No. 810,725. PATENTED JAN. 23, 1906.

R. M. CROSBY.

BELL RINGER.

APPLICATION FILED AUG. 2, 1905.

2 SHEETS—SHEET 1.

Fig. 2.

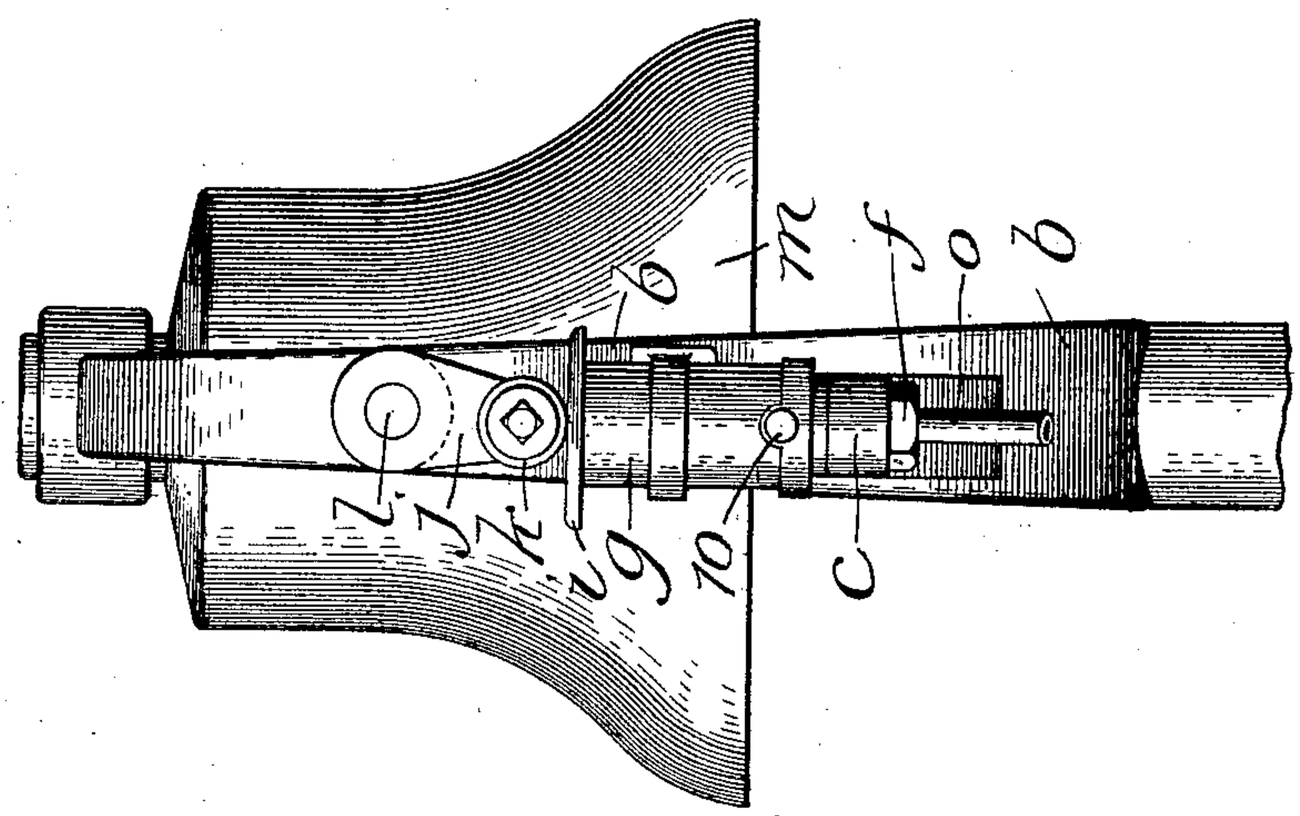
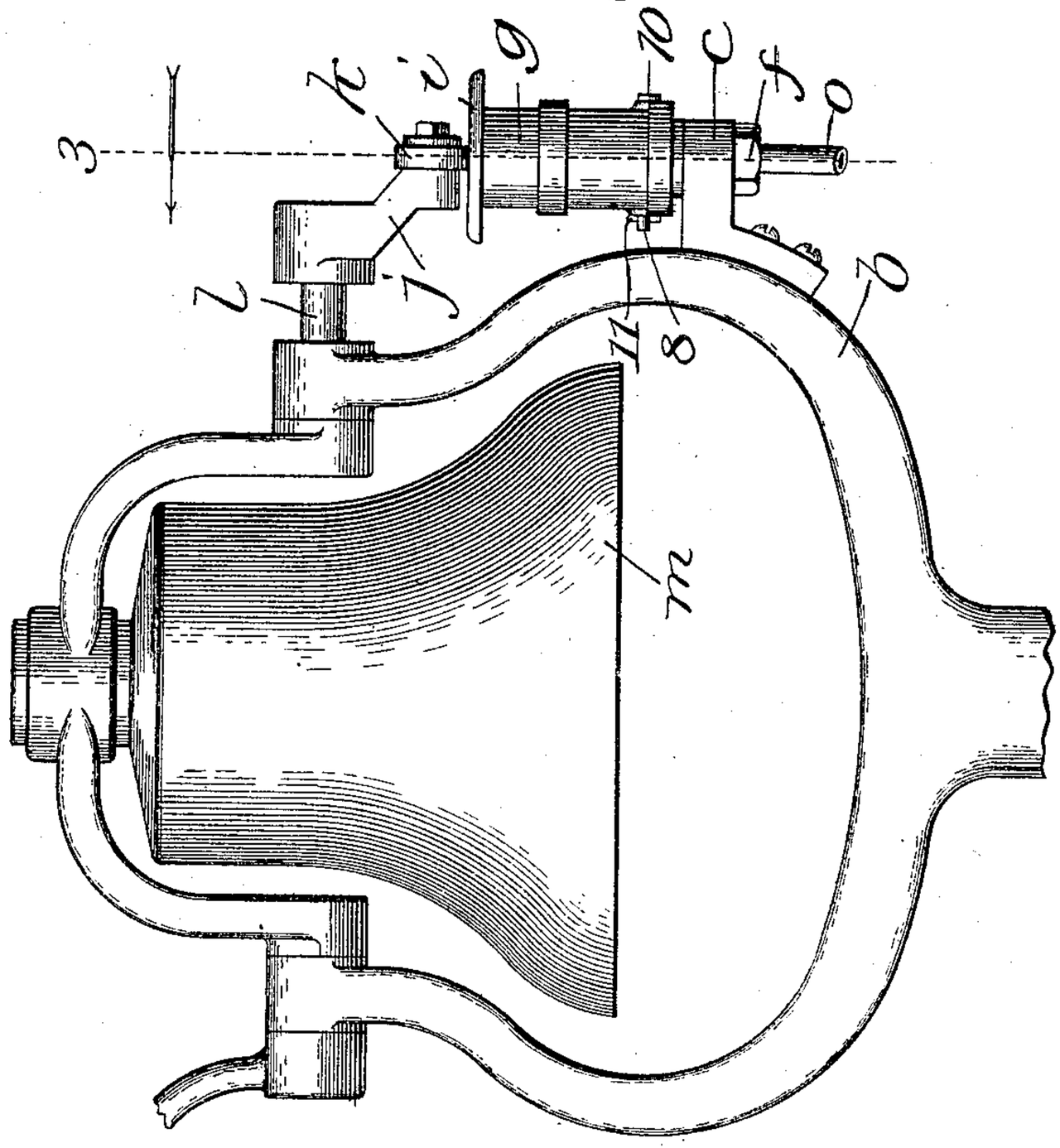


