

2 Sheets--Sheet 1.

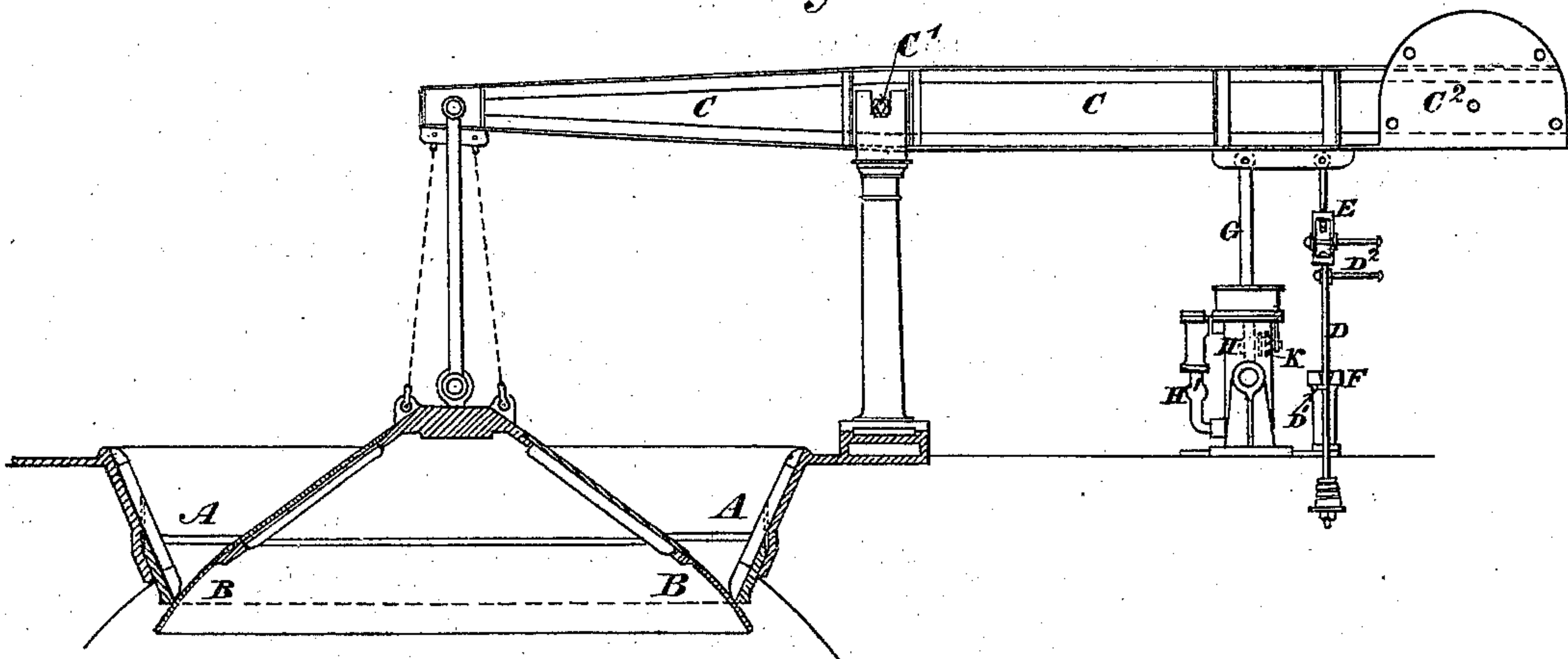
T. WRIGHTSON.

Apparatus for Lowering Weights.

No. 143,802.

Patented Oct. 21, 1873.

Fig. 1.



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Fig. 2.

