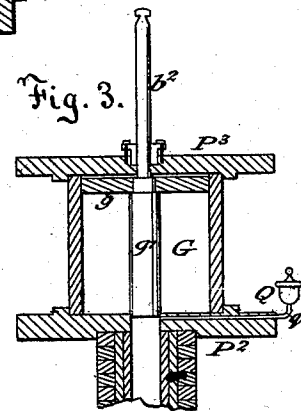
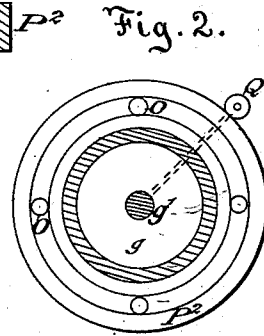
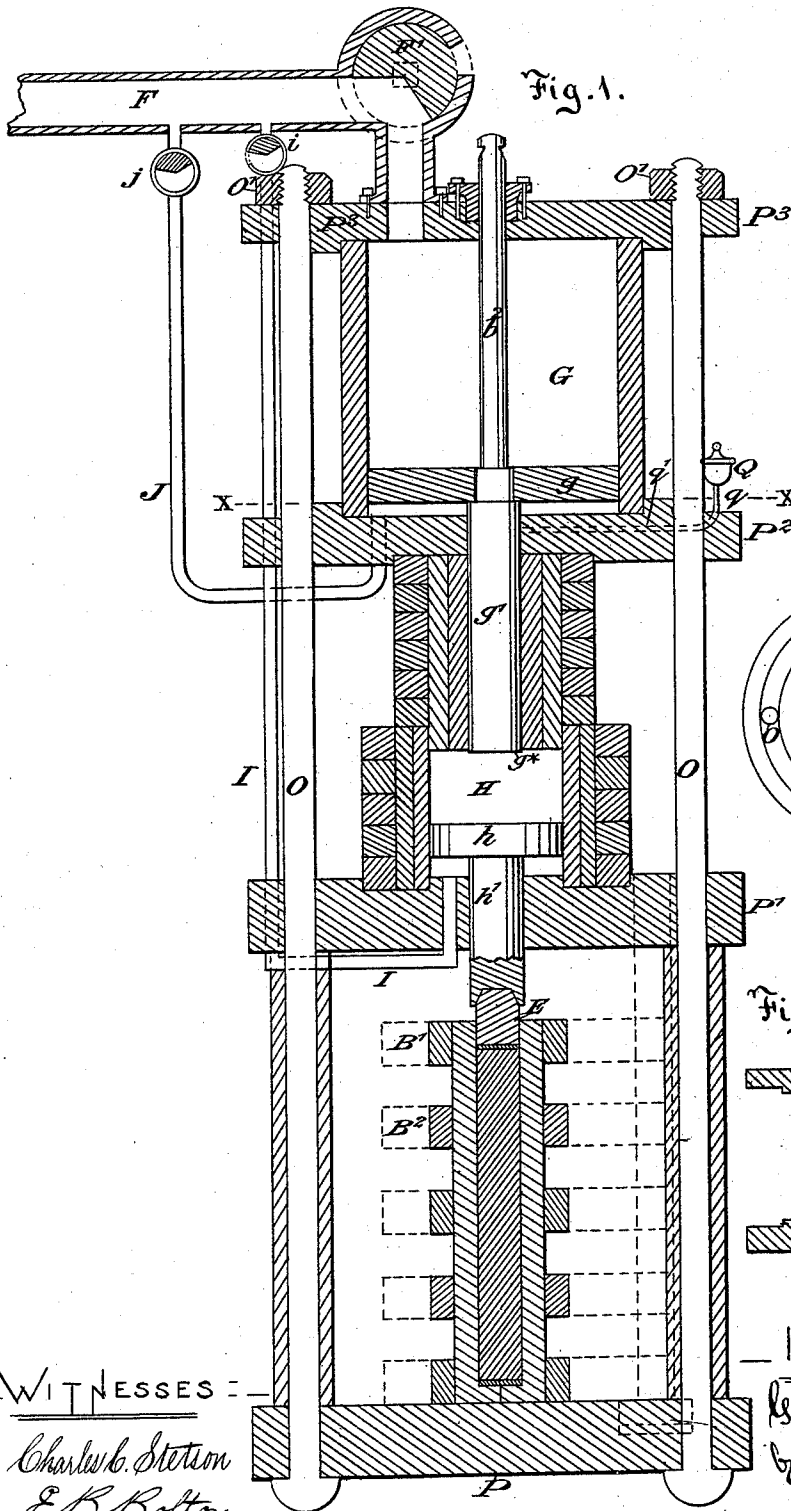


G. WEBB.
Hydraulic Press.

No. 223,568.