Fig. 1.



Witnesses:
Chas. E. Gaylord.
Chas. H. Buell.

Inventor:
Richard M. Crosby,
By Thomas F. Sheridan,
Atty.

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2 SHEETS—SHEET 2.

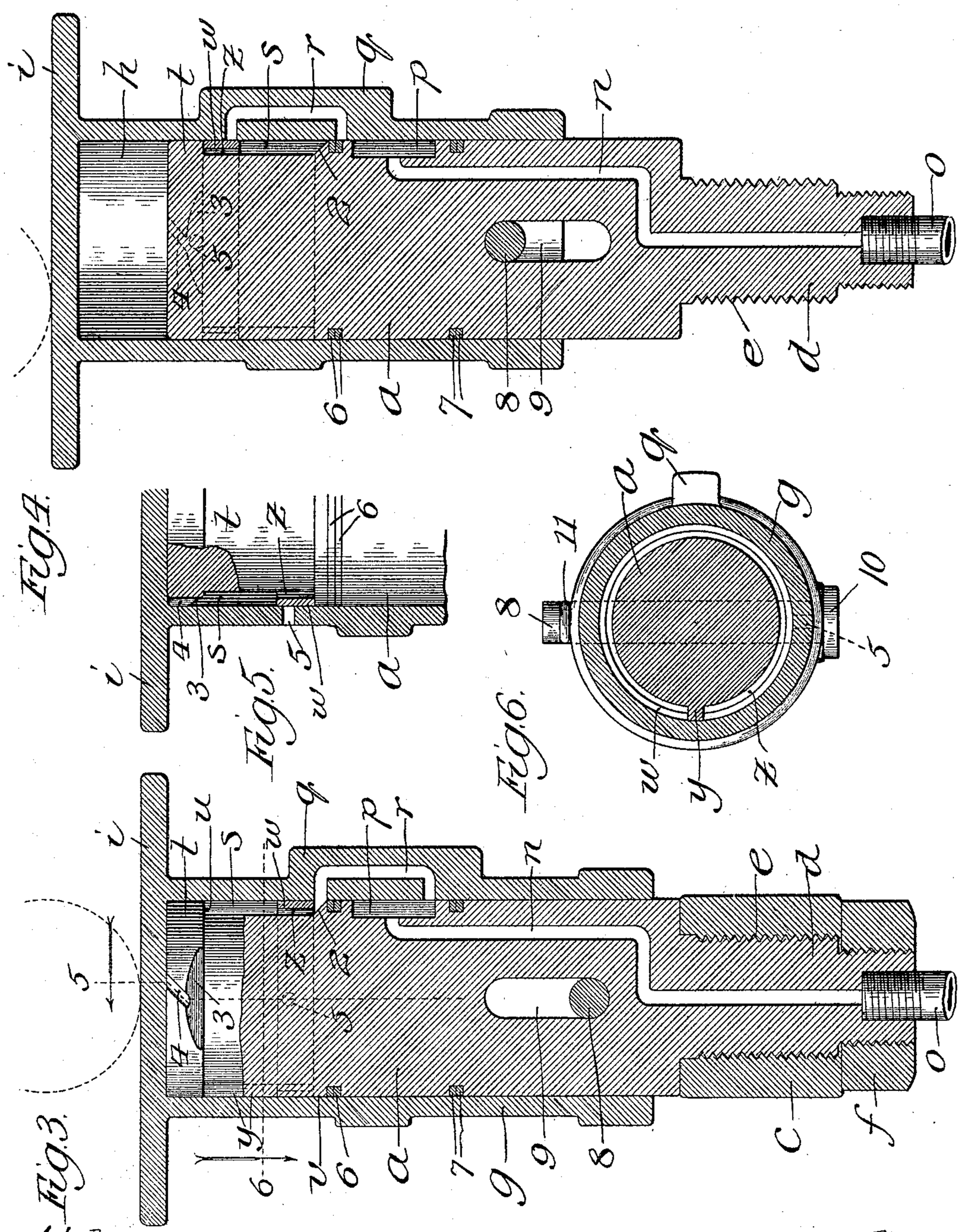

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 3.

Witnesses:
Geo. E. Gaylord.
Chas. A. Buell.

Inventor:
Richard M. Crosby,
By Thomas F. Sheridan,
Atty.

UNITED STATES PATENT OFFICE.

RICHARD M. CROSBY, OF TACOMA, WASHINGTON.

BELL-RINGER.

No. 810,725. Specification of Letters Patent. Patented Jan. 23, 1906.

Application filed August 2, 1905. Serial No. 272,298.

To all whom it may concern:

Be it known that I, RICHARD M. CROSBY, a citizen of the United States, residing at Tacoma, in the county of Pierce and State of Washington, have invented certain new and useful Improvements in Bell-Ringers for Locomotive-Engines, of which the following is a specification.

My invention relates to that class of bell-ringers comprising piston and cylinder mechanism operatively connected with the bell and provided with fluid-passages adapted to be connected with a suitable source of fluid-pressure.

The principal object of my invention is to provide a simple, economical, and efficient bell-ringer.

A further object of the invention is to provide a bell-ringer for locomotive-engines with suitable means for preventing water from penetrating to the inside of the cylinder, causing rust or the formation of ice and otherwise affecting the operation of the device; also, to provide means for enabling the mechanism to be oiled and permitting the oil to escape, so as to prevent the accumulation of oil in the cylinder.

