No. 710,286. Patented Sept. 30, 1902.

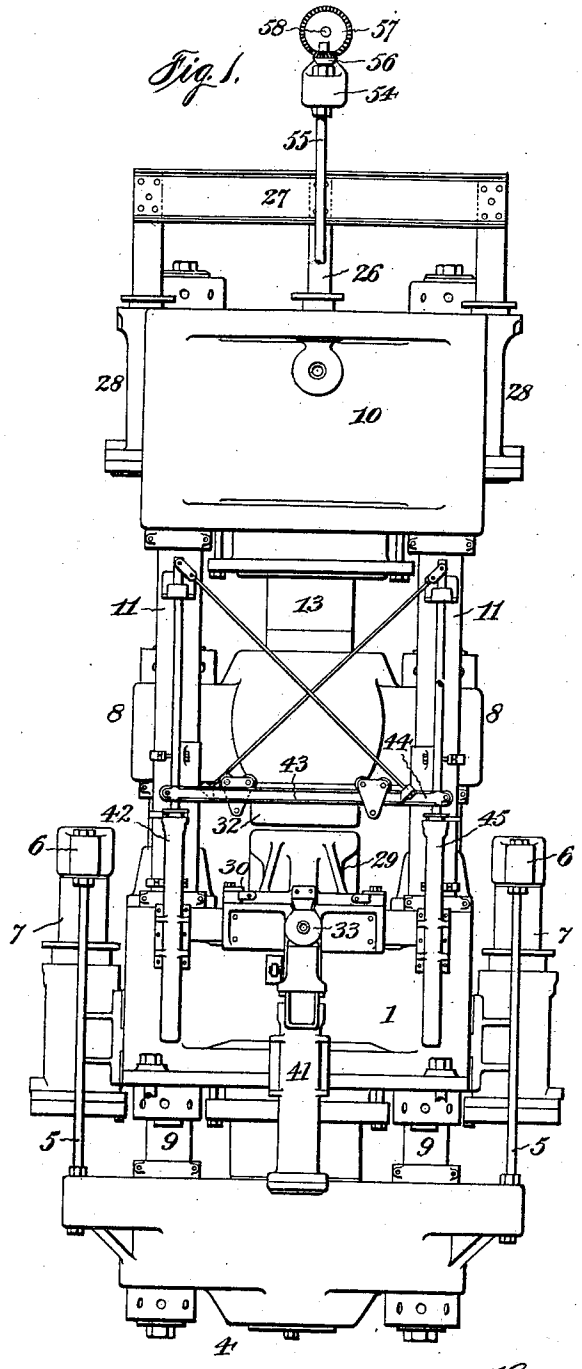
H. V. LOSS.

HYDRAULIC FORGING PRESS.

(Application filed Mar. 7, 1902.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



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Fig. 4.

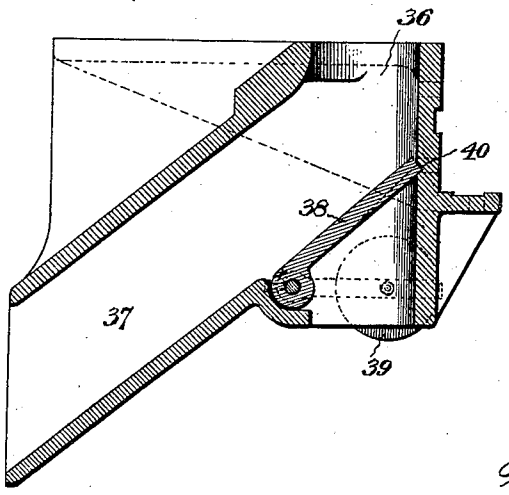


Fig. 2.

Fig. 5.

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Fig. 3.

