

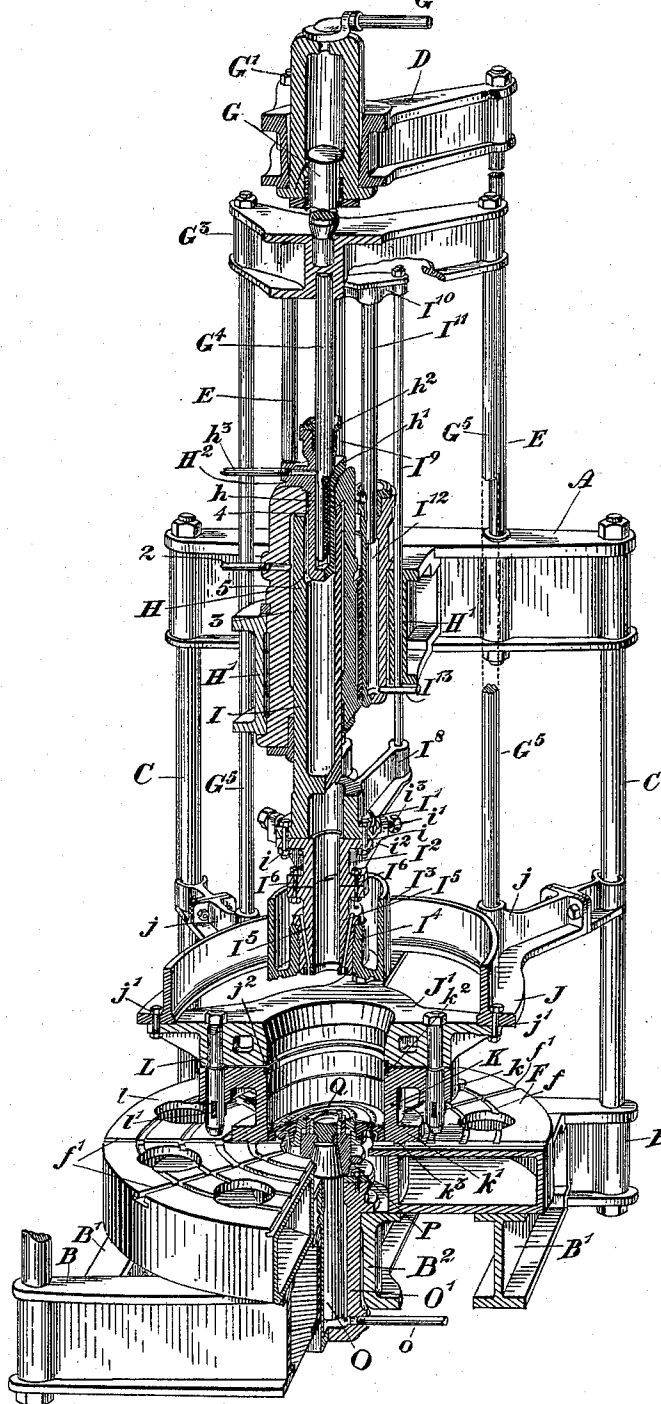
(No Model.)

2 Sheets—Sheet 1.

O. W. KETCHUM.
HYDRAULIC PRESS.

No. 535,112.

Patented Mar. 5, 1895.



Witnesses.

W. M. Thro
E. R. Case

Fig. 1.

Inventor.

