(No Model.) 2 Sheets—Sheet 1.

N. C. STILES.

DIE PRESS.

No. 410,746. Patented Sept. 10, 1889.

FIG. 1.

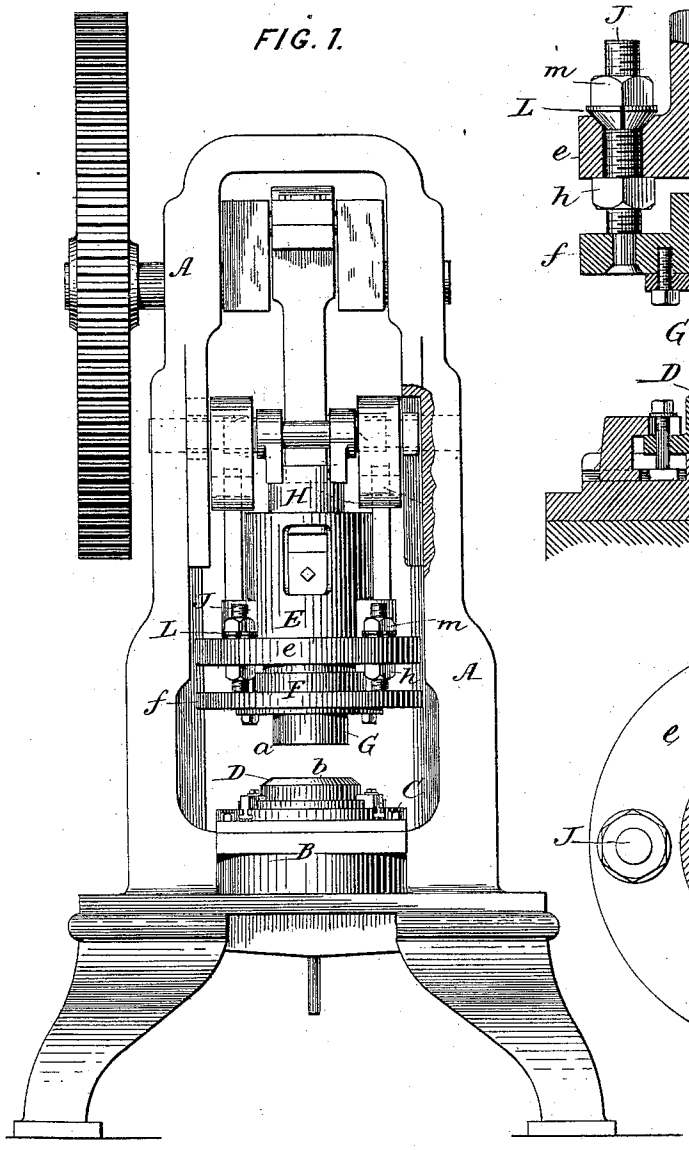


FIG. 2.

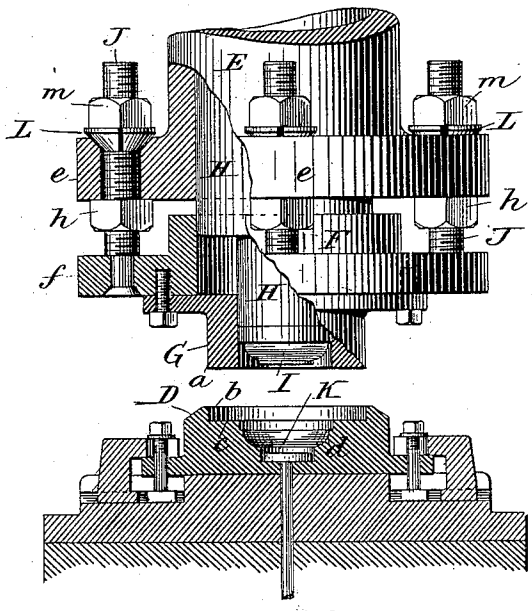
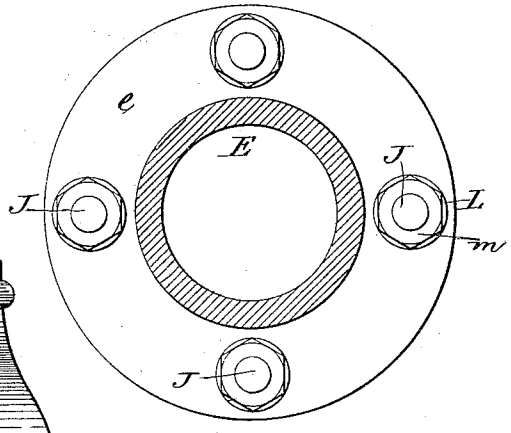


FIG. 3.



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INVENTOR:

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By his Attorneys,

Arthur G. Fraser & Co.