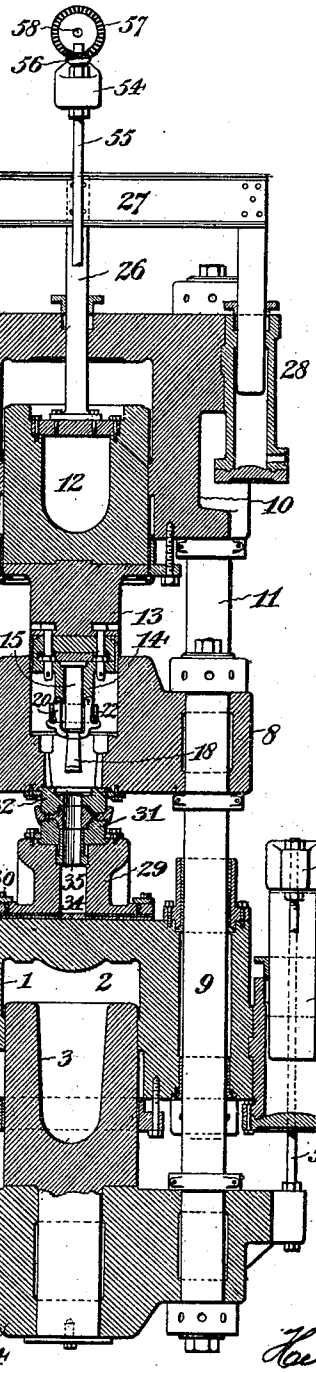


Fig. 8.

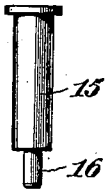


Fig. 9.

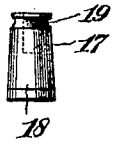


Fig. 10.

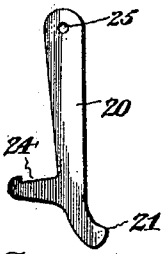


Fig. 11.

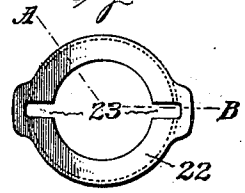


Fig. 12.

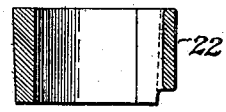


Fig. 14.

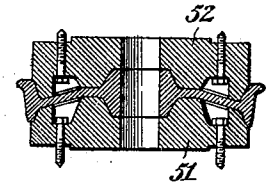
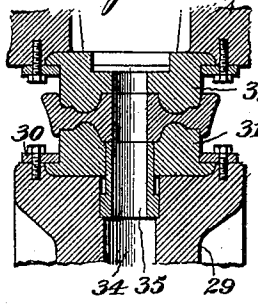


Fig. 13.



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No. 710,286. Patented Sept. 30, 1902.

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Fig. 6.

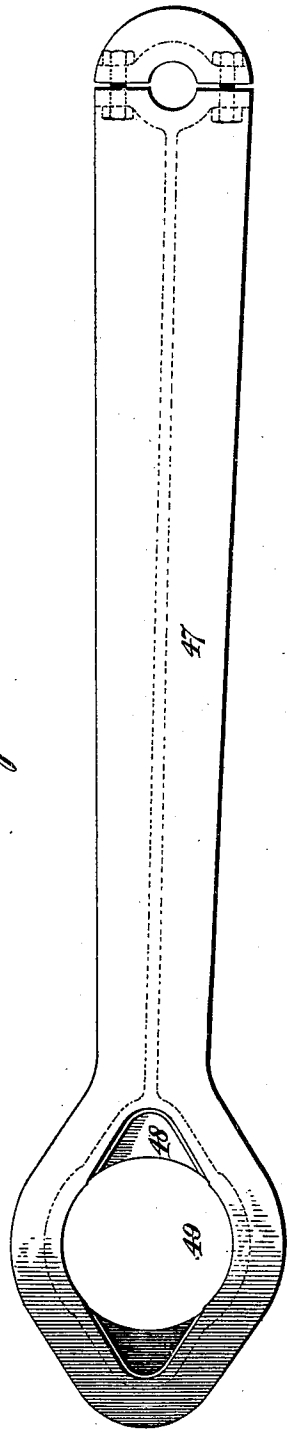
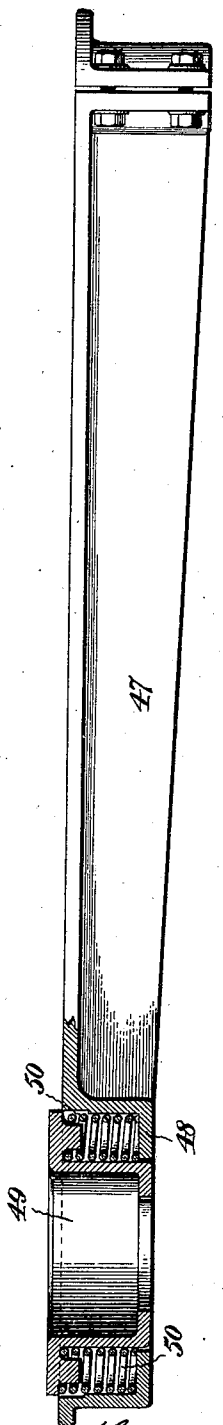


Fig. 7.