O. W. Ketchum
by Vetterstrom & Co. Atty.

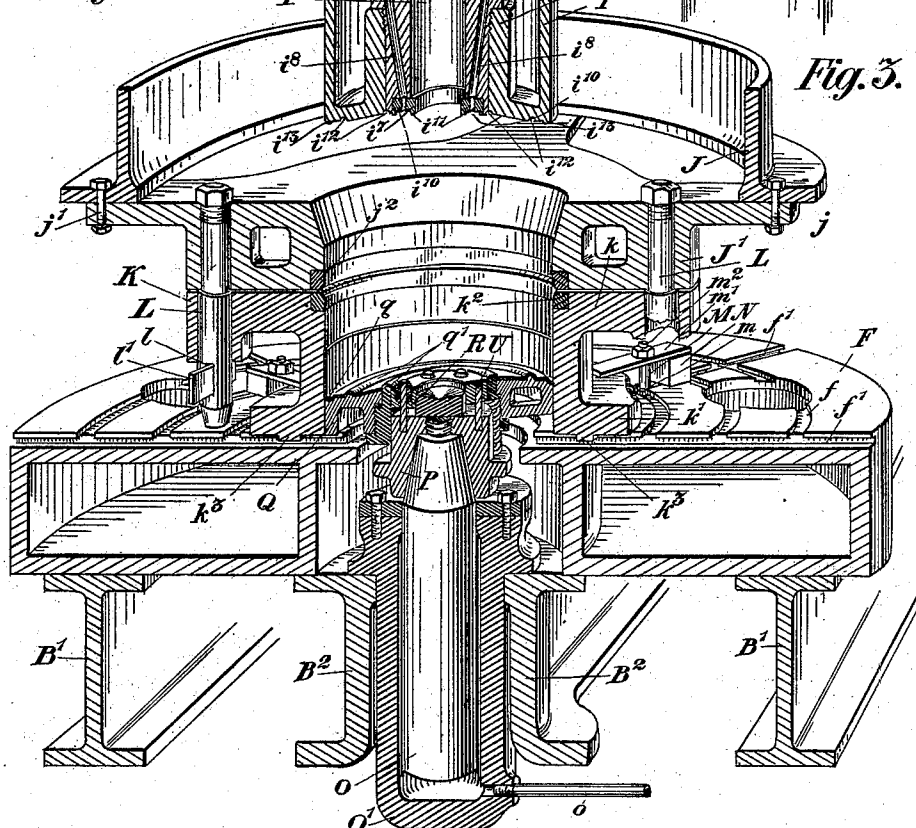
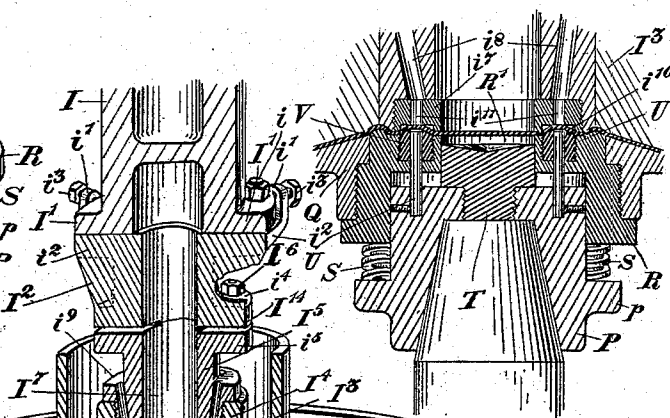
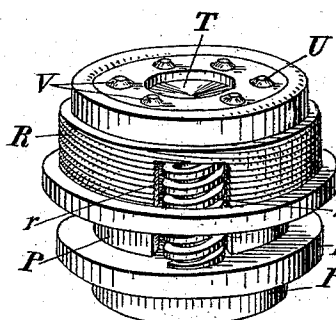
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Fig. 2.

Inventor.

O. W. Ketchum:
by Tetherstonhaugh & Co
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UNITED STATES PATENT OFFICE.

OLIVER WILLIAM KETCHUM, OF TORONTO, CANADA.

HYDRAULIC PRESS.

SPECIFICATION forming part of Letters Patent No. 535,112, dated March 5, 1895.

Application filed June 16, 1894. Serial No. 514,723. (No model.)

To all whom it may concern:

Be it known that I, OLIVER WILLIAM KETCHUM, manufacturer, of the city of Toronto, in the county of York, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Hydraulic Presses, of which the following is a specification.