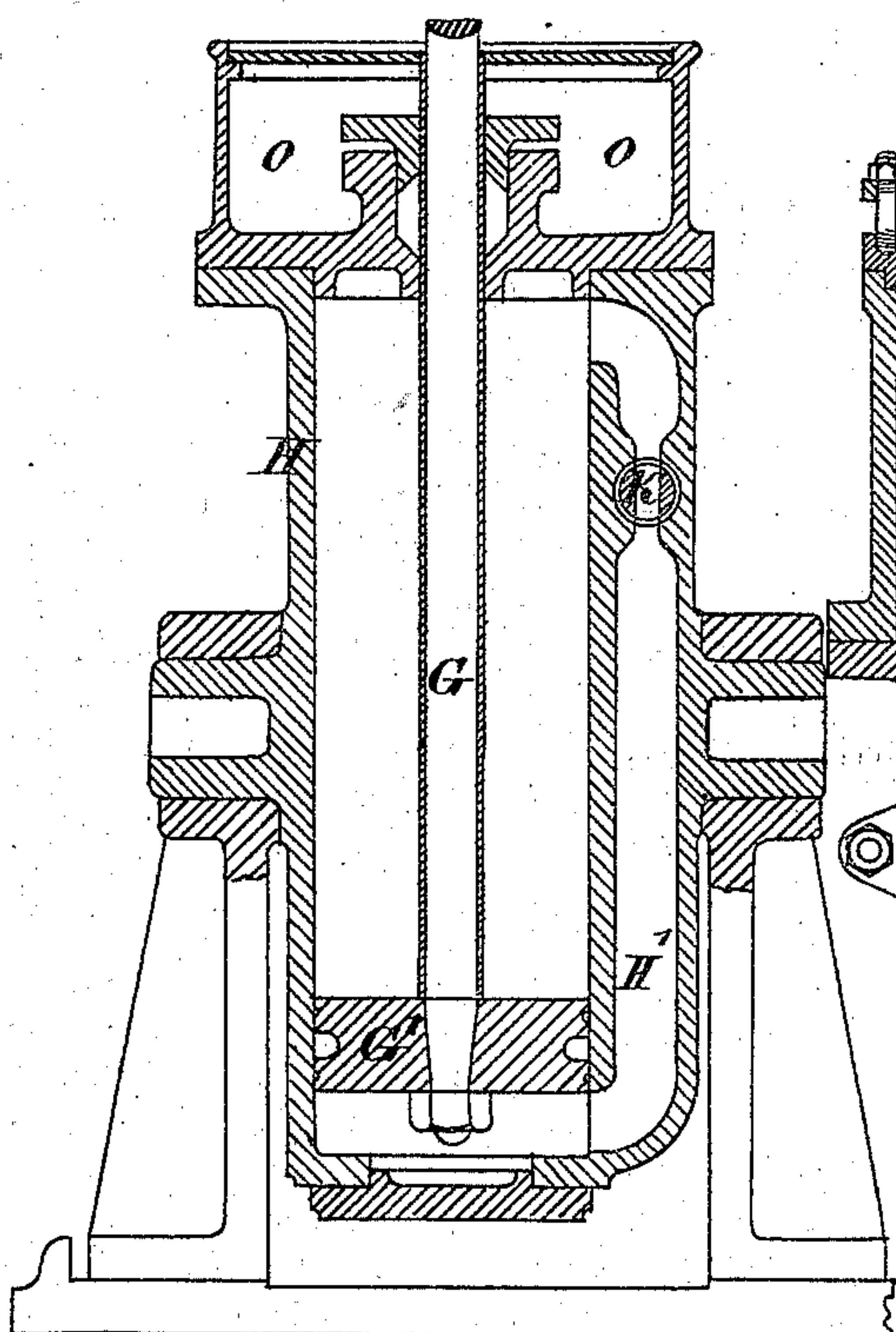


Fig. 3.

