(No Model.) 2 Sheets—Sheet 1.

S. T. WELLMAN.

INGOT PUSHER.

No. 418,999. Patented Jan. 7, 1890.

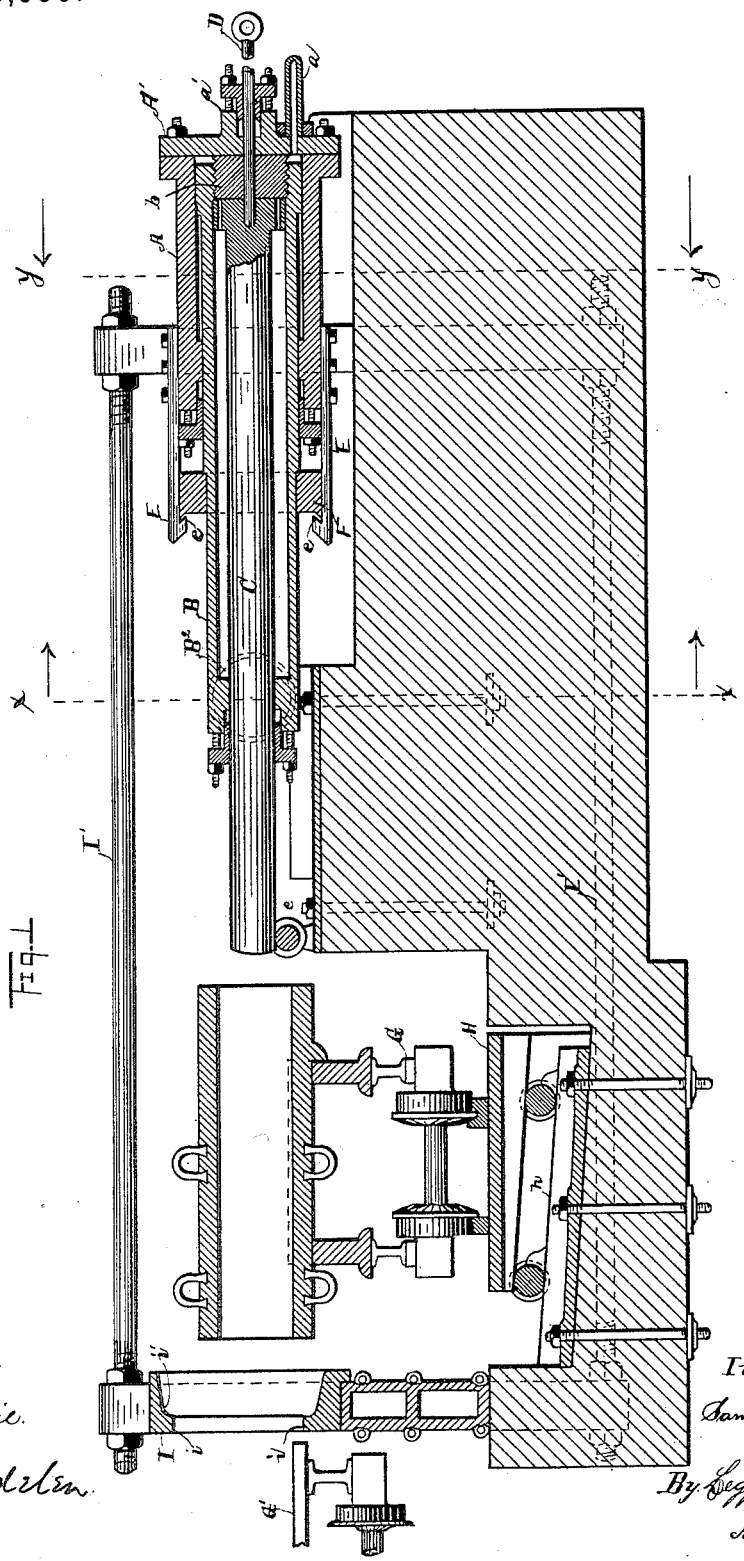

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3

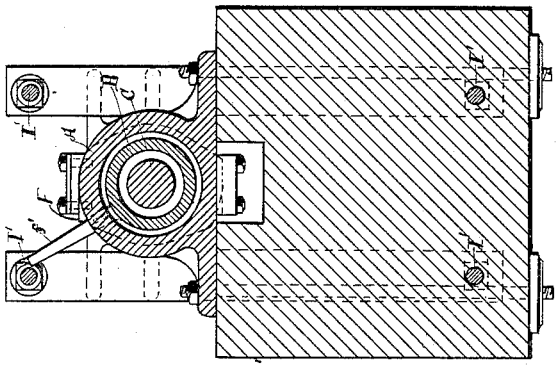


Fig. 4

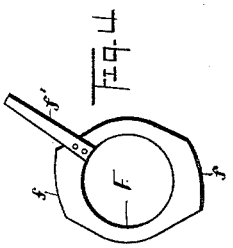
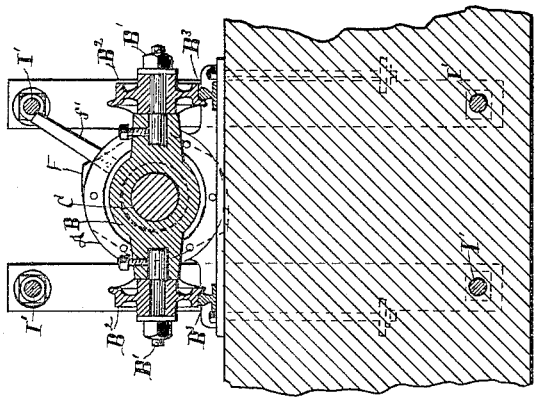


Fig. 2



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UNITED STATES PATENT OFFICE.

SAMUEL T. WELLMAN, OF CLEVELAND, OHIO.

INGOT-PUSHER.

SPECIFICATION forming part of Letters Patent No. 418,999, dated January 7, 1890.

Application filed June 27, 1889. Serial No. 315,726. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL T. WELLMAN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Ingot-Pushers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in hydraulic so-called "ingot-pushers," in which is employed a hydraulic ram having larger and smaller telescoping plungers, with means for locking or holding inoperative the larger plunger, to the end that lighter work may be done with the smaller plunger, requiring a comparatively small quantity of water, and by releasing the larger plunger the aggregate force of the two plungers may be employed for heavy work.

My invention also relates to details of construction hereinafter described, and pointed out in the claims.

Steel ingots are more commonly cast in open-ended tapering iron molds, and sometimes an ingot "sticks" in the mold, so that considerable force is required to push the ingot out of the mold, and occasionally very great power is required for the purpose. If a hydraulic ram were employed having a single plunger of sufficient capacity for the exceptional heavy work, there would accrue a great waste of power in operating such ram for lighter work, as the same quantity of water under pressure would be expended in operating the ram whether the latter was doing its maximum work or doing merely nominal work. I have therefore devised the hydraulic ingot-pusher illustrated in the accompanying drawings.

