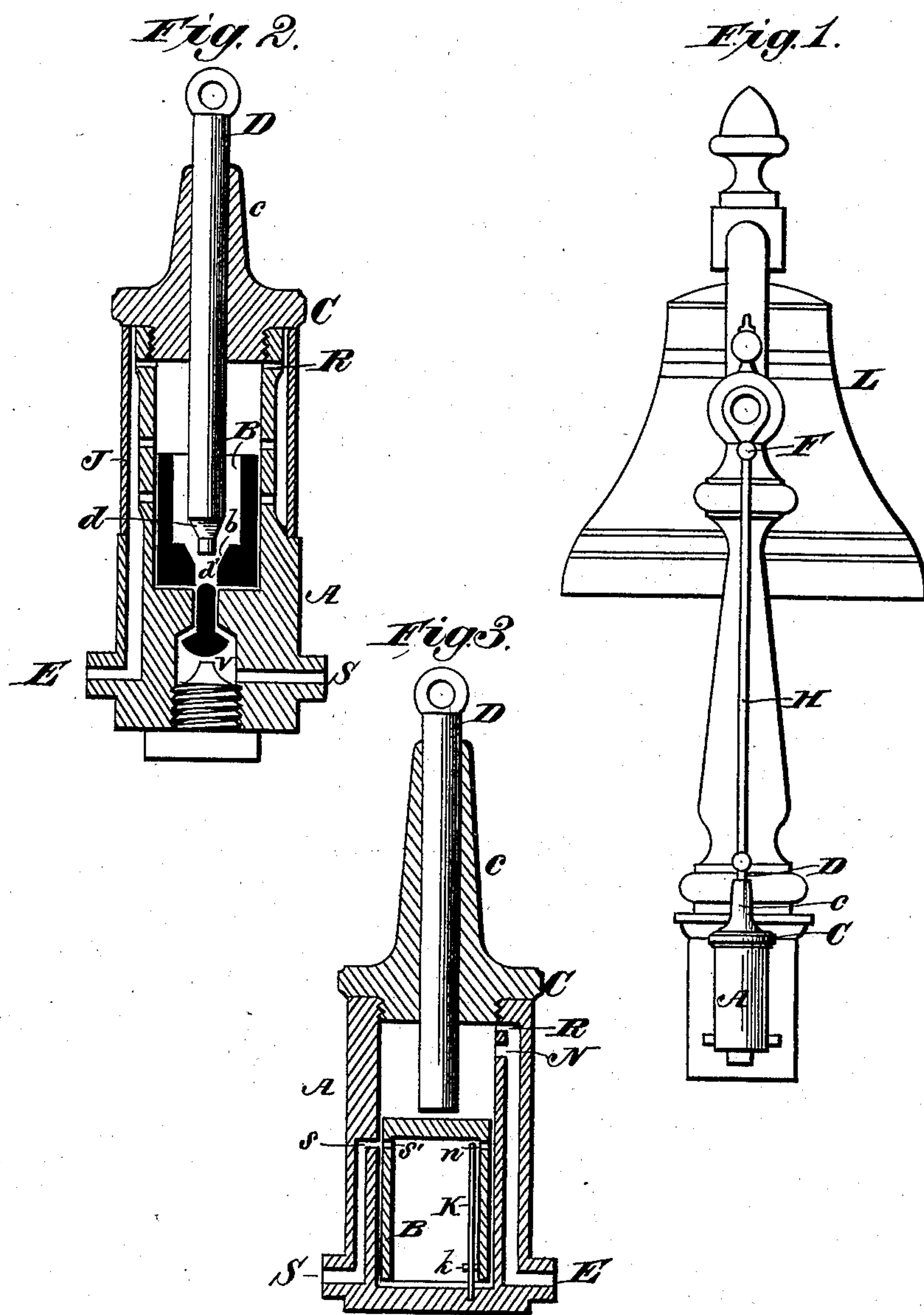


(No Model.)

G. B. SNOW.
STEAM BELL RINGER.

No. 384,095.

Patented June 5, 1888.



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UNITED STATES PATENT OFFICE.

GEORGE B. SNOW, OF BUFFALO, NEW YORK.

STEAM BELL-RINGER.

SPECIFICATION forming part of Letters Patent No. 384,095, dated June 5, 1888.

Application filed March 6, 1883. Serial No. 87,275. (No model.)