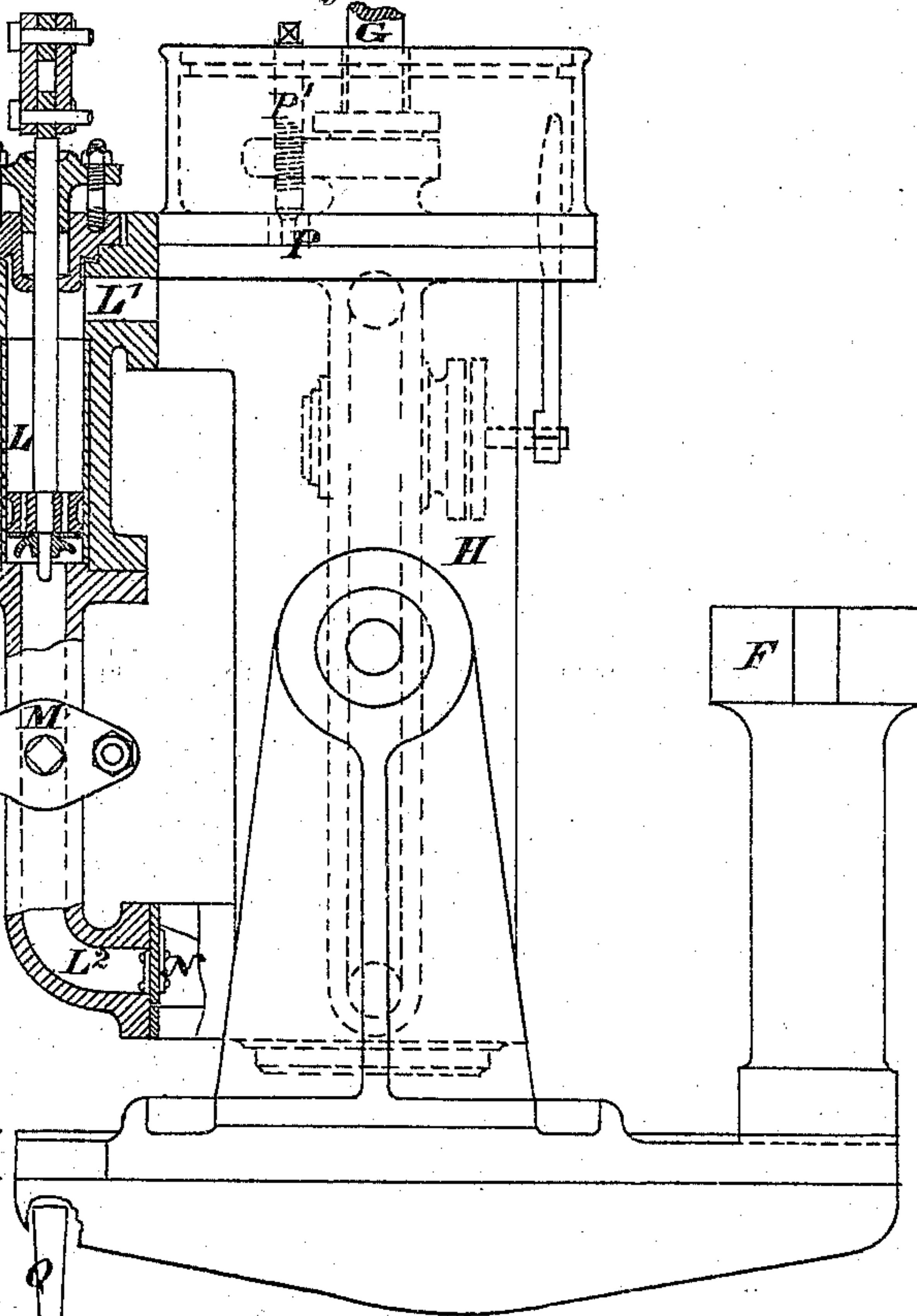
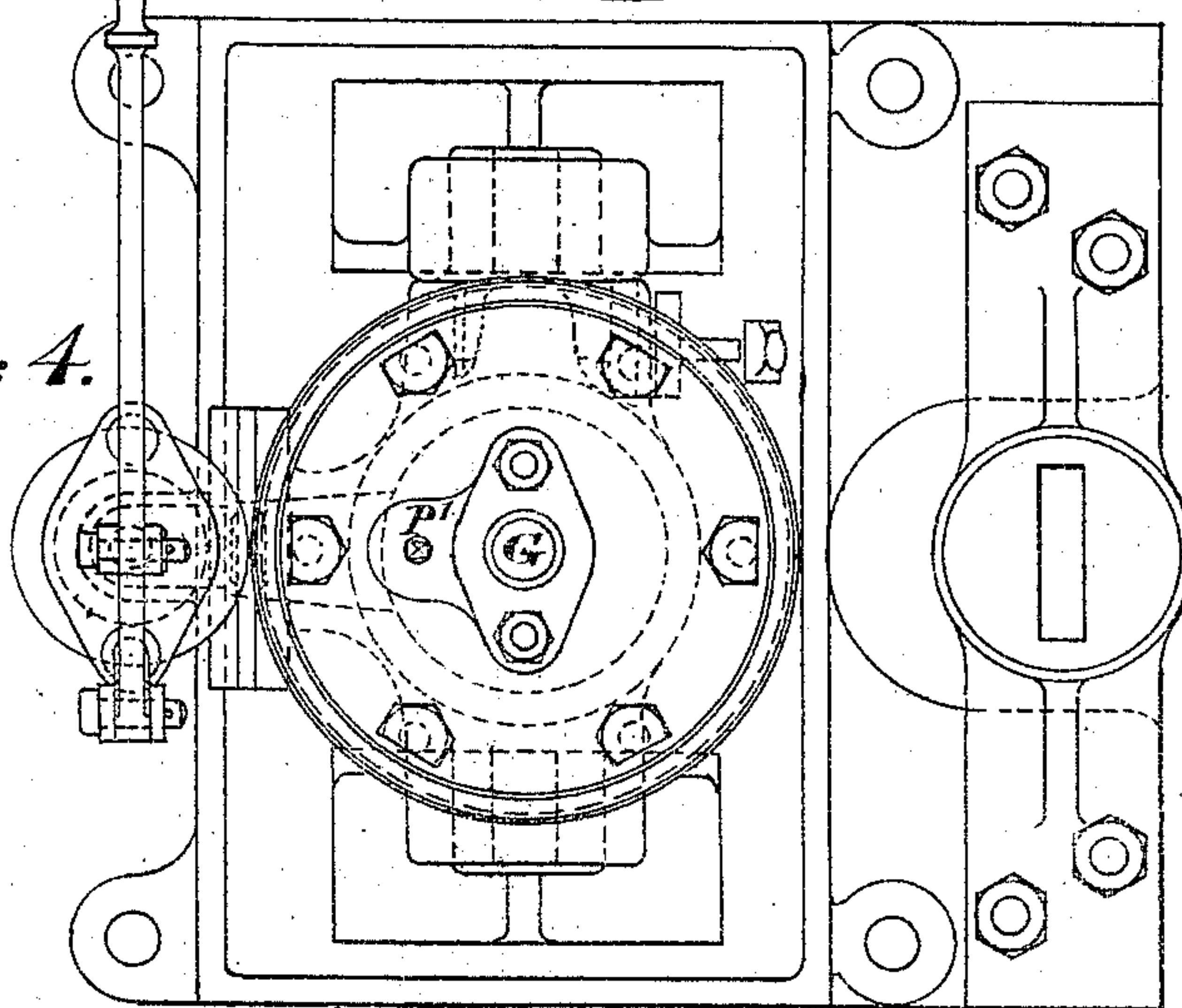