A further object of the invention is to provide means for enabling the force of the fluid-pressure to be gradually applied at the beginning of the strokes and to be gradually diminished at the final end of the strokes, so as to minimize the shocks which accompany the reversal of the movements of the parts in operation.

Other and further objects of the invention will appear from an examination of the drawings and the following description and claims.

The invention consists in the features, combinations, and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a view in elevation of a bell-ringer constructed in accordance with my improvements shown in operative engagement with the bell-crank to be operated thereby; Fig. 2, a similar view showing the mechanism illustrated in Fig. 1 as it would appear when looking from right to left of the figure; Fig. 3, an enlarged central sectional elevation in detail taken on line 3 of Fig. 1 looking in the direction of the arrow and showing the cylinder in initial or lowermost position; Fig. 4, a similar view showing the cylinder in raised position with the parts as they appear at the completion of an upward stroke; Fig. 5, a fragmentary sectional elevation in detail taken on line 5 of Fig. 3 looking in the direction of the arrow, and Fig. 6 a sectional plan view taken on line 6 of Fig. 3.

In constructing a bell-ringer in accordance with my improvements I provide a fixed piston *a*, which is mounted upon a supporting-frame *b* by means of a bracket *c*. The lower stem portion *d* is provided with screw-threads *e*, which engage a similarly-threaded perforation in the supporting-bracket, and a nut *f* serves to hold the piston rigidly in position upon the bracket.

A piston-cylinder *g* is provided, having side walls provided with preferably cylindrical inner surface portions *h*, forming a piston-chamber, and a preferably integral cap or disk *i*, forming a covering for the cylinder and closing the upper end of the piston-chamber formed thereby. This piston-cylinder is slidably mounted upon the piston with its open end down, the closed upper end of the cylinder, which is formed by the cap, being in engagement with the crank *j*, which is provided with an antifriction-roller *k*, interposed between the end of the crank and the top of the cylinder. The crank is operatively connected with the bell *m* by means of a rock-shaft *l*, which is pivotally mounted in the frame *b* in any ordinary and well-known manner. The piston is provided with an admission-passage *n*, communicating with a suitable source of fluid under pressure by means of a pipe *o*, which extends from the lower end of the passage to the compressed-air chamber of the engine and is adapted to be connected with any suitable source of fluid under pressure. The upper end of the passage *n* is enlarged so as to form an admission-port *p*, and the piston-cylinder is provided with a reinforced or projecting portion *q*, having a valve-passage *r*, the lower end of which when the parts are in the desired relative positions communicates with the admission-port and the upper end of which communicates with the space *s*, formed between the side of the piston and the inner surface of the piston-cylinder. The space or recess *s* is formed by cutting away a portion of the periphery of the piston, so as to form a relatively small neck portion *t*, having an annular shoulder portion *u* at its upper end and an annular shoulder portion *v* at its lower end, both in sliding engagement with the inner surface of the cylinder. The recess thus formed is adapted to contain an admission and exhaust

regulating sleeve *w*, which is mounted therein with its outer surface in sliding engagement with the inner surface of the piston-cylinder. This sleeve is made of resilient or flexible material, preferably steel, and is split so that the edges of its split portion slidably engage the longitudinal shoulder or guide *y* upon the piston. The inner side of the sleeve is of greater diameter than the portion of the piston which it encircles, and it thus provides a space or passage *z* between its inner surface and the periphery of the piston. The recess portion of the piston is of sufficient length from the lower to the upper annular shoulder to permit the movement of the sleeve with the cylinder throughout the principal portion of the stroke, the annular shoulders of the piston, however, limiting the movements of the sleeve. The lower annular shoulder *v* of the piston is provided with a groove 2, which when the parts are in the position shown in Fig. 3 forms a connecting-passage between the upper end of the valve-passage *r* and the space *s*. An exhaust-groove 3 in the periphery of the upper end or annular shoulder of the piston and a groove or perforation 4, extending from such peripheral groove to the top or end surface of the piston, form a passage between the space *s* and the piston chamber or space between the end of the pis on and the upper closed end of the piston-cylinder. In other words, they form a passage connecting the recess or space *s* with the piston-chamber formed between the end of the cylinder and the piston-head. An exhaust-passage 5 communicates with the groove 3 when the parts are in the position shown in Fig. 4 and is covered by the admission and exhaust regulating sleeve when the parts are in the position shown in Fig. 3 and intermediate such extreme portions. Packing-rings 6 and 7 are mounted in the periphery of the piston above and below the admission-port, and a retaining and guiding pin 8 extends through and in sliding engagement with the walls of an elongated slot 9 in the piston, having its opposite ends mounted in suitable perforations in the cylinder, one end of such pin being provided with a head 10 and the other with a cotter-pin 11 for holding it in position to limit the upward and downward movements of the cylinder.