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

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FIG. 5.

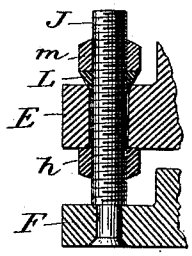


FIG. 6.

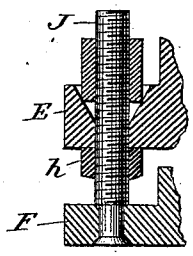


FIG. 4.

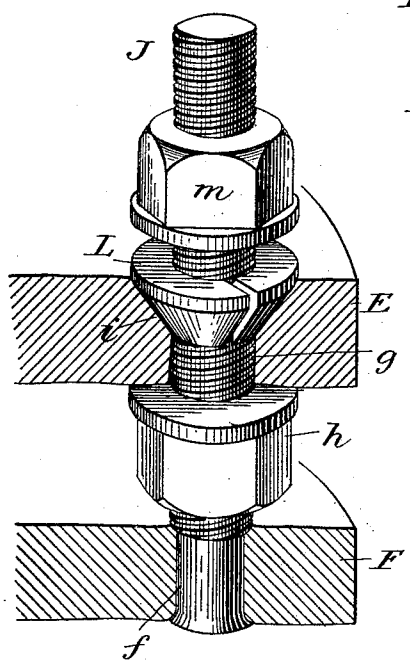


FIG. 7.

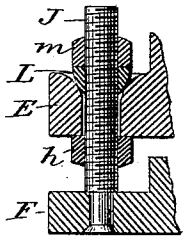


FIG. 8.

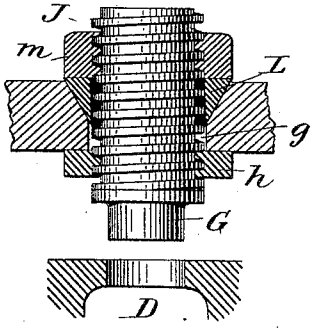
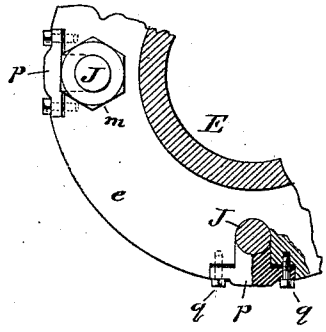


FIG. 9.



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UNITED STATES PATENT OFFICE.

NORMAN C. STILES, OF MIDDLETOWN, CONNECTICUT.

DIE-PRESS.

SPECIFICATION forming part of Letters Patent No. 410,746, dated September 10, 1889.

Application filed January 31, 1889. Serial No. 298,239. (No model.)

To all whom it may concern:

Be it known that I, NORMAN C. STILES, a citizen of the United States, residing at Middletown, in the county of Middlesex and State of Connecticut, have invented certain new and useful Improvements in Die-Presses, of which the following is a specification.

This invention relates to drawing-presses, stamping-presses, and other analogous machines in which male and female dies are employed, which are brought together or forced the one through the other in order to cut out or shape sheet metal or other material and for other analogous purposes. In presses of this character it is necessary to provide means for adjusting the dies relatively toward or from each other, and it is desirable to be able to effect such adjustment without impairing the lateral adjustment of the dies by which they are centered relatively to each other, or, in other words, it is important that after the adjustment of the dies toward or from each other has been effected they shall be brought into exact coincidence without requiring a subsequent lateral adjustment to bring them properly to center. The object of my invention is to provide a means for accomplishing this result.

The application of my invention is best illustrated with reference to drawing-presses, or those wherein a sheet of metal or other material is first confined against the female die by means of an annular holding-die called a "blank-holder," which rests upon the sheet and is held thereagainst with sufficient pressure, while a drawing die or punch moves inside of it and draws the metal down within the female die, at the same time pulling it from between the annular holding-surfaces and imparting to it the required shape. In such presses it is necessary to be able to adjust to a nicety the distance to which the blank-holder approaches the female die on different sides in order to insure that the blank shall be held on all sides with an equal pressure to prevent wrinkling as it is drawn from between the holding-surfaces, this adjustment being known as "leveling." It is also desirable to be able to adjust the blank-holder bodily toward or from the female die to adapt the press for working metal or other material of different thicknesses.

According to my invention I interpose one or more adjusting-screws between the parts of the press which require relative adjustment toward and from each other, (such, for example, in the case of a drawing-press, as the blank-holder head and the blank-holder slide, respectively, or the die-bed and its supporting-table,) the adjusting-screw or each of the screws being attached to one of said parts and adjustable through an opening in the other, and I provide means for centering the screw relatively to said opening after its adjustment, whereby on completing the adjustment the parts are returned to an invariable lateral position. This means for centering consists preferably of a washer or nut surrounding the screw and entering a seat in the part through which the screw is adjusted, either the washer or the seat, or preferably both, being tapered or coned in order that on forcing the washer into the seat it shall be brought to the center thereof, and, being made a tight fit with the screw, the latter is simultaneously brought to center. In order to insure the close and intimate fitting of the washer upon the screw, and consequently the accurate and invariable centering of the latter, the washer is made expansible by being slitted, in order that as it is forced into the seat it shall be thereby contracted and brought into firm engagement with the screw.