My invention relates to improvements in hydraulic presses more particularly adapted for the stamping or forming up of sheet metal pulleys and the objects of the invention are, first, to provide a blank holder for the sheet metal plate, by which it can be securely held in position till the die of the upper ram is brought down; secondly, to provide ready means of setting the different sizes of the cylindrical portion of the lower die so as to form pulleys of different diameters; thirdly, to provide a simple means whereby the central hole may be punched in the web and minor holes punched around it for the purpose of securing the web to the flange of the hub by suitable bolts, and, further, to provide means for forcing the formed up blank out of the cylindrical portion of the lower die, and it consists essentially, first, of securing the blank holder upon suitable standards and providing clamping bolts which extend through the blank holder and cylindrical portion of the lower die and are provided with slots at the lower end into which tapered keys are driven in order to securely hold the blank between the blank holder and the flange of the cylindrical portion of the lower die; secondly, in forming annular grooves in the bed plate of the press and providing corresponding annular downwardly extending projections in the bottom of the cylindrical portion of the lower die to fit into one of such grooves, also in providing radial grooves and one end of the bar being designed to be clamped upon the top of the lower flange of the cylindrical portion of the lower die, while the other end of the clamping bar is clamped by the bolt upon a block so as to thereby rigidly hold the cylindrical portion of the lower die upon the bed plate; thirdly, in forming the die of the lower ram, the cylindrical punch, and its surrounding punches with a stripper head through which the punches extend and which is supported upon spiral springs upon the top of the die,

the upper die being constructed and designed to co-act with the lower die and stripper head and the whole of the machine being otherwise arranged and constructed as hereinafter more particularly explained.

Figure 1, is a sectional perspective view of my press intermediately broken away near the top of the uppermost ram. Fig. 2, is an enlarged detail of the upper die, blank holder, also die and bed-plate, and bottom of the lower die and ram. Fig. 3, is an enlarged cross section through the head of the lower die showing portions of the upper die and bottom of the lower die and ram. Fig. 4, is a detail of the stripper head.

In the drawings like letters and numerals of reference indicate corresponding parts in each figure.

The frame of the press is comprised of the upper and lower I-beams, A, and B, connected together by the standard rods, C, and the web, D, supported on the upper I-beams by the minor standard rods, E.

B', are I-beams extending between the I-beams, B, and supporting, together with the beams B, the hollow bed-plate, F.

B², are channel beams extending between the I-beams, B, and located centrally between the I-beams, B'.

G, is the uppermost hydraulic ram which is held within the cylindrical casing, G', and is supplied with pressure through the pipe, G². The cylinder, G', is suitably supported in the web, D. The lower end of the ram, G, extends into and is secured in the center of the web, G³. The ram, G, and supporting standards are shown intermediately broken away. (See Fig. 1.)

H, is the cylinder of the ram to which the upper die is attached. This cylinder is shown in perspective quarter section in Fig. 1, suitably supported in the cross frame, H', extending between the upper I-beams, A, one only of which is shown.

I, is the plunger of the upper ram to which is connected, as hereinafter described, the upper die. The plunger, I, is hollow and moves within the cylinder, H. The cylinder, H, has a hole, h, made at the top into which fits the compression plug, H². The plunger, I, is also closed at the bottom. 2, is a pipe leading through the cylinder, H, into the ver-

tical opening, 3, which is connected by the horizontal passage-way, 4, and vertical passage-way, 5, to the interior of the plunger, I. The plunger, I, has an outwardly extending flange, I', to which is secured the laterally adjustable block I², by means of the bolts, i.

i', are bracket-shaped lugs extending out from the upper flange, i², of the adjustable block, I², and through which extend set screws, i³. The holes through with the bolts, i, extend are larger than the bolts so as to permit of the lateral adjustment of the block, I², by means of the set screws, i³, so as to bring the center of the block, I², on exact line of center with the center of the lower die.