The admission and exhaust regulating sleeve is made of sufficient width and the exhaust-passage 5 arranged in such position that when the parts are in the position shown in Fig. 3 the upper edge of the sleeve is above the upper edge of such exhaust-passage about one-sixteenth of an inch when the lower edge of the sleeve is in line with the upper edge of the valve-passage *r*. Therefore, when fluid under pressure is admitted through the passage *n*, valve-passage *r*, groove 2, space *s*, and grooves 3 and 4 to the piston-chamber the cylinder is raised with the sleeve until the upper edge of the sleeve engages the upper annular shoulder of the piston. The further upward movement of the cylinder partly closes the upper end of the valve-passage *r* before beginning to open the exhaust-passage 5. When the cylinder has reached a point which causes the sleeve to entirely close the upper end of the valve-passage *r*, the expansion of the air in the piston-chamber before it is permitted to escape is sufficient to raise the cylinder to its upward limit of motion. This leaves the lower edge of the admission and exhaust regulating sleeve a distance below the edge of the valve-passage *r* sufficient to permit a slight movement of the cylinder downward after the sleeve in its downward movement engages the lower annular shoulder *v* of the piston without exposing or opening the admission-passage. The lower end of the passage *r* is also above the upper edge of the port *p* a sufficient distance to permit such movement without opening the lower end of the passage *r* to the admission-port. This slight downward movement of the cylinder after the sleeve is stopped by the lower shoulder of the piston and before opening the admission-passage causes the sleeve to partially close the exhaust-passage 5 before the admission-passage begins to open for the next upward stroke of the cylinder. The end of the stroke is thus cushioned by the air which is caused to escape more slowly. The force at the end of the upward stroke is reduced so as to minimize the shock by first partly closing the admission before the exhaust is opened, and finally entirely closing the admission-passage before the upper limit of movement of the cylinder is reached.

I claim—

1. In an apparatus of the class described, the combination of a fixed piston, a piston-cylinder slidably mounted thereon having a closed upper end forming a piston-chamber provided with an exhaust-passage leading therefrom one of such members having an inlet-passage leading to such piston-chamber, and means for opening and closing such inlet and exhaust passages.

2. In an apparatus of the class described, the combination of a piston, a piston-cylinder slidably mounted thereon having a closed upper end forming a piston-chamber provided with an exhaust-passage leading therefrom one of such members having an inlet-passage leading to such piston-chamber, and the other having an inlet-passage communicating with a source of fluid-supply such inlet-passages being adapted to be connected and disconnected by the movement of the cylinder with relation to the piston.

3. In an apparatus of the class described, the combination of a piston, a piston-cylinder slidably mounted thereon having a closed upper end forming a piston-chamber pro-

vided with an exhaust-passage leading therefrom one of such members having an inlet-passage leading to such piston-chamber and adapted to communicate with a source of fluid-supply, and a sleeve-valve mounted in the piston-cylinder and movable into and out of engagement with such exhaust and inlet passages.

4. In an apparatus of the class described, the combination of a piston provided with a fluid-inlet passage, a piston-cylinder slidably mounted thereon having a closed upper end forming a piston-chamber provided with an exhaust-passage leading therefrom and having an inlet-passage communicating with such piston-chamber and adapted to be moved with the cylinder into and out of connection with the inlet-passage in the piston, and means for opening and closing the exhaust-passage.

5. In an apparatus of the class described, the combination of a piston provided with a fluid-inlet passage, a piston-cylinder slidably mounted thereon forming a piston-chamber provided with an exhaust-passage leading therefrom and having an inlet-passage communicating with such piston-chamber and adapted to be moved with the cylinder into and out of connection with the inlet-passage in the piston, and a sleeve-valve slidably mounted in engagement with the inner wall of such cylinder and movable into and out of closed engagement with the exhaust and inlet passages in such cylinder.