To all whom it may concern:

Be it known that I, GEORGE B. SNOW, residing in the city of Buffalo, in the county of Erie and State of New York, have invented a new and useful Steam Bell-Ringer, of which the following is a specification.

This invention relates to that class of steam bell-ringers in which the motor is a single-acting engine. Its object is to reduce, as far as possible, the friction and increase the durability and ease of operation of such apparatus.

It consists in substituting for the slotted rod shown in my patent of June 11, 1872, a connecting-rod having a round eye at either end for connection with the crank upon the bell-yoke and the piston-rod of the engine used as a motor, and in detaching the said piston-rod from its piston, so that it will not be limited in its motion by the stroke of the piston, and so that the connecting-rod and the piston-rod shall be wholly suspended from the crank-pin, instead of being upheld by friction induced by packing-rings and stuffing-boxes, as has heretofore been the case.

It also consists in seating the lower end of the piston-rod upon a central perforation through the piston, and thus forming an equilibrium-valve, so that the piston immediately upon the completion of its upstroke will drop to the bottom of the cylinder and there remain until steam is again admitted to the cylinder.

In the accompanying drawings, Figure 1 is an elevation of my device as applied to the bell of a locomotive. Fig. 2 is a central vertical section of a single-acting engine adapted for use as a motor with my present invention, in which a puppet-valve is used for the admission of steam, and the piston and its rod are shown to operate as an equilibrium-valve for facilitating the descent of the piston. Fig. 3 is a similar section of another form of single-acting steam-engine, also adapted for use in this connection, in which all valves are dispensed with, the piston admitting and exhausting steam from under itself.

In Fig. 1 there is shown upon the extremity of the bell-yoke a crank, F, fastened thereupon so as to be "on center" with and to point toward the cylinder A, as the bell L hangs per-

pendicularly. In locomotive practice the radius of this crank should be about two inches. The pitman H is jointed to the crank F by a round eye in the usual manner. The piston-rod D is jointed to the lower end of the connecting-rod H and slides freely in, at the same time fitting closely a sleeve, c, which forms a part of the cylinder-head C, making a fit which is practically tight against exhaust-steam. The piston-rod D and sleeve c bear such a proportion to each other and to the crank F that a complete revolution of the latter will not draw the rod D from its sleeve c. The piston B, contained in the cylinder A, has such a length of stroke that it reaches the upper end of the cylinder A at or about the time that the bell L has swung upward far enough to receive the stroke of its clapper, so that when the crank F has a throw of four inches the piston B will have a stroke of but little more than one inch. The piston-rod D is not attached to the piston B, but simply bears upon it, and can be drawn upward within the sleeve c as far as the motion of the crank F may carry it. (See Fig. 3.)

It will now be seen (without reference to any particular plan for admitting and releasing the steam) that if steam be admitted under the piston B it will drive it upward, and by means of the connection therewith of the piston-rod D, connecting-rod H, and crank F, it will swing the bell upward until the piston B reaches the upper end of its stroke, when the exhaust should open; but as the piston-rod D is detached from its piston the bell will be left free to continue its upward movement, carrying with it the crank F, connecting-rod H, and piston-rod D, until its momentum is spent, when its gravity will cause it to descend, forcing the piston to the bottom of the cylinder, when steam being again admitted as the crank F passes center, the bell will be swung upward on the other side of its vertical position, and thus it will continue to swing, receiving a stroke from its clapper for each impulse from the steam.

The crank F may be fastened upon the bell-yoke in such position that it will come to center and cause the engine to take steam as the bell is swung upward and at the point where it comes to a stop preparatory to again de-

scending, in which case one swing of the bell will be made by the impulse of steam and the resultant momentum, and the other swing by gravity and momentum, and the bell will give two sounds for each impulse it receives from the steam, and the effect will resemble ordinary hand-ringing, as described in my patent of July 11, 1854; but the position of the crank first described, which is the one set forth in my patent of June 11, 1872, is much preferable.

It is obvious that any single-acting steam-engine in which the piston-rod could be detached from its piston, and which is so arranged that the motions of the steam and exhaust valves are controlled by the piston, can be used as an element in the combination of parts above described. Such engines have been described in previous patents, and other forms will suggest themselves to the mechanic.

