(No Model.)

J. WEST.

TYPE CASTING PUMP.

No. 554,406. Patented Feb. 11, 1896.

Fig. 1.

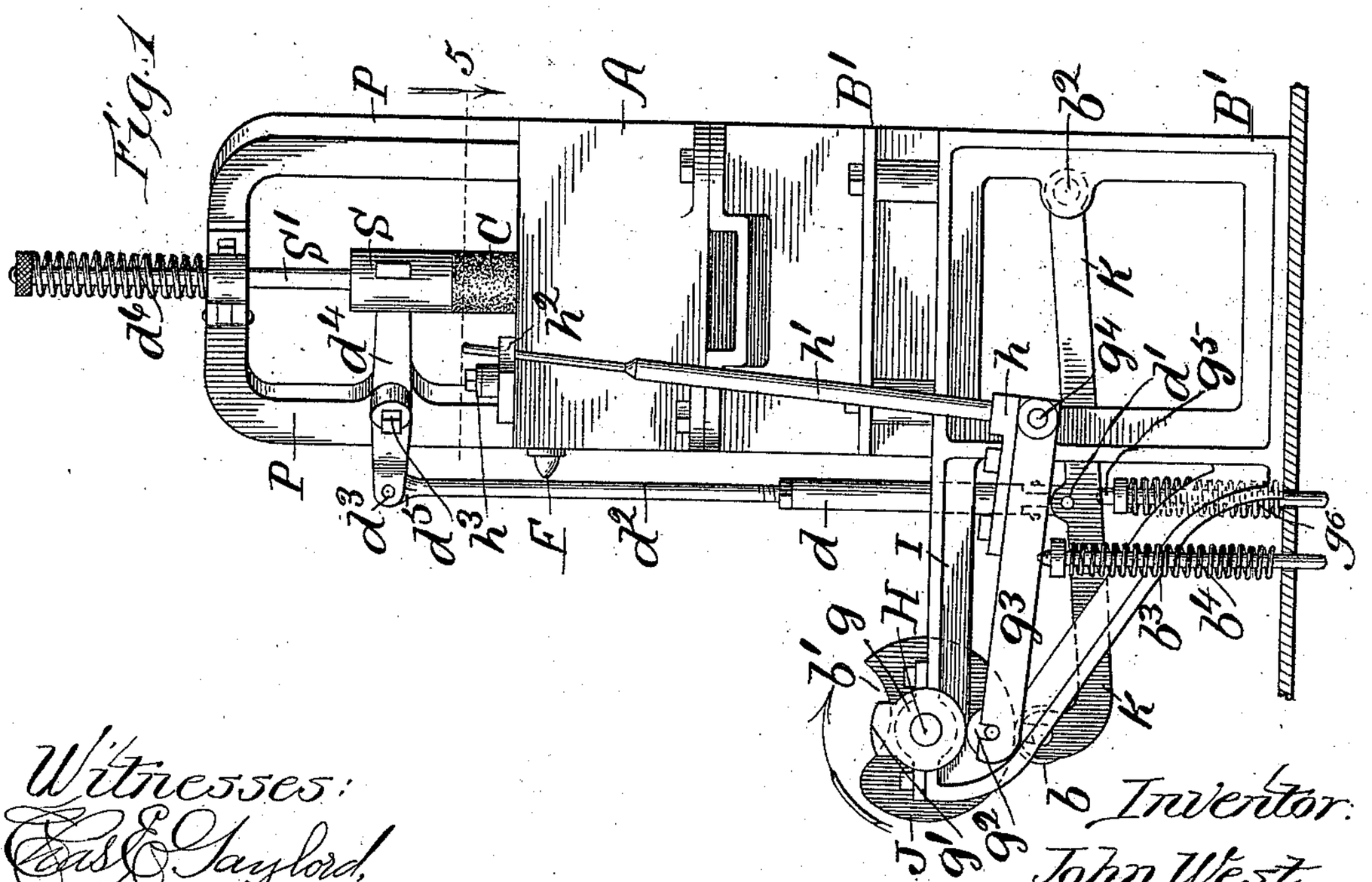


Fig. 2.