Patented Jan. 13, 1880.



-WITNESSES:-

Charles C. Stetson
E. B. Bolton

— INVENTOR:—

George Webb
by his attorney,
T. J. Sutton

UNITED STATES PATENT OFFICE.

GEORGE WEBB, OF JOHNSTOWN, PENNSYLVANIA.

HYDRAULIC PRESS.

SPECIFICATION forming part of Letters Patent No. 223,568, dated January 13, 1880.

Application filed July 1, 1879.

To all whom it may concern:

Be it known that I, GEORGE WEBB, of Johnstown, Cambria county, in the State of Pennsylvania, have invented certain new and useful Improvements relating to Hydraulic Presses, of which the following is a specification.

I make, in effect, two or more hydraulic presses, strongly mounted one over the other. The piston in the upper and largest cylinder of these receives the steam, water, or other fluid under a tolerable pressure, and by difference of area between this piston and its plunger and by the motion of its plunger it exerts a greater pressure on a quantity of oil or non-elastic fluid below. The force of the latter is applied on a second piston, and by difference of area between this piston and its plunger a very great force is accumulated in this second plunger, and this multiplication of force by this method may be continued through additional cylinders and upon additional plungers to any extent of pressure that cylinders can be made to stand.

The last plunger in the series will have accumulated in it all the multiplied force, and it will do the work.

I have designed the improvement with reference, mainly, to its use in compressing ingots of steel, and I will so describe it.

In compressing steel ingots the motion need be but little; but the force required is great. My invention is eminently adapted for this use; but it will be understood that it may be used in other situations. It may be used generally where pressure is required.

Figure 1 represents a vertical section through the center of my improved press. Fig. 2 is a horizontal section on the line X X, Fig. 1, on a smaller scale. Fig. 3 is a vertical section of the apparatus, showing the upper piston drawn up out of its working position, so as to replenish the oil in the chamber H.

In the drawings, P is a stout bed-plate; O, tie-rods, held by stout nuts O'; and P' P² P³, a series of cross-plates. G is the main cylinder, inclosing a piston, g, which works a plunger, g'. F is a pipe bringing steam or water at the highest available pressure from any suitable reservoir. F' is a valve which controls it.

The working of the piston g and its con-

nected plunger g' by the admission of steam or water may be in all respects similar to that of well-known hydraulic presses.

H is the second cylinder, and h a stout piston working therein and operating a connected plunger, h'. The fluid above the piston in the cylinder H remains constantly imprisoned. It may be oil, water, water with glycerine, or any other suitable fluid adapted to endure the conditions. The pressure in this cylinder H is induced by the descent of the plunger g'. The mechanical effect of this second cylinder depends upon the difference of area between the piston h and the plunger g'.

A' A² represents an ingot-mold, made of cast-iron, in sections. B' B², &c., are stout clamps, which hold the sections strongly together and enable them to resist great pressure.

The metal for the ingot is supplied in a fluid state while the ingot-mold is in a different place. It is moved into line with the plunger h' and planted strongly on the bed-plate A to receive the pressure.

E is a piece of cast metal, which I term a "set." It is adapted to exactly fill the top of the ingot-mold and to transmit the pressure from the plunger h' to the metal of the ingot.

In order to raise the piston h, I allow water or steam to flow through pipe I into the annular space under said piston. The valve i controls the ingress and egress of water or steam through the pipe. I employ a corresponding pipe, J, controlled by a corresponding valve, to admit fluid under pressure to the under side of the piston g, and raise it also. In case of derangement of J, or in the absence thereof, the rise of the piston h will apply a pressure on the fluid above it, and this lifting on the lower end of the plunger g' will lift the piston g.

Q is a vessel adapted to receive, by hand or otherwise, additional oil or water, to be added to the fluid above the piston g, to compensate for losses by leakage or otherwise. It is connected by a pipe, q, to the passage g' in the cross-plate P². This passage terminates, as shown, against the side of the plunger, so that when the piston and plunger g' are in their working position the end of the plunger g' will be below the orifice or pipe in cross-plate P², and no fluid or oil can escape that way.