Referring to Fig. 2, the piston-rod D is shown as having a beveled shoulder, *d*, near the lower end, with an extension, *d'*, of small diameter projecting beyond the shoulder *d*. This shoulder seats upon a countersink, *b*, at the upper part of a central perforation through the piston B, and the extension *d'* extends through the piston for the purpose of striking and opening the steam-valve V. When the piston B is at the bottom of the cylinder, it encircles the tail of the valve V, but does not touch it, so that the valve can only be opened by contact with the piston-rod D as it is forced downward as the crank F passes center. The piston B is fitted practically steam-tight in the cylinder A, but moves freely, so that it will fall therein by its own gravity. The exhaust is effected by the piston B passing and uncovering a number of holes, N, in the side of the cylinder, which open into an annular chamber formed by the ferrule J, which encircles the upper part of the cylinder. Relief-passages R provide escape for steam or air from above the piston B into the same annular space from which the passage E leads to the open air. Steam is admitted through the opening S, which terminates in a chamber in the bottom of the cylinder which contains the valve V, which seats upward and has a tail projecting through a central steam-port into the cylinder.

If the engine shown in Fig. 2 be now connected to a bell, as shown in Fig. 1, and steam be applied, the bell will be swung upward by the piston, as before described. The exhaust-ports being uncovered, as the piston reaches the top of the cylinder the steam will escape, and the current so established will carry the valve V to its seat. The piston-rod continuing its upward movement, the equilibrium-valve *d b* will open, and, a balance of pressure upon the piston being established, the piston will drop to the bottom of the cylinder and remain there until the steam-valve D is reopened by the descent of the piston-rod D.

It will be observed that the friction of the moving parts is here reduced to its least

amount, as the piston is free to drop in the cylinder when the steam-pressure leaves it, and the piston-rod is also free to descend in its sleeve. There remains only the friction due to the lateral pressure of the piston-rod in the sleeve, owing to the obliquity of the connecting-rod and the friction of the journals at either end of the said rod H.

Referring to Fig. 3, the piston B is made in the form of an inverted cup, having a hole, S', through its side near the top, which, when the piston is at the bottom of the cylinder, coincides with the port S in the side of the cylinder. A hole, N', opposite the hole S' in the piston similarly coincides with the exhaust-port N when the piston is at the top of the cylinder. The piston B may be prevented from turning and the coincidence of the holes S' N' with their respective ports S N secured by any one of a variety of expedients. There is shown for this purpose a pin, K, fastened in the cylinder-bottom and extending upward inside the piston, which is straddled by two pins, *k k*, in the lower edge of the piston B. The piston-rod D simply bears upon the flat top of the piston B without being secured thereto, as shown.

In the operation of this engine the steam is immediately cut off as the piston begins to rise, and the work is done entirely by the expansion of the steam included in and under the piston. So as the piston descends after exhausting, the exhaust-opening is at once closed, and the residual steam compressed; but by allowing proper space under the piston the compression will not be so great as to affect the operation of the engine, and so little steam is used that the waste is unappreciable.

A piston like the one shown in Fig. 3, with a central striking-pin to open the valve V, Fig. 2, may be adapted, with its piston-rod and long-sleeved cylinder-head to the cylinder shown in Fig. 2, the holes S' N' being suppressed and the exhaust being effected by the piston passing the holes N, Fig. 2. If the apparatus is to be operated by steam, the plan shown in Fig. 2, with the equilibrium-valve, insures the escape of the water of condensation, and is preferable on that account; but when compressed air is substituted for steam, as is often the case, very good results are obtained by the more simple plan shown in Fig. 3, or the modification above suggested.

I claim as my invention—

1. In a steam bell-ringer, the combination of a piston-rod operating through a sleeve on a cylinder-head and formed with a beveled shoulder near its lower end, and a piston formed with a countersink for engagement with the beveled shoulder on the piston-rod, the said piston-rod being wholly disconnected from the piston, substantially as described.

2. The combination, with a single-acting engine having its piston and piston-rod separate and capable of independent motion, of a connecting-rod and a crank attached to the yoke

of a swinging bell, the said crank and piston-rod having a greater throw than the said piston, substantially as described.

3. In a steam bell-ringer, the combination
5 of a piston-rod and piston separate and detached from each other and capable of independent motion, said piston-rod having a

greater throw than its piston, and seating thereupon to form an equilibrium-valve, substantially as described.

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Witnesses:

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