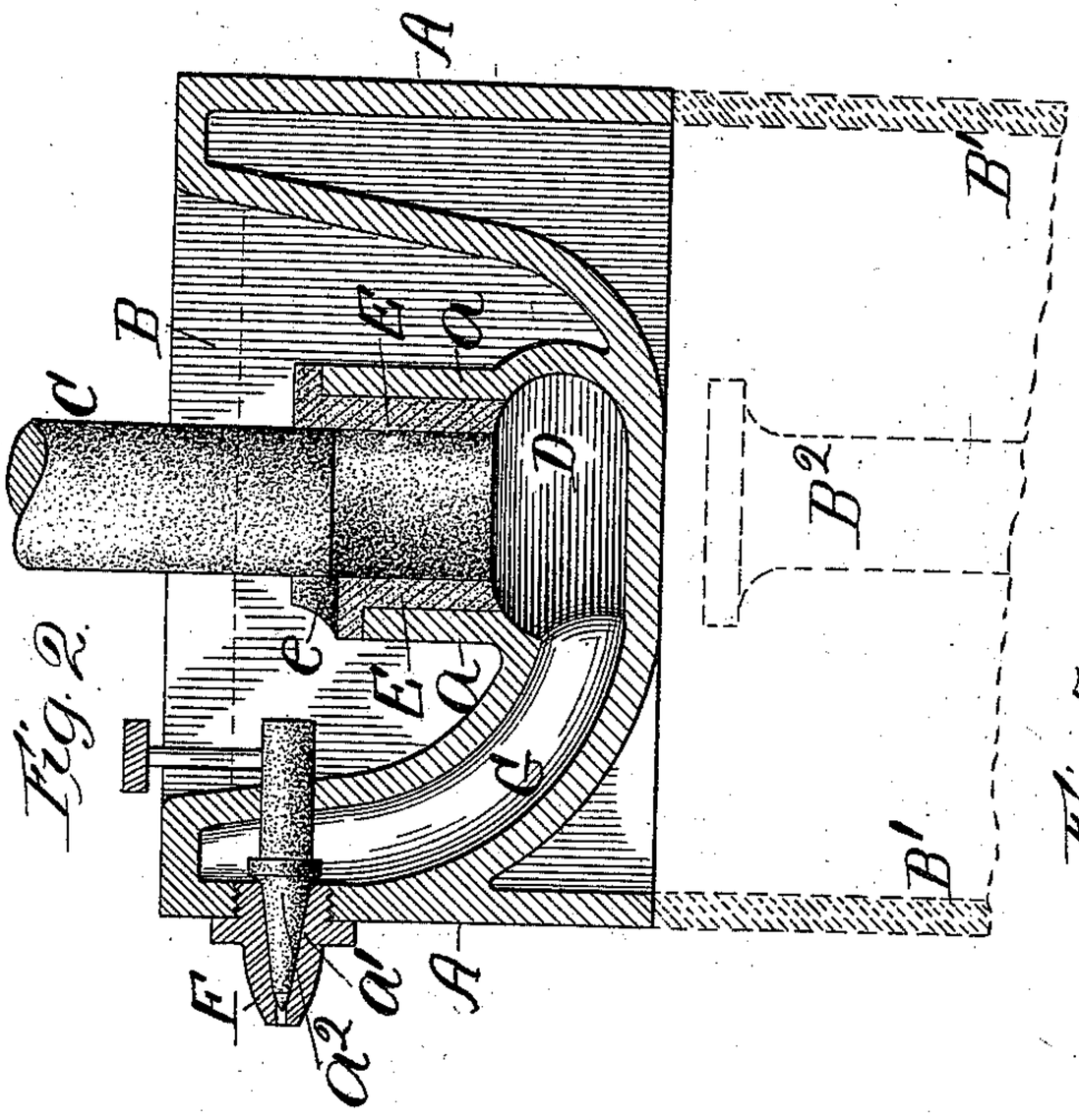
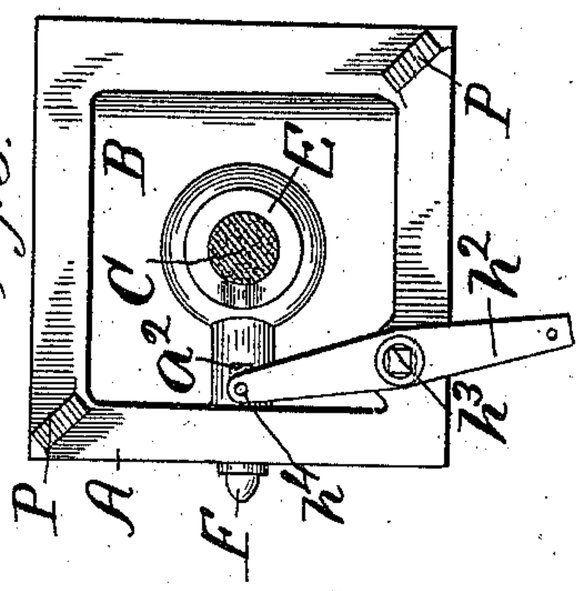


