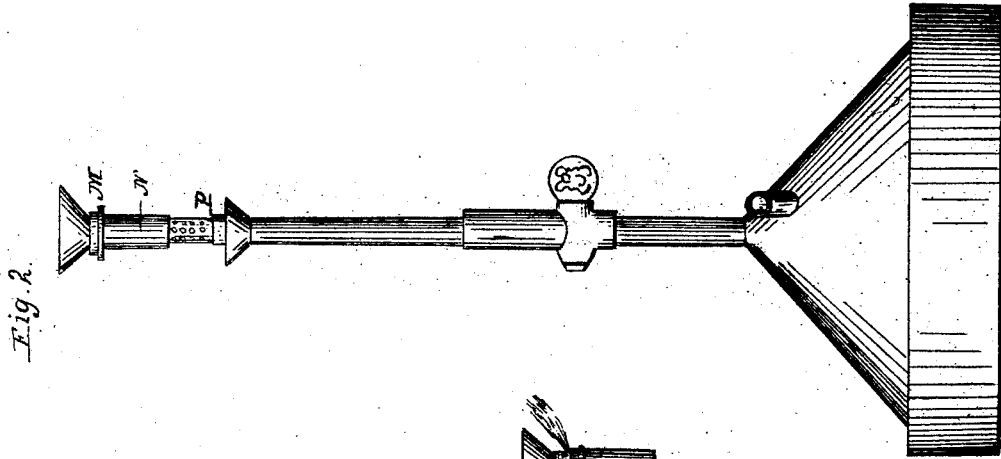
Witnesses,

I. STELLWAGEN,  
ALEX. MARTEN.

H. W. DOPP.  
Vapor Burner.

No. 30,444.

Patented Oct. 16, 1860.



Witnesses:  
*Wm. H. Alexander*  
*Arthur Stearns*

Inventor:  
*H. W. Dopp*

# UNITED STATES PATENT OFFICE.

H. WILLIAM DOPP, OF BUFFALO, NEW YORK, ASSIGNOR TO J. B. WHITE, OF SAME PLACE.

## LAMP.

Specification of Letters Patent No. 30,444, dated October 16, 1860.

To all whom it may concern:

Be it known that I, H. W. DOPP, of Buffalo, in the county of Erie and State of New York, have invented certain new and useful  
5 Improvements in Coal-Oil Lamps; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings and to the letters of reference marked  
10 thereon.

In order that those skilled in the art may make and use my invention I will proceed to describe its construction and operation.

In the annexed drawings, of which Figure  
15 1 is a vertical section, and Fig. 2 a side elevation, A, represents the body of the lamp, in which the oil is placed. In the bottom of this body is an elastic diaphragm or a bellows, B, to which is attached a spring C,  
20 said spring standing in a vertical position and being incased within a tube as shown in Fig. 1.

E, represents a pipe which is secured to the top of the body of the lamp, and which  
25 has been connected to it a tube D, which extends down into the lamp and conveys oil to pipe E. In the pipe E, is secured a stop cock F, which serves a double purpose—it admits oil to the burner, and at the same time its  
30 periphery being provided with a cam groove it serves to raise and lower the rod *a*, one end of which presses upon the stop cock and is governed by the cam groove.

G, represents a pipe which connects with  
35 the upper end of pipe E, by means of a screw. A rod *a*, passes through this pipe, and a wick *c*, surrounds the rod, as is represented in the Fig. 1. To the upper end of the rod *a*, is secured a valve *s*, and on top of  
40 this valve is secured a needle point *w*. Upon the lower end of the rod is a cap *i* and surrounding the rod between the wick and the cap is seen a spring *d*.

*n*, represents a small nozzle with a minute  
45 hole through it. This hole is just above the needle point and when the rod *a*, is raised the needle point passes into and through this small orifice for the purpose of cleansing it of all impurities, and keeping it free from  
50 obstructions. H, represents a pipe which screws into the pipe G, and which is perforated as represented in the drawings.

The pipe H is provided with a cap R, and

is surrounded with three sleeves, M, N, P. It is also provided with an opening at *e*,  
55 through which the atmospheric air passes in and mingles with the gas from the oil. The gas burns as it escapes from the orifices at *m*.

The object in perforating the pipe H, is  
60 to prevent smoking and blowing. If a long burner pipe is used sufficient heat cannot be obtained, and if the pipe is shortened it will blow or smoke unless perforated.

In using this lamp the oil is placed in the  
65 body A, through a proper opening, to receive it. The lamp is then tightly closed, and the bellows or elastic diaphragm forces the oil up the tube D, into the pipes E and G. The oil is converted in gas as it passes  
70 through the nozzle at *n*, and rising mingles with atmospheric air which enters the opening *e*, and passing out is burned at the orifices *m*. A larger or smaller flame may be  
75 produced by the use of the sleeves.