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UNITED STATES PATENT OFFICE.

HENRIK V. LOSS, OF PHILADELPHIA, PENNSYLVANIA.

HYDRAULIC FORGING-PRESS.

SPECIFICATION forming part of Letters Patent No. 710,286, dated September 30, 1902.

Application filed March 7, 1902. Serial No. 97,197. (No model.)

To all whom it may concern:

Be it known that I, HENRIK V. LOSS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Hydraulic Presses, of which the following is a full, clear, and exact description.

This invention has for its primary object the production of a hydraulic press for use in forging hot ingots, and more especially for forging car-wheels from a plastic ingot of cast-steel.

Although I do not limit my invention to its use for forging car-wheels, nevertheless, for the sake of a concrete example and as illustrating the principle of the invention, I have shown the invention embodied in a die-press for this particular purpose.

The invention comprises, essentially, a stationary lower cylinder and a stationary upper cylinder, whose plungers are adapted to be moved separately or in unison in order, for example, respectively to lower the top die to perform the forging operation and to lower the punch to punch the axle-hole, independent means being employed to return the plungers to their starting-points. An auxiliary power mechanism is employed to carry away horizontally from the top the forged blank with the detached punch therein and remove the forged blank. In order to facilitate the operations of the press, there is employed a crane to place the blank in the die and another to carry it away therefrom when acted upon and again another crane to insert a new punch end in position in the press. The same press with suitable dies may be used for dishing the finished wheel in accordance with any desired contour or profile. These broad features, together with certain parts and combinations of parts, constitute the invention, as I will proceed now more particularly to set forth and finally claim.

In the accompanying drawings, illustrating my invention, in the several figures of which like parts are similarly designated, Figure 1 is a front elevation. Fig. 2 is a side elevation. Fig. 3 is a vertical section. Fig. 4 is a longitudinal section, on a larger scale, illustrating part of the discharging apparatus. Fig. 5 is a top plan view of part of the apparatus shown in Fig. 4. Fig. 6 is a top plan view, and Fig. 7 is a partial longitudinal section, of the crane-arm for inserting a fresh punch. Fig. 8 is a side elevation of the punch-spindle. Fig. 9 is a side elevation of the punch end. Fig. 10 is a side elevation of one member of the punch-latch. Fig. 11 is a plan view of the latch-counterweight, and Fig. 12 a cross-section taken in the plane of line A B, Fig. 11. Fig. 13 is a detached cross-section, on a larger scale, of the forging-dies. Fig. 14 is a cross-section illustrating a pair of dies that may be used in this press for dishing a car-wheel.

As will be readily understood, the press is to be erected over a pit; but I have deemed it unnecessary to show the pit. The casting 1 may be the bed-plate of the press, and it contains a cylinder 2, within which is arranged a plunger 3, supported in a cross-head 4, hereinafter referred to as the "lower" cross-head. For the return movement of the plunger 3 the cross-head 4 is suspended by rods 5, applied to its opposite ends and connected to cross-heads 6 of hydraulic or other power apparatus, such as hydraulic rams 7, arranged upon opposite sides of the bed-plate 1. 8 is the upper cross-head, and these two cross-heads 4 and 8 are connected to move in unison by means of the rods 9, which pass through suitable bearings in the bed-plate 1 and are guided thereby.

Above the cross-head 8 is erected a cylinder 10 upon pillars 11, secured upon the bed-plate 1. This cylinder 10 contains a piston or plunger 12, which carries a punch-stem 13, to which is affixed a punch-holder 14, in which is arranged the punch-spindle 15. This spindle, as shown in Fig. 8, is provided with a reduced point 16, which is adapted to enter a socket 17 in the punch end 18. This punch end 18 has its upper portion adjacent to its socket provided with a circumferential groove 19, with which are adapted to engage latches 20, having points 21 to enter the groove 19. These latches 20 are pivoted to the punch-holder 14, and they are held in normal engagement with the punch end by means of a counterweight 22. (Shown more especially in Figs. 11 and 12.) This counterweight has grooves 23 to receive the latches 20, and said latches are provided with laterally-projecting

portions 24 to support the said counterweight, said supports being so located with relation to the latch-fulcrums 25 as to be eccentric, so that when the punch end has performed its function and the punch-holder is moved upward the resistance to stripping the punch end from the work causes the latches to yield laterally and become disengaged from the punch end, while the punch end remains sticking in the punched object. The piston 12 is connected by a stem 26 with a cross-head 27, which in turn is connected with power apparatus, such as hydraulic rams 28, whereby the punch-holder is returned to normal upper position.