Fig. 3.

Fig. 4.

Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN WEST, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE INDESTRUCTIBLE TYPE COMPANY, OF SAME PLACE.

TYPE-CASTING PUMP.

SPECIFICATION forming part of Letters Patent No. 554,406, dated February 11, 1896.

Application filed June 1, 1895. Serial No. 551,367. (No model.)

To all whom it may concern:

Be it known that I, JOHN WEST, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Type-Casting Pumps; 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 appertains to make and use the same.

This invention relates to improvements in that class of pumps used by type-founders for injecting molten metal into type-casting machines, and has for its object to provide a pump or apparatus of this character with certain features that will permit of the use of a much harder type-metal than is possible under the ordinary arrangement.

The difficulty met with in attempting to cast type from a harder metal or alloy than is ordinarily used is that the molten metal will adhere to the plunger or driver and other working parts and surfaces with which the metal has contact, causing the plunger and other parts to clog and stick in their working position, thus rendering the operation impracticable. Under the ordinary arrangement the piston, the contracted cylindrical neck-passage through which it works, and the valve-plug closing the discharge-passage into the mold have been composed of metal.

The object therefore of this invention is to provide a pump-plunger and other moving parts and surfaces with which the molten metal has contact of a refractory and non-adhesive material or substance to which the molten metal will not adhere or have the effect of soldering the parts together and thus preventing successful working.

Mechanism for operating the pump is also shown in the drawings and set forth in the specification.

In the drawings, Figure 1 is an elevation of a pump apparatus embodying my improved features; Fig. 2, a vertical broken-away section through the metal-reservoir and well-chamber; Fig. 3, a detached elevation of a valve-plug; Fig. 4, a broken-away detail of construction; and Fig. 5, a horizontal section on line 5, Fig. 1, looking in the direction indicated by the arrow.

A represents a casing; B, the metal-reservoir inclosed thereby, and B′ a supporting base, to the lower part of which is attached the pump-operating mechanism.

The inclosing base-support is open for the introduction of a gas or other burner B^2 for the purpose of reducing the metal and maintaining it in the required molten or fluid state. The relative position of the burner or heating attachment, with reference to the metal-holding reservoir, is indicated by dotted lines in Fig. 2.

The pump plunger or piston C is composed of a carbon composition or other suitable non-metallic or non-adhesive material to which the molten metal will not adhere or solder the plunger in its working passage. Some qualities of crucible material, fireclay and asbestos, the carbon compound used for electric lights, and other refractory materials have been found available.