Figure 1 is a side elevation in section. Figs. 2 and 3 are elevations in transverse section, respectively, on lines $x\,x$ and $y\,y$. Fig. 4 is a detail of the locking-collar, the same being an end elevation.

A represents a horizontal hydraulic cylinder, in which operates, primarily, plunger B, the latter being a hollow cylinder. In the bore of plunger B operates the secondary or smaller cylinder C. The outer end of plunger C is supported by roller c, the latter having a circumferential groove adapted to fit the periphery of the plunger, the trunnions of the roller being journaled in suitable stationary boxes. Plunger B has lateral trunnions or cross-heads B′, on which are journaled flanged wheels B^2, that travel on tracks B^3, by means of which the outer end of the larger plunger is supported and guided in its reciprocations. The inner end of plunger B is provided with a bushing b, that so far reduces the bore of this plunger that the bushing overlaps the end of plunger C, whereby, in reversing plunger C, plunger B, if it has been advanced, is necessarily returned to its place of beginning by reason of plunger C engaging the bushing. A rod D is shown extending through the bore of the bushing, this rod being attached to the end of plunger C. This rod extends out through a stuffing-box a' of cylinder-head A′, this rod being used for returning the plungers inward. A cable (not shown) may connect with this rod, such cable leading over sheave and with weights attached, or other appliances, according to circumstances, may connect with this rod for effecting the return of the plunger. Pipe a serves for induction and eduction purposes.