I³, is a die which is cylindrical in form and is attached by means of the internally threaded hub, I⁴, to the die holder, I⁵. The die holder, I⁵, is secured to the lower flange, i⁴, through its upper flange i⁵, by the bolts, I⁶. i⁷, is a steel ring secured within the bottom of the die holder, the inner diameter of the ring being slightly less than the hole I⁷, through the die holder, I⁵.

i⁸, are passage ways leading obliquely up through the die holder to and through the flange, i⁹. The steel ring, i⁷, has a series of round recesses, i¹⁰, cut in the bottom and vertical holes, i¹¹ i¹², are annular grooves cut in the bottom of the die and designed to form with corresponding projections on the lower die the beads on the web of the pulley.

I⁸, are cross beams attached to or forming part of the lower part of the plunger, I. One half of the cross beams, I is shown in Fig. 1, the other half being on the other side of the press.

I⁹, are rods which extend upwardly through the supporting beam, H', into the cross bar, I¹⁰.

I¹¹, is a plunger rod secured at the upper end in the cross bar, I¹⁰, and having the lower end extending downwardly into the cylinder, I¹².

I¹³, is a pipe from which the water pressure is obtained.

The parts, I⁹, to, I¹³, are duplicated on the opposite side of the machine.

G⁴, is a piston rod secured in the web, G³, and extending down into a hole, h', in the compression plug H².

h², is a suitable packing surrounding the rod, G⁴, at the top of the hole, h'.

h³, is a pipe leading into the hole, h', and designed to exert an upward pressure upon the rod, G⁴, through a channel in the cylinder when the water is turned on through this pipe.

The web, G³, is connected by the rods, G⁵, to the arms, j, of the blank holder supporting the frame, J.

J', is the blank holder which is connected to the frame, J, by the bolts, j'.

K, is the cylindrical portion of the lower die which is provided with an upper outwardly extending flange, k, and a lower flange, k'. The top edge of the cylindrical portion of the lower die is surrounded by a steel ring,

k², and the bottom edge of the blank holder is also preferably surrounded with a steel ring, j². The blank holder is brought down by the hydraulic ram, G, upon the top of the flange of the cylindrical portion of the lower die, the circular blank having been first placed on top of the cylindrical portion of the lower die in the position shown in dotted lines in Figs. 1 and 2. As it is absolutely necessary that the blank holder should hold the blank very firmly, I provide in addition to the hydraulic ram, G, which may not have sufficient pressure to hold the blank secure enough, the bolts, L, which are held in the blank holder and when it is brought down extend through the flange, k, of the cylindrical portion, K, of the lower die. In order to securely grip the blank, I provide slots, l, in the lower portion of the bolts and drive into them the tapered feather keys, l'.

f, are a series of annular grooves formed in the bed-plate, F.

k³, is an annular projection formed in the bottom of the flange, k', of the cylindrical portion, K. The cylindrical portion, K, is made with a central opening of sufficient diameter to form up the size of pulley desired and consequently, the flange, k', and annular projections, k³, will be more or less distant from the center. In Fig. 1, the distance shown is at the least distance and consequently, the annular projection, k³, is nearest the center, but if the pulley to be formed up is of a larger diameter it will be understood that the projection, k³, of a larger cylindrical portion, K, will fit into one of the other grooves, this, of course, depending on the size of the pulley to be formed up. The diameter of the opening of the blank holder, J, as also the diameter of the cylindrical die, I³, will be of corresponding size.

f', are radial reversed T-shaped grooves made in the circular bed-plate, F, and, M, are bolts, the heads, m, of which fit and are retained within the grooves.

m', are clamping plates through which the bolts, M, extend, the bolts M, being provided with nuts, m².

N, are blocks which bridge the grooves. The outer ends of the plates, m', rest upon the blocks, N, and the inner ends upon the flange, k'. By screwing the nuts, m², down upon their respective bolts, M, it will be seen that the plates, m' will thereby securely hold the cylindrical portion, K, down upon the bed plate.

O, is the lower ram which moves within the cylindrical casing, O', being supplied with hydraulic pressure from the pipe, o.

P, is the supporting head.