The metal-reservoir is provided with a well-chamber D, having a neck-part extension *a* in which the plunger works. The plunger being necessarily close-fitting in the cylindrical neck-passage to the well-chamber, it is obvious that the inclosing wall of the neck or throat passage should be of the same or similar material as that entering into the composition of the plunger, or material of like expansion under the influence of heat. The cylindrical plunger-passage is therefore provided with a lining E, Figs. 2 and 5, composed of carbon composition, or other non-metallic material, that will resist the soldering or clogging action of the molten metal, no matter how hard the type-metal or alloy may be; or the lining E may be of compressed asbestos or slag, or some material which contracts under heat, and thus maintain approximately the same plunger-pressure at varying temperature.

The soft type-metal that is ordinarily used will not adhere to a metal plunger or other working parts which the molten type-metal comes in contact with. Hence there was no necessity for an improved pump for soft metal. The attempt, however, to successfully use a harder type-metal or alloy has always proved a failure for want of a pump that would successfully work a hard alloy. The

introduction of type-setting machines has made it desirable that a harder and more durable type be produced.

A nozzle F, through which the type-metal is injected into the casting-molds, (not shown,) is inserted in the casing at one side, Fig. 2, and communicates with a passage G leading outwardly from the well-chamber, and through which the metal is forced on its way to the mold by the action of the plunger. This nozzle is provided with a tapering passage a' therethrough. Into this passage through the nozzle, from the inner side, is loosely inserted the correspondingly-tapering end of a valve-plug a^2, adapted to have a reciprocating endwise movement in opening and closing the passage through the nozzle coincident with the movement of the pump-plunger, and prevent any outflow of the metal when the molds have receded and the plunger is on the upstroke. This valve-plug is also composed of the same or like quality of material entering into the composition of the plunger and its inclosing wall.

It is obvious that the neck part through which the plunger works may be made solidly of a non-metallic composition instead of being lined therewith and having a metal backing, as shown.

It is also obvious that, as there are so many different forms of carbon and similar non-metallic substances or compositions thereof from which the plunger and other parts named might be made and work equally as well, it is not necessary to give any particular form or composition, as any material or composition that is capable of withstanding the action and soldering effect of a hard-metal alloy will answer the purpose.

The mechanism for operating the pump will next be described.

A driving-shaft H is journaled in a bracket extension I of the supporting-base. A cam-wheel J is rigidly mounted on this shaft and has frictional contact with a roller b journaled in the outer end of a lever K and lying in the path of the cam-wheel. This cam is cut out on one side to form a recess b', as shown in Fig. 1. The inner end of lever K has a pivotal connection with the base, as at b^2. The upper end of a rod g^5 is secured to the under side of lever K near its longitudinal center. A spring g^6 is coiled and bears upward on rod g^5. The lower end of a tubular rod d is pivoted to the upper side of lever K, as at d'.

The lower end of a connecting-rod d^2 has a threaded engagement with the joining end of a rod d to permit of the same being shortened or lengthened, as circumstances may require in practical working. The upper end of rod d^2 is pivoted, as at d^3, to the outer end of a pump-lever d^4, provided with a fulcrum-bearing d^5 in a bridge P, mounted on top of the casing or reservoir. The inner end of lever d^4 is secured in the plunger-head S. A plunger-rod S′ extends down through bridge P and has its lower end secured in the plunger-head. The upper part of the plunger-rod extending above the bridge-support has a spring d^6 coiled thereon.

The pump-plunger is shown in its uppermost position and the operation is as follows: As the driving-shaft is rotated, the recessed or low part of the cam-wheel J in due time reaches the outer end of lever K and permits the same to be forced upwardly by the action of its spring-bearing on the under side. This movement has the effect of forcing the pump-plunger downwardly through the medium of the connection described. The up or return movement of the plunger is accomplished by the automatic action of the spring d^6 on the plunger-rod, which has been compressed by the plunger on its down movement. When the plunger is at the end of the upstroke, a port e, Fig. 2, is uncovered and momentarily permits the molten metal to flow from the reservoir to the well-chamber. The plunger on its downstroke closes this port, cuts off the flow, and injects a charge of metal into the molds.

