

(No Model.)

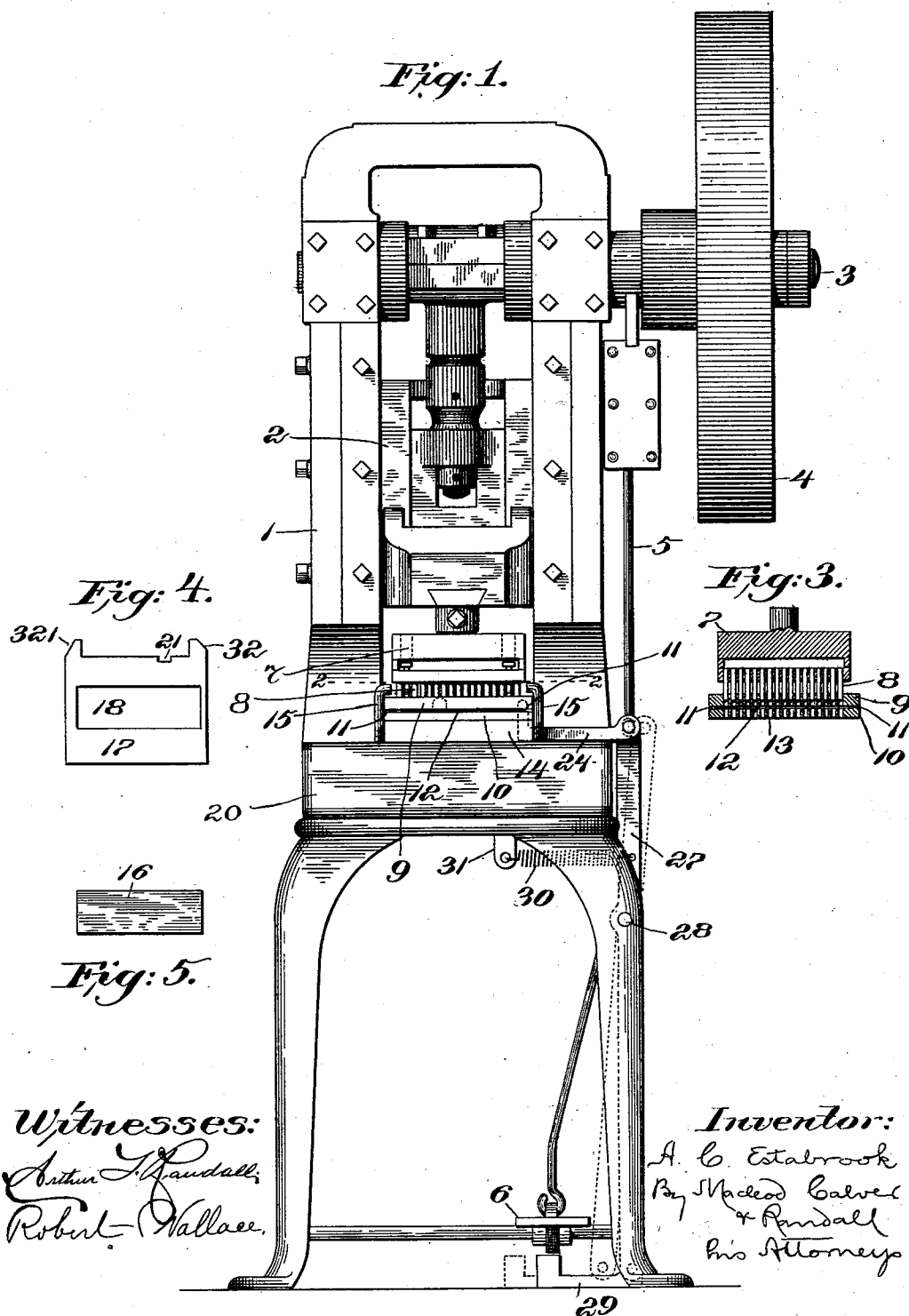
3 Sheets—Sheet 1.

A. C. ESTABROOK.

DEVICE FOR USE IN PUNCHING FROM SHEETS OF PLASTIC MATERIAL.

No. 568,941.

Patented Oct. 6, 1896.



(No Model.)

3 Sheets—Sheet 2.

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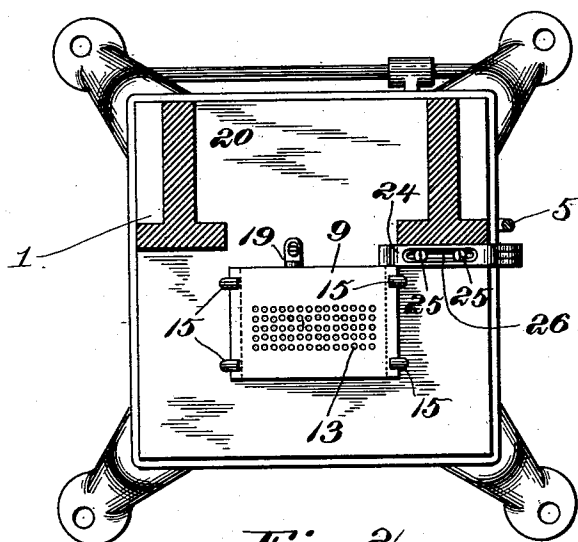


Fig. 2.