The lower die plate, Q, is supported upon the bed plate, F.

R, is the stripper or stripper head which is supported upon the flange, p, of the head, P, by the spiral spring, S. r, are recesses formed in the stripper, R, and, p', are recesses formed in the head, P, for the reception of springs,

S, which are of sufficient length to permit of the requisite movement of the stripper. The stripper, R, is provided with a suitable shoulder and is screwed into a central opening in the die plate, Q.

T, is a punch which is screwed or otherwise secured in the head, P. The punch, T, is cylindrical and fits and moves vertically within the hole, R', made in the stripper head, R, and a corresponding hole of the ring, i', forming part of the upper die, I³.

The web of the pulley is pressed or formed up upon the die plate, Q, by the upper die, I³, the die plate, Q, having an outer groove, q, which with the bead, i¹³, of the upper die I³, forms the bead at the juncture of the rim with the web of the pulley. The die plate, Q, is also provided with annular projections, q', which with the annular grooves, i¹², of the upper die, I³, form the annular beads in the web.

U, are a series of punches surrounding the punch, T, secured in the head, P, and extending upwardly through the stripper and conical minor dies, V. The minor dies, V, are screwed into corresponding holes made in the top of the stripper and are designed to form up the conical bosses around the central hole of the web of the pulley. The punches, U, which extend through the conical minor dies coact with the holes, I¹, in the upper die to punch holes out of the center of the conical bosses of the web. The passage ways, i⁸, serve to conduct the waste disks punched, away from the die plate, Q.

I¹⁴, are slots formed partially out of the block, I², and die holder, I⁵, between them. The waste disks cut by the punch, T, out of the center of the web are carried up through the ring, i', and opening, I', to the slots, I¹⁴, through which they may be pushed.

I shall now briefly describe the operation of my press in forming the pulley.

The blank is laid upon the top of the cylindrical portion and the pressure is brought upon the ram, G, so as to bring down the blank holder, J', upon the top of the flange. If there is not sufficient pressure to grip the blank securely enough the tapered feather keys, l', may be pushed into the slots, l, of the bolts, L, so as to securely bind the blank holder, J', and cylindrical portion, K, of the lower die together. The pressure is now brought upon the ram or plunger, I, through the pipe, 2, so as to force the cylindrical die, I³, down. As it is caused to descend it presses upon the blank and gradually draws it out from between the blank holder and flange of the portion, K, and presses it down till the blank assumes the position and form shown in Fig. 2. The lower ram during this period has no pressure applied to it and the die plate, Q, remains at the bottom of the cylindrical portion, K, of the lower die and rests upon the bed plate, F. Immediately upon the upper die reaching the die plate, Q, pressure is applied to the lower ram and it is impelled upwardly and forces the cen-

tral punch, T, and the minor punches, U, through the center of the web and bosses of the web respectively, thereby cutting the holes. The downward pressure being now taken off the ram of the upper die, and the upward pressure being applied thereto, such die is removed from out of the cylindrical portion of the lower die. The blank holder is freed from the cylindrical portion of the lower die and also tilted up. The pressure, however, being continued upon the lower ram, O, the die plate, Q, is brought up sufficiently far to throw the formed up blank out of the portion, K.

It will be understood that the punches will force the waste metal when the upper die is down, into their respective passage ways in the same.

It will also be understood that immediately upon the die plate, Q, being brought to the top of the cylindrical portion the spring supported stripper, R, will free the formed up blank from the punches, when the blank can then be removed. Upon the pressure being gradually removed from the lower ram the die plate will be brought down and assume the position shown in Figs. 1 and 2 ready for the forming up of the next blank. Although I show my press as applied to forming up the web and rim of a sheet metal pulley integrally, it will of course be understood that it may be adapted for other work of a similar nature.

What I claim as my invention is—

1. In a hydraulic press the combination of the upper ram and die, the two part lower die with means for clamping said parts together to hold the edges of the blank between them, and the plunger reciprocating through the bottom of the lower die to free the completed blank, substantially as described.