Upon the bed-plate 1 is erected a die-holder 29, slidable in ways 30, and this die-holder is supplied with the die 31. The complemental die 32 is secured to the cross-head 8 in any suitable manner and is moved toward and from the die 31 as said cross-head is moved.

The die-holder 29, with its contained die and the work therein, may be moved bodily from beneath the die 32 by any suitable apparatus, such as a hydraulic motor 33, so as to convey the work to an auxiliary stripping and discharging ram. The die-holder, which, as will be observed, is provided with a central aperture 34 and separate sleeve 35, projecting therefrom into the die 31, is carried over the stripping and discharging apparatus. (Shown in detail in Figs. 2, 4, and 5.) This last-mentioned apparatus comprises a vertically-arranged passage-way 36, which is open top and bottom and has a laterally-inclined discharge-chute 37. There is pivoted within this portion 36 a gate 38, which is provided with a counterweight 39, which normally tends to throw the said gate across the passage-way 36, the free end of said gate resting in a recess 40 in the wall of the passage-way 36. As the die-holder 29 comes over the passage-way 36 the portion of metal punched out of the work drops down into said passage-way upon the gate 38 and is conveyed from the machine through the chute 37. Below this device and in line with the passage-way 36 is an auxiliary apparatus or hydraulic ram 41, whose plunger is adapted to travel upwardly within the passage-way 36 and push the wheel out of the bottom die by engaging the movable sleeve 35, which is in contact with the wheel-hub.

42 is a motor or ram, upon which is mounted a crane 43 with a suitable trolley and other appliances, and this crane is brought into play to carry away the wheel, while the second crane 44, operated by a motor or ram 45, is brought into action to place a fresh ingot in the die, and a third power-crane 46 is adapted to receive a punch end and convey it to the punch-holder and position it for engagement by the latches 20. This crane 46 is supplied with any suitable swinging mechanism (not shown) whereby its arm (next described) may be moved toward and away from the dies.

The crane 46 has an arm 47, as shown in Figs. 6 and 7, the outer end of which is provided with a pocket 48, in which is arranged a cup 49, supported upon springs 50, so as to be self-adjusting to the punch-holder in presenting the punch end to the punch-holder and permitting the latches to enter into engagement with the groove 19.

I have shown with sufficient clearness the details of the hydraulic apparatus and connections of parts and deem a further description of these parts unnecessary, since they may be of any usual or approved character, and within this class of parts I include the necessary packing for making tight joints, for lubrication of parts, for detachably connecting those members that require renewal or repair and adjustment, and the like.

In the operation of the machine and supposing it to be equipped for the forging of one-piece or integral car-wheels I use a circular ingot of cast-steel of approximately the shape of the finished wheel, as illustrated in Figs. 3 and 13, and having placed the same in a die 31 of substantially the profile shown in Figs. 3 and 13 the upper die 32 is caused to move downwardly and against the lower die 31, and the forging action takes place, producing the hub and the adjacent portions of the web. Then the punch-plunger is caused to descend, and the punch end 18, passing through the upper die, is driven through the blank, thereby forming the axle-hole through the center of the hub. The punch end sticking in the blank and the punch-plunger receding and the counterweight of the latches being disconnected from their holding position, the said latches are freed from the punch end, and then the punch plunger and holder move upwardly, leaving the punch end in the blank, and the crane 46 is then brought into operation to place a fresh punch end in the punch-holder. The die-holder 29 is then moved over to the stripping and discharging apparatus and the operations previously described as taking place at this point occur, and the wheel being removed from the die the die-holder and die are moved back into position with a fresh ingot and the previously-described operation is repeated.