6. In an apparatus of the class described, the combination of a piston, a piston-cylinder slidably mounted thereon provided with an upper portion closing the upper end and extending beyond the main body portion of such cylinder adapted to engage the bell-crank of a bell to be operated thereby such cylinder forming a piston-chamber having an exhaust-passage leading therefrom and one of such members having an inlet-passage leading into such piston-chamber, and means for opening and closing such inlet and exhaust passages.

7. In an apparatus of the class described, the combination of a piston, a piston-cylinder slidably mounted thereon forming a piston-chamber provided with an exhaust-passage leading therefrom one of such members having an inlet-passage communicating with such piston-chamber, and means for partially closing the admission-passage before the exhaust-passage is open during the stroke in one direction and movable into position to partially close the exhaust-passage during the return movement before the admission-passage is open.

8. In an apparatus of the class described, the combination of a fixed piston, a piston-cylinder slidably mounted thereon having a closed upper end forming a piston-chamber provided with an exhaust-passage, such piston and cylinder being provided with inlet-passages communicating with a source of fluid under pressure, and means for opening and closing such exhaust and inlet passages.

9. In an apparatus of the class described, the combination of a piston provided with an admission-passage communicating with a suitable source of fluid under pressure, a piston-cylinder provided with a closed upper end and an open lower end mounted upon such piston and having an exhaust-passage and an admission-passage adapted to communicate with such admission-passage in the piston when the cylinder is in one position and movable out of communication with such admission-passage when the cylinder is in a second position, and a sleeve-valve slidably mounted in such cylinder for covering and uncovering such exhaust and admission passages.

10. In an apparatus of the class described, the combination of a piston provided with a fluid-inlet passage and having an annular recess and an annular shoulder above and below such recess, a piston-cylinder in sliding engagement with such piston having a closed upper end and side walls forming a piston-chamber and provided with a passage in its side walls leading to such chamber and adapted to communicate with such inlet-passage in the piston, and a sleeve-valve mounted in the recess between the piston and cylinder-walls movable with the cylinder into and out of engagement with the shoulders upon the piston for opening and closing the fluid-passage.

11. In an apparatus of the class described, the combination of a fixed piston having a fluid-inlet passage and provided with an annular recess having annular shoulder portions forming the upper and lower ends of such recess, a cylinder closed at its upper end slidably mounted upon such piston forming a piston-chamber having a passage communicating with the space formed by such recess and provided with a passage having its lower end movable into and out of communication with the inlet-passage of the piston and its upper end opening into the recessed portion of the piston, and a sleeve-valve mounted in slidable engagement with the inner wall of such piston-cylinder and movable into and out of engagement with the upper end of such fluid-passage in the cylinder.

12. In an apparatus of the class described, the combination of a fixed piston having a fluid-inlet passage and provided with an annular recess having annular shoulder portions at the upper and lower ends of such recess, a cylinder closed at its upper end slidably mounted upon such piston forming a piston-chamber having a passage communicating with the space formed by such recess and provided with an exhaust-passage leading from the recess and an inlet-passage hav-

ing its lower end movable into and out of communication with the inlet-passage of the piston and its upper end opening into the recessed portion of the piston, and a valve slidably mounted in the recess formed between the piston and the walls of the piston-cylinder and movable with the piston-cylinder into and out of engagement with the shouldered portions of the piston for opening and closing the inlet and exhaust passages in the cylinder.

13. In an apparatus of the class described, the combination of a piston and piston-cylinder mounted in sliding engagement with each other and provided with fluid inlet and exhaust passages, and means for partially closing the admission-passage before the exhaust-passage is open during the upward movement of the cylinder and movable into position to partially close the exhaust-passage before the admission-passage is open during the downward movement of the cylder.

14. In an apparatus of the class described, the combination of a piston and piston-cylinder mounted in sliding engagement with each other and provided with fluid inlet and exhaust passages, and a piston-ring slidably mounted in engagement with the inner surface of the piston-cylinder movable into position to partially close the admission-passage before the exhaust-passage is open during the upward movement of the cylinder and movable into position to partially close the exhaust-passage before the admission-passage is open during the downward movement of the cylinder.

R. M. CROSBY.

Witnesses:
G. F. MATTHEWS,
J. P. BJERGE.