

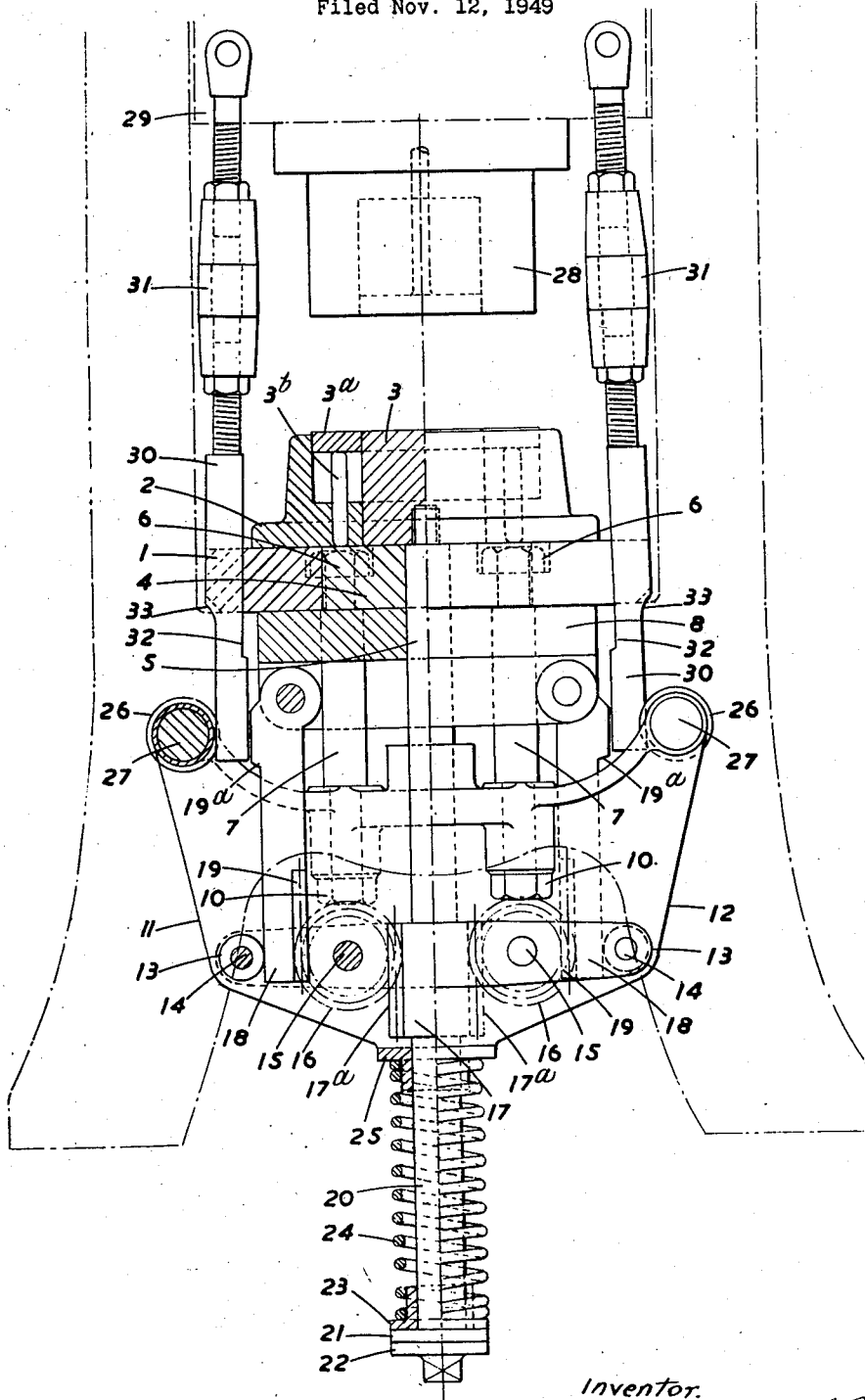
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PRESS FOR DRAWING SHEET METAL

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PRESS FOR DRAWING SHEET METAL

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1 Claim. (Cl. 113—46)

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This invention relates to improvements in or relating to presses for drawing sheet metal, and more particularly to a press of the kind in which an upper die carried by a ram co-operates with a lower die supported on the bed-plate of the press, and in which the lower die is provided with a forming block and with a draw ring supported by a pressure plate beneath the bed of the press, the pressure plate being operatively connected to the forming block so as to raise the forming block against the action of a return spring as the draw ring and pressure plate are depressed by the descending upper die during the drawing operation.