In the accompanying drawings I have shown my invention as applied to a double-action drawing-press, or one in which the blank-holder first descends against the female die, and subsequently, and while the blank-holder remains in this position, a drawing-punch is forced into or through the female die in order to draw the metal to the required shaped.

Figure 1 is front elevation showing a suitable construction of such presses, being that known as the "Stiles & Parker straight-sided toggle-joint drawing-press." Fig. 2 is a fragmentary elevation, partly in vertical section on an oblique plane, showing the dies and their supporting parts with my invention applied thereto. Fig. 3 is a horizontal section of the blank-holder slide. Fig. 4 is a perpective detail view of one of the adjusting-screws and its appurtenances on a larger scale. Figs. 5, 6, 7, and 8 are fragmentary

vertical sections through the axis of the adjusting-screw, showing modified construction.

The particular construction of double-acting drawing-press shown in Fig. 1 need not be here described, since it has no necessary connection with my present invention. Its construction is the same as that shown in my patent, No. 364,142, dated May 31, 1887, to which reference is made for a full understanding of its mechanism. For the purposes of my present application for patent it will suffice to state that the frame A of the press is constructed at its lower part with a die-table B, to which is fastened a die-bed C and on which bed is clamped the female die D in such manner that it may be adjusted laterally to bring it to proper center. The side frames A A form guides between which travels the blank-holder slide E, and to the under side of this slide is fastened the blank-holder head F, and beneath which is fixed the blank-holder G. Within the parts E, F, and G works the drawing-punch slide H, to the bottom end of which is fastened the drawing-punch or male die I, as best shown in Fig. 2. The female die D being ordinarily immovable, the operation of the press consists in the moving down of the parts E, F, and G until the latter cuts the blank by the shearing action of its outer edge *a* against the edge *b* of the female die, thereby forcing the cut blank down onto the holding-surface *c* and holding it there with the required pressure. Thereupon the punch-slide H descends, causing the punch I to encounter the blank and draw it down into the concave or shaping portion *d* of the female die, thereby pulling its clamped edge out from between the holding-surfaces. The blank-holder G and punch I then reascend, and a "knock-out" or push-out plate K moves up and lifts out the stamped blank, whereupon it is removed and a new sheet put into the machine for the next stamping operation.

I will now proceed to describe my present invention.

Referring to Fig. 2, the blank-holder head F is fastened to the blank-holder slide E, through the medium of adjusting-screws J J, which screws are fixed at their lower ends in a flange *f* on the blank-holder head and passed through holes or openings *g* in a flange *e* on the blank-holder slide E. A nut *h* is screwed upon each of the screws J and comes against the under side of the flange *e*, the downward pressure against the blank-holder being transmitted through the flange *e* and nut *h* and through the lower portion of the screw J to the flange *f*. Hence by adjusting the nuts *h h* up or down the distance apart of the slide E the head F may be adjusted, whereby the blank-holder G may be brought closer to or farther from the holding-surface *c* of the female die during the time that the blank-holder is pressed down.

In the upper side of the flange *e* are formed seats or counterbores *i i*, communicating with the openings *g*, through which the screws pass, and into each of these seats fits a coned or tapered washer L. This washer is pressed down by turning a lock-nut *m*, which screws upon the upper part of the screw J. When the nut *h* has been correctly adjusted, the screwing down of the nut *m* crowds or forces the washer L down into the seat *i*, and hence, by reason of the reciprocally-coned surfaces of the washer and seat, and by reason, also, of the interior of the washer being a close fit with the exterior of the screw, the screw is drawn into an exactly concentric position. In adjusting the press to operate upon metal or material of any thickness an adjustment of the respective dies to approximate level is first made. The male and female dies are then brought into proper lateral coincidence, so as to give the correct shearing cut, and the drawing action of the press is then tested. The blank-holding surfaces are then found to require some minute relative adjustment to cause them to grip the blank with the same pressure on all sides. This adjustment is effected by slightly turning the nuts *h* and *m* of one or more of the screws J. By the means employed prior to my present invention this vertical adjustment has been found upon the retightening of the nuts to leave the blank-holder out of center or to impair its lateral adjustment, so that upon bringing it down upon the female die its cutting-edge *a* is eccentric to the cutting-edge *b* of the female die, thereby impairing the shearing action of the dies; hence it was necessary after the vertical adjustment or leveling of the blank-holder to carefully readjust the female die in lateral direction in order to bring it into coincidence with the male cutting-die or blank-holder. According to my invention, however, this subsequent lateral adjustment is no longer necessary. Before readjusting the blank-holder vertically the nuts *m m* of the screw J whose adjustment is required are slackened, thereby releasing the screws from the concentric pinch of the washers L L and leaving the blank-holder head F to that extent free to shift laterally and get out of center. The vertical adjustment is then effected by turning the nuts *h h*, whereupon the nuts *m m* are retightened, thereby again compressing the washers L L into their seats *i i* and against the exterior of the screws, whereby the screws, and consequently also the head F and the blank-holder, are brought back laterally to the same position as before the vertical readjustment was commenced. Consequently the male cutting-die or blank-holder is found to be again in exact coincidence with the female die, and no further adjustment of the latter is required.