Heavy locking-bars E are attached to cylinder A, these bars having internal shoulders e for engaging locking-collar F. The latter is journaled on plunger B and engages shoulder b' of the plunger. This collar is of variable thickness, as shown in Fig. 4, the thicker section f being adapted, when in position, to engage shoulder e of the locking-bar. By rotating this collar on its axis a quarter-turn the thinner sections of the collar are brought opposite shoulders e, and these thinner sections may pass without contact with such shoulders. The collar is provided with a reversing-lever f'. Such of the ingots as cannot be discharged from the molds by ordinary means are loaded upon the car and transferred to the "pusher," a suitable car for the purpose being shown at G, the ingot being brought in line with plunger C. Car G, when in position in the machine, rests on table H, the wheels of the latter traveling on inclined tracks h. A second car G′ is usually placed in position to receive the ingot when the lat-

ter is pushed out of the mold. A heavy iron abutment I is connected by tie-rods I′ with cylinder A, the former having an opening *i* of sufficient size for the passage of the ingot and having a recess or sunken seat *i′* around the opening for receiving the larger end of the mold. The mold is shown at J and the ingot at J′. I will remark that the ingots are usually cast of approximately-uniform thickness adapted to enter the reducing-rolls; but the width and length of the ingots may vary indefinitely, according to the desired weight of the ingots. If the thickness of the ingots is, say, fourteen inches, the lateral dimensions of opening *i* and seat *i′* are made accordingly, while the vertical dimensions of the opening and seat should be such as to accommodate the largest ingots and molds made and used in the establishment. The walls of seat *i* flare outward, so that the mold readily enters, and the ingot is thereby brought in central position laterally of opening *i*. The larger plunger is usually locked, and the smaller plunger is applied to the end of the ingot, the mold and ingot being, of course, set edgewise on the car, with the smaller end thereof presenting toward the plunger. The first effect of the plunger as it advances is to push the table up the incline and enter the mold into the seat *i′*, and when the mold becomes firmly seated in the recess the further advance of the plunger pushes the ingot out of the mold and discharges the ingot upon car G′. In most instances the smaller plunger will do the work; but in a few exceptional cases the larger plunger is unlocked and brought into use for the purpose.

It is obvious that a great saving of motive force is effected by using the small plunger alone in cases where such plunger will do the work. In case of a single plunger such plunger would have to be of the same diameter as plunger B, in order to do the exceptionally-heavy work, and such larger plunger would require the same amount of water to operate it whether it was doing light or heavy work. As soon as the ingot has been discharged from the mold, table H returns by gravity to its normal position, thereby bringing the tracks in line on which car G travels, and at the same time retiring the mold from recess *i′*.

What I claim is—

1. In hydraulic so-called "ingot-pushers," in combination, horizontal hydraulic cylinder provided with plungers of unequal diameters, the smaller plunger operating in the bore of the larger plunger, and means for locking the larger plunger, substantially as set forth.

2. In hydraulic ingot-pushers, in combination, hydraulic cylinder provided with two plungers, the smaller plunger operating in the bore of the larger plunger, with means for locking the larger plunger, and an abutment for engaging the mold, such abutment having an aperture for the passage of the ingot in discharging the latter from the mold by means of the plunger or plungers, substantially as set forth.

3. In combination, hydraulic cylinder provided with plungers of unequal diameters, the smaller plunger operating in the bore of the larger plunger, and locking-bars connecting with the cylinder, such locking-bars having shoulders for engaging the locking-collar, such collar being mounted on the larger plunger and having sections adapted to engage or be disengaged from the shoulders of the locking-bars, according to the rotative position of the collar, substantially as set forth.

4. The combination of hydraulic cylinder provided with larger and smaller plungers, the latter operating in the bore of the former, the larger plunger, by means of a reduced bore at the inner end thereof, being adapted to engage the inner end of the smaller plunger, and a rod connected with the smaller plunger and extending outside the cylinder for applying power to reverse the plungers, substantially as set forth.

5. In hydraulic so-called "ingot-pushers," in combination, horizontal hydraulic cylinder provided with plungers of unequal diameters, the smaller plunger operating in the bore of the larger plunger, substantially as set forth.

In testimony whereof I sign this specification in the presence of two witnesses.

SAMUEL T. WELLMAN.

Witnesses:
N. C. BOVEE,
W. F. SWASEY.