When it is required to replenish the oil above the piston g , I raise the piston g and plunger g' by means of a lever or pulley-tackle applied to the upper end of the rod b^2 , so as
 5 to raise the lower end of the plunger g' above the mouth of the passage q' in the cross-plate P^2 , thereby allowing the oil to freely flow into the space above the piston g ; but so soon as the space is filled with oil I drop the piston
 10 and plunger to their working position, when the lower end of the plunger g' will again close the passage q' and prevent the escape of oil therethrough.

It will be observed that the cylinder H is
 15 hooped and adapted to resist the pressure very efficiently. When the plunger g' forcibly descends and exerts the required great pressure in the fluid in H , the latter lifts strongly on the annular space around the plunger g' in
 20 the upper part of the cylinder H . I esteem it preferable to transmit this lifting force through the walls of the stout cylinder G to the upper cross-plate, P^3 , so that the whole of the upward strain may be received on the nuts O' .

My press may be used for general purposes
 25 wherever a very great force is required. It will be useful in most classes of heavy presses, as well as in machines for stamping, punching, shearing, and similar purposes, as also in
 30 pressing various materials, as hay, cotton, and the like.

By this invention, quick-acting, positive, and relatively free from friction, it is possible
 35 to press steel on a scale of magnitude equal to the requirements of any works manufacturing ingots in a dense and perfect condition. It is also practicable, by its aid, to make car-wheels, axles, bearings, and other steel shapes at one operation.

I do not esteem it new simply to produce ingots and shapes by compression on the melted steel; but this press makes it possible to do the desirable work on a very economical scale. Pressure has not been used generally heretofore,
 45 because no suitable press has been made to work on a scale of practice.

Among the miscellaneous uses to which my invention is adapted, I esteem the application of a great force on water or other inelastic
 50 fluid to produce a mechanical effect at a distance, in the manner of an accumulator, as has long been known, and is much used in iron-mills to lift molds, adjust rolls, &c.

Any mechanical effect which requires only a simple motion to a moderate extent can, by this means, be effected at a distance by the employment of a suitable strong piston and cylinder at the desired point and connecting the points by a strong and sufficiently-large
 60 pipe.

I can use my invention also, in the manner of a pump, to force water for this purpose into a space under a heavily-loaded piston, usually known as an "accumulator." The water or
 65 oil thus conditioned is available, by the open-

ing of a cock or equivalent valve, to effect the desired result, either immediately after my press has stored the power or after a considerable interval, as convenience may require.

Modifications may be made in the details
 70 without sacrificing the advantages of the invention. The nuts O' may be made of any thickness desired, or re-enforced by keys. The rods O and the nuts or other provisions thereon may be increased in number; but I believe
 75 four is the best number.

It will be understood that packing and other ordinary appliances are used at all the joints required.

The extension of the rod b^2 upward from the
 80 piston g and out through the stuffing-box in the upper end of the cylinder G serves to indicate the exact position of the plunger, which might not otherwise be easily determined in some conditions of the compound apparatus,
 85 and it can serve, by any ordinary or suitable appliance, (not shown,) as a means of raising or of holding the upper plunger and its connections in an elevated position for any required period, and for the purpose of intro-
 90 ducing into the lower or second cylinder, H , a renewal of the supply of oil, water, &c., needed for the waste or leakage lost through the packing or otherwise during the work.

I can carry the multiplication of cylinders
 95 and pistons still further. The piston g and its connections may exert a high pressure on a second piston, and its plunger may, instead of being applied directly to the work, exert a still higher pressure in a third cylinder, and
 100 so on; but I do not deem it generally necessary to carry the compounding beyond the two herein shown.

The form of valves may be varied indefinitely.
 105

I claim as my invention—

1. The compound hydraulic press described, composed of two or more cylinders and pistons, $G g H h$, mounted in line, and connected by the rods O and cross-plates $P^1 P^2 P^3$, combined and arranged for joint operation substantially as and for the purposes herein specified.
 110

2. The combination, with a compound hydraulic press having a quantity of inelastic fluid imprisoned between the plunger g' and the piston h , of the supply-vessel Q and connecting-passage q' , arranged to supply additional fluid when the plunger g' is in its extreme raised position, and to cut off the escape
 120 by the descent of the plunger, as herein specified.

In testimony whereof I have hereunto set my hand this 13th day of June, 1879, in the presence of two subscribing witnesses.

GEO. WEBB.

Witnesses:

IRVIN RUTLEDGE,
 A. MONTGOMERY.