Fig. 4.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN APPARATUS FOR LOWERING WEIGHTS.

Specification forming part of Letters Patent No. **143,802**, dated October 21, 1873; application filed
September 13, 1873.

To all whom it may concern:

Be it known that I, THOMAS WRIGHTSON, of the Teesdale Iron Works, Stockton-on-Tees, in the county of Durham, England, a subject of the Queen of Great Britain, have invented or discovered new and useful Improvements in Apparatus for Lowering Weights; and I, the said THOMAS WRIGHTSON, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof—that is to say:

This invention has for its object improvements in apparatus for lowering weights; and the improvements relate chiefly to apparatus for lowering the charges into blast-furnaces.

For lowering the charges into blast-furnaces I employ an ordinary bell and hopper at the top of the blast-furnace, such as is now commonly employed. The bell is attached to one end of a lever. The weight of the bell is balanced by a heavy weight at the other end of the lever, the movements of which are slightly in excess of those of the bell when empty, so as to keep it always shut. When the charge is put into the hopper and rests on the bell the bell would descend, but it is held by a locking apparatus at the other end.

The means I adopt for governing the lowering of the charge is as follows: The lever is coupled with a piston working in a small hydraulic cylinder in such manner that the piston must rise in the cylinder to allow the bell to descend, and this is regulated by opening a valve in a pipe or passage leading from one end of the cylinder to the other, so as to allow water to pass from the top to the bottom of the piston at any required speed, according as the valve is more or less opened.

In some cases a lump of material larger than the others gets wedged in so that the bell will not close. To remedy this I apply on one side of the cylinder a small hand-pump, the barrel of which is open to the top and bottom of the cylinder. The plunger of the pump is fitted at the bottom with an india-rubber flap or other kind of clack-valve. By moving this plunger up and down a few times the water is drawn from the top into the bottom of the cyl-

inder, thus forcing up the piston and lowering the bell to any required extent. When this pump is not being worked the passage of water through the pump-barrel is stopped by the closing of a valve. A flap valve or clack may be placed between the under side of the pump-piston and the bottom of the cylinder, to prevent the water coming back during the stroke of the pump. When the bell is quite closed the locking apparatus prevents its moving when the charge is being thrown on. The apparatus may be worked with oil or water.