A separate press may be supplied with dies such as shown in Fig. 14, where the die 51 has a substantially convex profile, while the die 52 has a substantially concave profile, and these two dies when caused to approach will serve to bend the web of the wheel, so as to dish the wheel, substantially as shown. It is within my invention to use dies of any desired profile to produce the desired conformation of the wheel.

The stroke of the punch-plunger may be regulated by a screw 53, secured to the cross-head 27 and mounted in a nut carried in the beam 54, which in turn is supported upon rods 55, mounted on the cylinder 10, and this nut may be supplied with a beveled wheel 56, which in turn is connected with a beveled wheel 57 on a shaft 58, having a chain-wheel

59, the chain 60 of which (part only being shown) extends within convenient reach of the operator.

What I claim is—

1. A hydraulic press, having a stationary bed-plate and cylinder, a die-holder fixed to said cylinder, a plunger arranged within said cylinder, a cross-head supporting the plunger, rams to return the said cross-head and plunger, and a second cross-head arranged above said cylinder and rigidly connected to said first cross-head and moving with it, combined with a punch working in said second cross-head, and independent actuating mechanism for said punch.

2. A hydraulic forging-press, comprising essentially a stationary bed-plate and cylinder, a plunger arranged in said cylinder, a cross-head arranged below the bed-plate and carrying the plunger, means to return said cross-head, a second cross-head arranged above the bed-plate, connecting-rods having bearings in the bed-plate and uniting the cross-heads to cause them to move in unison, a die-holder arranged upon the cylinder and containing a die, and a die applied to the upper cross-head, combined with a punch working in said second cross-head and independent actuating mechanism for said punch.

3. A hydraulic forging-press, comprising essentially a stationary bed-plate and cylinder, a plunger arranged in said cylinder, a cross-head arranged below the bed-plate and carrying said plunger, means to return said cross-head, a second cross-head arranged above the bed-plate, connecting-rods having bearings in the bed-plate and uniting the cross-heads to cause them to move in unison, a die-holder fixed to the cylinder and containing a die, and a die applied to the upper cross-head, combined with a punch-plunger and a cylinder therefor arranged above the upper cross-head, a punch-holder carried by the punch-plunger and working within the upper cross-head and carrying a punch, and means to retract the punch mechanism independently of the die mechanism.

4. In a forging apparatus, a punch-stem and means to move it, combined with a punch-holder, a detachable punch end, latches pivotally suspended from said punch-holder to engage said detachable punch end, and a counterweight grooved to receive said latches, which latches have eccentric supports for said counterweight, and the counterweight serving to hold the latches in engagement with the punch end and automatically movable to permit the said latches to free themselves from said punch end.

5. In a forging apparatus, a movable bottom die, combined with a stripping and discharging device, comprising a gated passage-way having a lateral discharge-chute, and a ram for coöperation with said gated passage-way to strip the blank from the die.

6. In a die forging apparatus, a movable bottom die, combined with a stripping and discharging device including a gated passage-way having a lateral discharge-chute, a ram coöperating with said passage-way to strip the blank from the die, and means to move the said die into coöperative relation with the said stripping and discharging device.

7. In a die forging and punching apparatus, having a detachable punch end, a crane for handling the punch end, having an arm provided with a spring-supported cup for carrying the punch end into position and applying it to its holder.

8. In a die forging and punching machine, a punch-plunger and means to adjust the same, comprising a cross-head to which the plunger is connected, an adjusting-screw secured to said cross-head, a nut in which the screw is arranged, a beam to receive said nut, gearing for actuating said screw, and a manual controlling device for said gearing.

In testimony whereof I have hereunto set my hand this 25th day of February, A. D. 1902.

HENRIK V. LOSS.

Witnesses:
CHAS. T. SCHOEN,
J. G. GLADING.

Correction in Letters Patent No. 710,286.

It is hereby certified that Letters Patent No. 710,286, granted September 30, 1902, upon the application of Henrik V. Loss, of Philadelphia, Pennsylvania, for an improvement in "Hydraulic Forging-Presses," was erroneously issued to said "Loss" as owner of said invention; whereas the said Letters Patent should have been issued to *Charles T. Schoen, of Philadelphia, Pennsylvania,* as owner of the entire interest in said invention, as shown by the assignments of record in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of November, A. D., 1902.

[SEAL.]

F. I. ALLEN,

Commissioner of Patents.