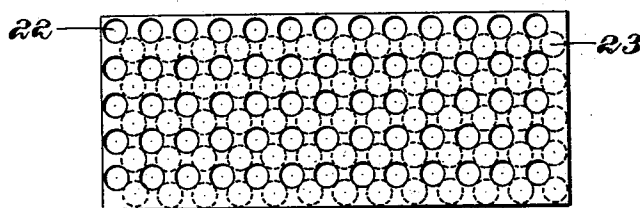


Fig. 6. 16

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(No Model.)

3 Sheets—Sheet 3.

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Fig. 7.

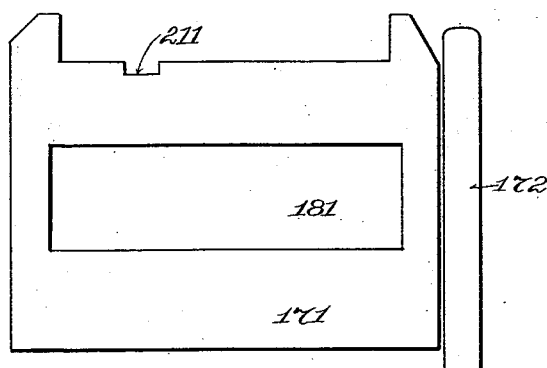


Fig. 8.

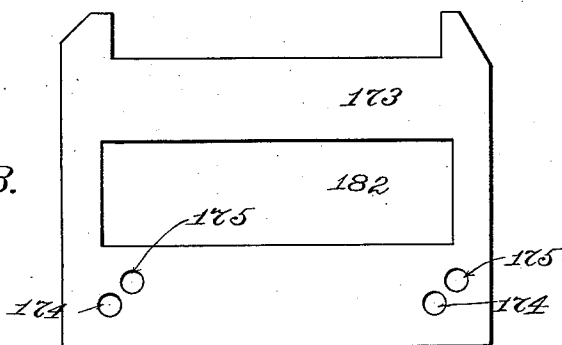
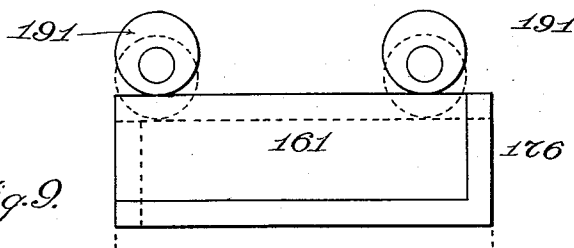


Fig. 9.



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UNITED STATES PATENT OFFICE.

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DEVICE FOR USE IN PUNCHING FROM SHEETS OF PLASTIC MATERIAL.

SPECIFICATION forming part of Letters Patent No. 568,941, dated October 6, 1896.

Application filed December 18, 1895. Serial No. 572,505. (No model.)

To all whom it may concern:

Be it known that I, ALANSON C. ESTABROOK, a citizen of the United States, residing at Northampton, in the county of Hampshire and State of Massachusetts, have invented certain new and useful Improvements in Devices for Use in Punching from Sheets of Plastic Material, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 of the drawings shows in front elevation a punching-press having certain features of my invention applied thereto. Fig. 2 is a view showing the same in horizontal section on the dotted line 2 2 of Fig. 1. Fig. 3 is a view in vertical section of the parts which are more immediately concerned in performing the punching. Fig. 4 is a view in plan of the plate, which is described hereinafter. Fig. 5 is a view in plan of a sheet or strip of plastic material from which portions are to be punched by the devices of Figs. 1, 2, and 3 with the aid of the plate shown in Fig. 4. Fig. 6 is a view of a strip of plastic material, on an enlarged scale, showing the arrangement of the holes that are punched therein. Figs. 7, 8, and 9 show modifications.

1, Figs. 1 and 2, is the framing of a punching-press.

2 is the slide, which is mounted to reciprocate in guides on the said framing. It is operated as usual by a crank on the shaft 3, as indicated in Fig. 1.

4 is the actuating-wheel that is mounted loosely on said shaft 3. The said shaft 3 is operatively connected with the actuating-wheel 4 whenever it is required to produce a reciprocating movement of the slide 2. This connection of the shaft and actuating-wheel is effected in practice by the aid of clutching devices of the character usually employed in presses of the kind here shown. Such clutching devices are not described or illustrated herein, inasmuch as they are of well-known character and are in common use.