The mechanical means employed for imparting a reciprocating movement to the valve-plug working in the injector-nozzle will be next described.

A second cam-wheel, g, is mounted on the driving-shaft and is provided with the enlarged part g'. A roller g^2 is journaled in the outer end of a lever g^3, the opposite end of which is pivoted to the base, as at g^4. The upper end of a rod b^3 is secured in the under side of lever g^3 near its longitudinal center, the lower end extending down through the floor and being unattached, so as to hang loosely in position and permit of a limited endwise movement. A spring b^4 is coiled on this rod and is adapted to be compressed when the rod is forced downwardly. An adjustable slide-plate h is bolted on the inner end of lever g^3 and has the lower end of a rod h' secured therein. The upper end of this rod connects with the outer end of a lever h^2 and is secured on the top of the reservoir-casing by a pivot-bolt h^3, Figs. 1, 4 and 5. The inner end of this lever is connected with the valve-plug by means of a rod h^4. When the enlarged cam part g' comes in contact with and depresses the outer end of lever g^3 against the pressure of its spring, it has the effect of tilting the upper end of rod h' and swinging the outer end of lever h^2 in the same direction and withdrawing the valve-plug from its closed position, (shown in Figs. 2 and 5,) and permits of a charge of metal being forced into the molds by the action of the pump-plunger. When the enlarged part of the cam passes out of contact with the outer end of lever g^3, the spring g^6 forces the outer end of said lever upwardly, which has the effect of moving the connecting parts in the opposite direction and throwing the valve-plug into its closing position.

The movements of the two cams and connecting parts are so timed that the valve-plug

is withdrawn and the outlet-passage from the well-chamber to the molds is open when the plunger is on the downstroke and closed when it is moving in the opposite direction.

In my application, Serial No. 509,313, filed April 28, 1894, I claim a pump with carbon-composition plunger working in metallic bearings. Those claims are limited to one form of the apparatus and one part of the pump. The present application is intended to cover a genus or class of inventions of which that application embodies distinct species.

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

1. In a type-founder's pump, the metal-reservoir having a well-chamber of usual external construction, and means to operate the pump, said pump provided with a movable working part and bearing-surface therefor composed of refractory and non-adhesive material, these being respectively of corresponding expansibility under high temperatures, substantially such as described, the parts combined so that a close working joint may be had and the soldering of the parts together by molten metal prevented, substantially as described.

2. A type-founder's pump having a metal-reservoir, a well-chamber with a refractory and non-adhesive throat-lining of the character described, and a plunger, the plunger and throat-lining being of similar capacity for expansion, and possessing the characteristic of non-adhesion to alloys, the named elements and their necessary co-operating adjuncts combined, substantially as described.

3. A pump for molten metals having metal-well, heater, and operative parts, and a plunger and plunger-passage of carbon composition, all combined substantially as described.

4. In a type-founder's pump, the metal-chamber having a well and passage therefrom, a nozzle at the mouth of said passage, and a valve-plug of refractory and non-adhesive material substantially as described, the named elements and their necessary co-operating parts in combination substantially as described.

5. The combination, in a type-founder's pump, of the metal-reservoir having a well-chamber with its neck lined with refractory and non-adhesive composition, a plunger of like character working in said neck, the passage from the well-chamber having a nozzle, and a valve-plug of refractory and non-adhesive material operating therein, and means for reciprocating said plunger and valve-plug, all combined substantially as described.

6. A pump for pumping molten metal having the usual metal-well and heating apparatus, a driver for the molten metal and a passage for the driver having wearing-surfaces covered with refractory and non-adhesive material of the described characteristics as to heat and adhesion of alloys, and means for operating the same, all combined substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN WEST.

Witnesses:
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