My invention is applicable not only to drawing-presses, but also to all forms of stamping-presses wherein it is essential that the dies shall be adjustable toward or from each other, and wherein, after such adjustment, it is desirable that the dies shall be in exact coincidence with each other in lateral direction.

The splitting of the washer L is practically important; but it is not absolutely essential to my invention, since if a sufficiently close fit were made between the interior of the washer and the exterior of the screw a solid washer might be used to like effect.

The washer L and nut J may be made in one piece without departing from my invention, or, in other words, the washer L may be a nut. This is shown in Fig. 6.

It is not essential to my invention that both the washer L and its seat *i* shall be coned or tapered, as if either one of these parts is tapered the tapering of the other may be omitted. In Fig. 5, for example, the washer alone is tapered, the seat consisting merely of the upper end of the opening *g*, which is slightly rounded. In Fig. 6, on the contrary, the seat alone is tapered, the bottom portion of the washer or nut entering it and being slightly rounded. The tapering of the washer and seat, or either of them, need not extend for any considerable portion of their height, nor need it be essentially in a straight line or a segment of a cone, since a curved taper may be used. Fig. 7 shows both the seat and washer with their coacting surfaces formed in cross-section as arcs of circles so disposed that the portions thereof which come into contact touch at such an angle as to give the required concentric wedging effect.

Any number of adjusting-screws J may be employed from one up. The adjusting-screw J need not be merely an adjusting screw, but may itself form some otherwise essential part of the press. For example, I have shown in Fig. 8 a cutting or stamping press in which the male die G, which enters the female die D, is formed in one piece with or attached to the lower end of a screw J, which constitutes the adjusting-screw, and which passes out freely through a hole *g* in a slide E, being provided with nuts *h* and *m* and washer L, as already described.

Instead of adjusting the upper or male die by applying to it the means of adjustment provided by my invention, the lower or female die may be in like manner adjusted by a mere inversion of the adjusting elements, or the adjusting elements may be inverted relatively to the flange *e*, in which case the lower nut will be the one which presses against the curved washer L.

Other methods of recentering the screws J may be substituted for that shown, it being only necessary to provide for a relative adjustment in size of the exterior of the screw and the interior of the hole through which it passes in order to draw the screw back always to the same center. Fig. 9 shows a means for accomplishing this which may be substituted for those already described. Each screw passes through an open slot in the flange *e*, which is closed by a cap *p*, analogous to a bearing-cap, and which is drawn up by screws *q q* to force its inner end against the screw J, thereby pressing the latter tightly to the same position against the walls of the slot.

I claim as my invention the following-defined novel features or combinations, substantially as hereinbefore specified, viz:

1. In a press of the described kind, the combination, with two parts requiring adjustment relatively toward and from each other, of an intervening adjusting-screw adjustable through an opening in one of said parts, and means, substantially as described, for centering the screw relatively to such opening after its adjustment, such means consisting of a piece movable relatively to the walls of said opening and adapted when forced to place to embrace and seat itself against the screw, whereby such parts are returned to an invariable lateral position after each adjustment.

2. In a press of the described kind, the combination, with two parts requiring adjustment relatively toward and from each other, of an intervening adjusting-screw adjustable through an opening in one of said parts, the said part formed with a seat, and a washer surrounding the screw and entering said seat, the seat and washer being reciprocally tapered at their points of engagement, whereby on forcing the washer into the seat the screw is brought to center.

3. In a press of the described kind, the combination, with two parts requiring adjustment relatively toward and from each other, of an intervening adjusting-screw adjustable through an opening in one of said parts, the said part formed with a seat, and a split or collapsible washer arranged to surround the screw and entering said seat, the seat and washer being reciprocally tapered at their points of engagement, whereby on forcing the washer into the seat it is collapsed upon the screw and the latter is brought to center.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

NORMAN C. STILES.

Witnesses:
ARTHUR C. FRASER,
JNO. E. GAVIN.