In known presses of this kind the work is stripped from the forming block solely by the effort exerted by the return spring, which reasserts itself and returns the pressure plate and draw rings upwards and the forming block downwards to their original positions, as the upper die ascends on the return stroke of the ram. When, however, the dies have to "iron" the metal as well as to draw it, as in the production of aluminum stampings, the stripping effort required may be greater than the effort of which the return spring is capable.

It is an object of the invention to provide a sheet metal drawing press in which the work is positively stripped from the forming block.

It is a further object of the invention to provide a sheet metal drawing press suitable for drawing aluminum.

According to the invention there is provided an improved press for drawing sheet metal in which an upper die carried by a ram co-operates with a lower die supported on the bed-plate of the press, and in which the lower die is provided with a forming block and with a draw ring supported by a pressure plate beneath the bed of the press, the pressure plate being operatively connected to the forming block so as to raise the forming block against the action of a return spring as the draw ring and pressure plate are depressed by the descending upper die during the drawing operation, including a linkage by means of which the ram is operatively connected to the pressure plate during the early part of the return stroke of the ram only, so as to impart to the pressure plate an upward motion which raises the draw ring and depresses the forming block, whereby the work is positively stripped from the forming block by motion derived from the ram.

Preferably the linkage comprises a pair of depending links pivotally attached to the ram and cam means are provided for swinging the links

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during the working stroke of the ram, into an operative position in which they engage beneath the pressure plate and for releasing the links from the operative position during the return stroke of the ram.

One embodiment of the invention will now be described, by way of example, with reference to the accompanying drawing, the single figure of which shows:

A part-sectional front elevation of a press according to the invention.

Referring to the drawing, in which only such parts of the press are shown as are necessary for the proper understanding of the invention, 1 indicates the bed-plate of the press upon which is mounted the bottom die 2 having a central opening for the passage of a block or former 3, said block at its base resting upon the collar or ring 4 disposed in an opening formed in the bed-plate, and which collar or ring slidably engages the upper end of a rod 5 having a screw-thread to engage an appropriate thread formed in a hole in the block 3. The draw ring 3a is supported by pins 3b resting on the ring 4. Secured to the bed-plate 1 by means of nuts 6 countersunk into the upper surface of the said bed-plate are downwardly projecting rods 7, the upper end of each of which is reduced in diameter where it enters the said bed-plate and is screw-threaded to engage one of the nuts 6. The rods 7, of which four are provided, form guides for a pressure plate 8, the rods serving to prevent the plate from tilting or rocking as it moves upwards and downwards.

The rods 7 are each reduced in diameter at their lower ends and each screw-threaded for the reception of a nut 10 whereby there is secured to the said rods a bracket having vertical side cheeks 11 and 12 in each of which holes are formed for the passage of the lower ends of the said rods. The side cheeks 11 and 12 are suitably spaced apart to accommodate a pair of lower rollers 13 mounted on spindles 14 and a pair of pinions 16 mounted on spindles 15, the spindles 14 and 15 being supported at each end thereof by the cheeks 11 and 12. A pair of upper rollers 26 freely mounted on spindles 27 are also accommodated between the upper portions of the cheeks 11 and 12, the spindles thereof being supported by the said cheeks.

The rod 5 has, intermediate its ends, an enlarged portion 17 having upon opposite sides thereof racks 17a with which engage the afore-said pinions 16.

Depending rack members 18 pivotally mounted upon the underside of the pressure plate 8 are

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provided upon their inner faces with teeth indicated by 19 forming racks which engage with the pinions 16, the engagement of the racks with the pinions being ensured by the rollers 13 which engage the outer surface of the members 18. The members 18 are also provided on their outer surface near the upper ends thereof with inclined or bevelled ledges 19a.