2. In a press the combination with the cylindrical upper die suitably connected to the ram or plunger, I, and means for raising and lowering the plunger within the cylinder, and the cylindrical portion of the lower die, and die plate, and means for raising and lowering the die plate of the blank holder, J', suitably bolted to the frame, J, which has arms, j, extending to the standard rod, C, and, rods, G⁵, connecting it to the web, G³, which is driven downwardly by the ram, G, and upwardly by the piston rod, G⁴, working in the hole, h', in the plug, H², as and for the purpose specified.

3. In a press the combination with the upper ram and die and the lower die plate and cylindrical portion of the lower die having an upper outwardly extending flange, of the blank holder, means for raising and lowering it and bolts extending through the blank holder when it is brought down and through the top flange of the cylindrical portion of the lower die so as to clasp them together as and for the purpose specified.

4. In a press the combination with the upper ram and die and the lower die plate and cylindrical portion of the lower die having

an upper outwardly extending flange, of the blank holder, means for raising and lowering it and bolts extending through the blank holder when it is brought down and through the top flange of the cylindrical portion of the lower die plate and having slots in the lower portion of the bolts into which the feather keys are driven as and for the purpose specified.

5. In a press the combination with a lower fixed die of the upper die having a laterally adjustable block for securing it to the head of the ram as and for the purpose specified.

6. In a press the combination with a lower fixed die of the upper die having a laterally adjustable block for securing it to the head of the ram, the laterally adjustable block being connected to the die by the bolts, I^6 , and to the bottom flange of the plunger or ram, I , by the bolts, i , extending through the enlarged holes in the upper flange of the block, and flange of the plunger, and the bracket shaped lugs, i' , and set screws, i^3 , extending through the same to accurately center the die as and for the purpose specified.

7. The combination with the cylindrical portion of the lower die having a flange, k' , and annular downwardly extending projections, k^3 , of the bed-plate, F , having the annular grooves, f , made in it as and for the purpose specified.

8. The combination with the cylindrical portion of the lower die having the flange, k' , and annular downwardly extending projections, k^3 , of the bed plate, F , having the annular grooves, f , and the radial reversed T-shaped grooves f' , and means for securing the flange, k' , upon the bed plate by means of bolts, the heads of which are held within the radial grooves as and for the purpose specified.

9. In combination, the upper die having a ring 7 provided with a series of recesses or

depressions in its under face and openings leading from the center of said depressions through the die, the lower die having a series of conical raised portions corresponding to said depressions and having central openings, and the minor dies passing through said openings, substantially as described.

10. The combination with the upper die, I^3 , having the ring, i^7 , surrounding the central opening of the die plate, Q , secured to the stripper, R , supported by the springs, S , upon the flange, p , of the head, P , of the ram and the punch, T , secured in the head, P , and designed to be brought up past the top of the opening, R' , of the stripper into the ring, i^7 , as and for the purpose specified.

11. The combination with the upper die provided with the ring, i^7 , having the recesses, i^{10} , and the holes, i^{11} , of the minor dies, V , secured in the top of the spring supported stripper and surrounding the central opening, R' , of the die plate, Q , and the punches, U , extending through holes in the conical minor die and designed to co-act with the holes, i^{11} , in the ring, i^7 , as and for the purpose specified.

12. The combination with the upper die having the central opening, I^7 , and ring, i^7 , at the bottom thereof and the lower die plate and punch arranged as specified, of the openings, I^{14} , extending laterally from the central opening as and for the purpose specified.

13. The combination with the upper die and ring, i^7 , recesses, i^{10} , and the holes, i^{11} , surrounding the central opening of the die plate, Q , having the minor conical dies, V , and punches, U , all arranged as specified, of the passage-ways, i^8 , extending up from the holes, i^{11} , as shown and for the purpose specified.

OLIVER WILLIAM KETCHUM.

Witnesses:

K. GREENWOOD,
B. BOYD.