I wish not to be understood as claiming any particular form or shape of apparatus as this may be changed without affecting my invention.

I claim—

1. The employment of a bellows or elastic diaphragm operated by a spring or equivalent for the purpose of driving or forcing the fluid from the body of the lamp toward  
85 or in the direction of the burner substantially as specified.

2. Operating the valve *s*, and needle point *w*, for graduating and cleaning purposes by means of a cam groove or its equivalent in the stop cock F, in combination with the  
90 nozzle *n* whereby I avoid the necessity of packing, substantially as specified.

3. The rod *a*, or its equivalent when used as described by means of which I am enabled to place the cam stop cock, (or its  
95 equivalent) beyond the reach of the surplus heat substantially as set forth.

4. The valve *s*, in combination with the rod *a*, spring *d*, and cam stop cock F, for the purpose of graduating the size of the  
100 flame substantially as specified.

H. WILLIAM DOPP.

Witnesses:

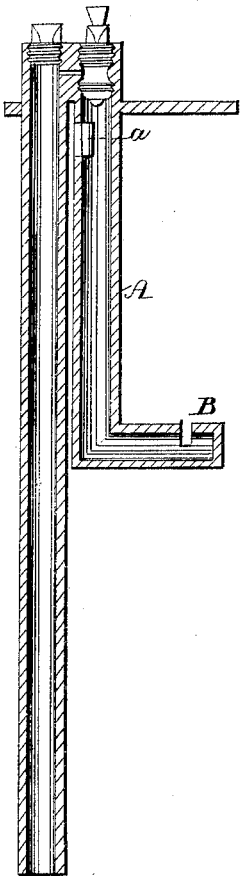
C. M. ALEXANDER,  
A. A. YEATMAN.

H. W. DOPP.  
Vapor Burner.

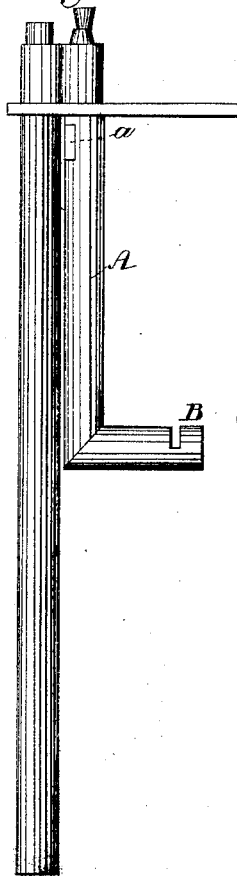
No. 30,621.

Patented Nov. 13, 1860.

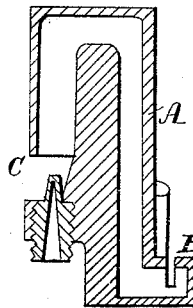
*Fig: 1.*



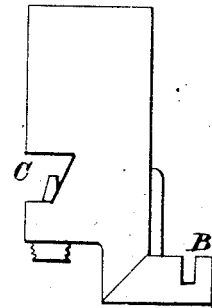
*Fig: 3.*



*Fig: 2.*



*Fig: 4.*



*Witnesses;*  
*C. M. Alexander*

*A. A. Yeaman*

*Inventor,*

*H. W. Dopp*

# UNITED STATES PATENT OFFICE.

H. WILLIAM DOPP, OF BUFFALO, NEW YORK.

## VAPOR-LAMP.

Specification of Letters Patent No. 30,621, dated November 13, 1860.

*To all whom it may concern:*

Be it known that I, H. W. DOPP, of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Vapor-Burning Lamps; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings and to the letters of reference marked thereon.

Figures 1 and 3, of the annexed drawings represent a plan for accomplishing my object varying slightly from that seen in Figs. 2, and 4.

These improvements are applicable to that class of lamps which burn the coal oil gas or vapor and the feature which I consider new is mingling the vapor with atmospheric air near the generating point and causing the two to descend to the burner. The air and the gas have been mingled below the burner, in which case they were compelled to ascend before they were burned—not being compelled to descend at any time. In Figs. 1 and 3, the air and gas are mingled

at *a*, and are caused to descend through pipe A to burner B. In Figs. 2, and 4, the gas and air are mingled at *c*. They then ascend slightly but then descend to the burner at B. The advantage derived is that the gas and the air being heated as they pass down pipe A, unite more perfectly, and consequently produce more perfect combustion.

The idea of causing the vapor in air-vapor lamps to ascend to the generator and burner in order to produce a gas light is not new and this I do not claim, but

What I claim as new and valuable and desire to secure by Letters Patent, is—

Mingling the vapor formed, with atmospheric air, above the burner, as at *a, a*, Figs. 1, and 3, the vapor and the air descending through the pipe A, to be burned at the burner B, as and for the purposes herein specified.

H. WILLIAM DOPP.

Witnesses:

I. FORSYTH,  
J. B. WHITE.