The rod 5 has a reduced lower portion 20 which is screw-threaded part-way along its length from the lower end thereof and provided with lock-nuts 21 and 22, the nut 22 supporting a bushing 23 against the collar of which abuts the lower end of a helical spring 24 encircling the said reduced portion 20 and having its upper end bearing against a horizontal transverse plate 25 extending between the cheeks 11 and 12 of the aforesaid bracket.

The upper die 28 of the press is carried by the ram 29. A pair of depending links 30 pivotally attached to the ram extend downwardly into the vicinity of the upper portions of the rack members. The links 30 are each provided on the inner side near the lower end thereof with an inclined or bevelled ledge 32 and are provided on the outer surface with a ramp 33 on to which the rollers 26 run immediately after the upper die 28 contacts the metal blank.

The effective length of the links 30 is adjustable by means of turnbuckles 31 so that when the upper die 28 carried by the ram 29 contacts the metal blank resting on the lower die 2, the ledges 32 of the links 30 are at a level slightly below that of the ledges 19a on the rack members 18.

The positive stripping device functions as follows:

As the upper die 28 moves downwards on to the metal blank its pressure is transmitted through the draw ring 3a and pins 3b to the collar or ring 4 and so to the pressure plate 8 causing the latter to be depressed. The depression of the pressure plate 8 causes the rack members 18 to rotate the pinions 16 which, owing to their engagement with the teeth 17a upon the enlarged portion 17 on the rod 5, cause the forming block 3 to be raised, compressing the return spring 24. As the ram 29 approaches the bottom of its stroke the links 30 are caused to swing inwards by the ramps 33 co-operating with the rollers 26, bringing the ledges 32 into their operative position in which they engage beneath the corresponding ledges 19a on the rack members 18.

Upon the upward movement of the ram, the ledges 32 engage the ledges 19a whereby a positive upward motion is imparted to the pressure plate 8 and draw ring 3a whilst a positive downward movement is imparted to the forming block 3 through the rack members 18 engaging with the pinions 16 which in turn engage the teeth 17a on the enlarged portion 17 of the rod 5.

By virtue of the above arrangement, the work is positively stripped from the forming block 3

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during the early part of the return stroke of the ram. Since the ledges 32 and 19a are bevelled, they slip out of engagement, and the links 30 swing outwards again to their normal positions when the rollers 26 leave the ramp 33 just before the pressure plate 8 has returned to its normal position. The return of the pressure plate 8, draw ring 3a and forming block 3 to their normal positions is assisted and completed by the spring 24 reasserting itself.

What I claim is:

A press for drawing sheet metal, comprising a bed-plate, a lower die supported on said bed-plate, a ram movable with an up and down stroke away from and towards said lower die, an upper die carried by said ram and co-operating with said lower die, a draw ring movable up and down within said lower die and arranged to be depressed by said upper die during the down stroke of said ram, a pressure plate movable with and supporting said draw ring, a rod movable axially up and down with respect to said bed-plate, a forming block carried by the upper end of said rod and movable within said draw ring, two racks formed on opposite sides of said rod, two corresponding rack members depending from said pressure plate, two pinions supported from said bed-plate, each pinion engaging between a rack on said rod and the corresponding rack member depending from said pressure plate, a return spring arranged to be stressed by upward movement of said rod, a ledge on the outer side of each rack member, a link depending from each side of the ram and swingable inwards into engagement with the corresponding depending rack member, a ledge on the inner side of each link and engageable beneath the corresponding ledge of the corresponding rack member, on swinging the link inwards as aforesaid, said ledges on said links and rack member being bevelled so as to cam said links out of engagement with said rack members, ramps on the outer sides of said links, and rollers supported from said bed-plate and co-operating with said ramps to swing said links into engagement with said rack members at a predetermined point of the down stroke of said ram and to allow said links to be cammed out of engagement at the same point on the up stroke of said ram.

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