Where sufficient pressure of water can be obtained I dispense with the side pump and use a valve of such a form that the pressure can be admitted to the under side of the piston, thus lowering the bell.

Having thus described the nature of my invention I will proceed to describe more fully the manner of performing the same.

In the drawings hereunto annexed I have shown apparatus, such as is above described, for lowering charges into a blast-furnace. Figure 1 shows a side elevation of the apparatus, partly in section. Fig. 2 shows, on a larger scale, a vertical section of the hydraulic cylinder. Fig. 3 shows a side elevation, partly in section; and Fig. 4 a plan view of the same.

A is the hopper at the top of the blast-furnace; B, the bell for closing the same. This bell is suspended from one end of a lever-beam, C, turning on a fulcrum at C'. At the opposite end of the lever is a weight, C², to over-balance the weight of the bell. To this end of the lever is also jointed a rod, D, by which the lever C can be locked, and the bell thus retained from descending when the charge is put into the hopper. This rod can be lengthened or shortened by the screw-coupling E. On the rod D is an arm, D¹, which, by turning the rod by the arm D² upon it, can be brought under a fixed stop, F, as shown at Fig. 1. The end of the lever has also jointed to it the upper end of the piston-rod G, the piston on which works in the hydraulic cylinder H. This cylinder is supported on trunnions, as shown. H' is a pipe or passage connecting the top and bottom of the cylinder. In this pipe or passage is a regulating-tap, K, by opening which more or less the flow of liquid from

one end of the cylinder to the other can be governed. L is the barrel of a small hand-pump, the upper end of which is connected by the passage L¹ with the top of the cylinder H; while the lower end of the pump-barrel is connected by the pipe L² with the bottom of the cylinder. In this pipe is a stop-valve, M, by which the passage of liquid from one end of the cylinder to the other can be entirely closed when the pump is not in use. N is a valve for preventing liquid passing from the bottom of the cylinder into the pipe L². O is a small supply-tank for containing a supply of liquid to replace any leakage which may take place. P is a valve, which can be opened and closed by the screw P', to open or close the communication between the cylinder and supply-tank.

The action of the apparatus is as follows: When the bell B is closing the bottom of the hopper A the piston G' is at the bottom of its stroke in the cylinder H, and the beam is retained by the locking-rod D, as before explained. When a charge has been placed into the hopper the rod D is turned to release the lever-beam, and the bell then descends, its descent being controlled by the degree to which the regulating-valve K is opened. When the charge has descended from the hopper into the blast-furnace the lever is brought back by the counter-balance weight upon it, and the bell is caused to again close the bottom of the hopper.

If, as in some cases happens, a lump of material gets wedged in between the bell and the hopper, so that the bell cannot close, the regulating-tap K is closed, the valve M opened, and the plunger of the pump-barrel is worked to and fro by the pump-handle Q, and liquid is drawn from the top and forced into the bottom of the cylinder, thus forcing up the pis-

ton G' and lowering the bell to any required extent. When the obstruction has been removed the regulating-tap K is again opened and the bell is so allowed to rise, and when it closes the bottom of the hopper it is again locked, as before explained.

As before stated, the side pump L may be dispensed with in cases where a continuous supply of water under sufficient pressure for raising the piston G' can be obtained. In this case a valve for controlling the admission of water under pressure to the bottom of the hydraulic cylinder is employed in place of the pump, and a small tap for permitting the exhaust water from the top of the cylinder to escape.

A similar arrangement of lowering apparatus to that hereinbefore described may be employed for lowering wagons in blast-furnace plants, and for lowering other weights. In such cases the platform on which the wagon or other weight is supported takes the place of the bell B of the apparatus above described.

Having thus described the nature of my invention and the manner of performing the same, I would have it understood that what I claim is—

1. The combination, substantially as before set forth, of the bell, the locking-rod, and stop, the hydraulic cylinder, the piston thereof, and the regulating-tap.

2. The combination, substantially as before set forth, of the bell, the locking-rod, and stop, the hydraulic cylinder, and piston, and the means for forcing water beneath the hydraulic piston.

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Witnesses:

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