At 5 is a rod serving for the actuation in customary manner of the clutching devices, and at 6 is a treadle with which the said rod is connected.

At 7 is a punching-head, which is secured to the lower end of the slide 2. It carries a

gang of punches 8, which are arranged in parallel rows.

At 9 and 10 are plates which are connected together, spacing-pieces 11 being placed between the ends thereof to produce a space or opening 12 between the said plates 9 and 10 for the admission of the sheet or strip of material from which portions are to be punched. These plates 9 and 10 are perforated, as at 13, for the passage therethrough of the punches 8. The upper plate 9 serves as a guide for the lower portions of the punches, while the ends of the said punches coast with the plate 10 in punching the desired portions from the sheet or strip of material, as will be obvious.

14, Fig. 1, is a plate on which the connected plates 9 and 10 rest in the press, this plate being placed upon the bed-plate 20. 15 15 are screw-stops having inturned upper ends to limit the upward movement of the plates 9 and 10 as the punches withdraw therefrom in the upward movement of the slide 2.

The foregoing parts, as well as other necessary features of a punching-press which may not have been described, are or may be as heretofore.

The features which have been so far described have been presented merely in order to render clear the connections and application of the features of my invention, which latter I now will proceed to describe.

The punches 8 customarily are arranged in a number of parallel rows. This arrangement is indicated by the illustration in Fig. 2 of the corresponding arrangement of the holes 13 that are made in the plate 9. The punches are placed as closely together as possible in each row in the punching-head and the rows are placed as close together in the said head as possible. It is, however, impossible to apply the punches to the punching-head without leaving spaces of certain extent between the punches in each row and between the successive rows. This is due to the fact that a gang of punches must have metal enough to give them strength and rigidity enough to do the work, and this separates the punches to a relatively considerable extent. It therefore follows that after a sheet of plastic material has been intro-

duced beneath the punches and the latter have passed through the same the holes which are produced in the said sheet or strip will be separated by intervening solid portions of material which have been left by the punches. Heretofore the portion of the sheet which remains after the performance of the punching operation has been relatively large in quantity. It has been regarded as scrap, and has been sold as such to be reworked with the addition of new material and formed into new sheets. The scrap sells for a very small fraction of the cost of the original sheets. Hence the manufacturer, who has to purchase the material in sheet form, finds that the expense of making the articles which he produces is very much increased by the great proportion of scrap which he makes and the relatively low value of the latter.

My invention has for its aim to enable the manufacturer to utilize a much greater proportion of the original sheet than heretofore, thereby lessening the proportion which has to be sold as scrap, correspondingly increasing the number of articles which can be produced from a given quantity of sheet material, and reducing the cost of production. It will be seen from inspection of Fig. 2 that between the parallel lines of holes in the plate 9 there are spaces which respectively are slightly more than equal in area to the respective holes themselves. The sheet or strip of plastic material after being punched contains solid portions corresponding with the spaces aforesaid on the plate 9. I provide as follows for enabling the said sheet or strip to be acted upon a second time by the punches so as to utilize the said solid portions.

Fig. 5 of the drawings shows a sheet 16 of plastic material as it appears before it has been punched. Fig. 4 shows a plate 17, serving as a holder for the said sheet 16, whereby to facilitate the placing of the said sheet or strip properly in position beneath the punches and the subsequent withdrawal of the said sheet or strip. The said plate 17 is formed with an opening 18 therethrough corresponding in outline and proportions with the sheet 16. The sheet or strip 16 is placed within this opening, and the plate 17 then is slipped into the opening or space 12, so as to carry the sheet 16 with it into proper position beneath the punches. In connection with the said plate I employ means whereby to determine the position which it shall assume after having been slipped into the space 12, and whereby after the punches have passed once through the sheet or strip 16, removing from the latter certain portions of its substance, the plate, and with it the sheet or strip of plastic material, may be given a new position under the punches, thereby presenting the previously-untouched portions of the sheet or strip of plastic material in position beneath the lower ends of the punches to be acted upon thereby in the second descent thereof. Various means of determining the

two positions of the plate 17 at and previous to the two punching operations aforesaid may be adopted. The means which I prefer is as follows:

At 19 is a stop secured to the bed-plate 20 of the press and projecting up therefrom sufficiently to be struck by the rear edge of the plate 17 when it has reached the proper position in the space 12. This stop determines the rearward movement of the plate 17. The latter is made of such width that when it is slipped into the space 12 its side edges are guided by the filling-pieces 11 11 at the opposite ends of the said space. Thereby the position of the plate 17 and of the sheet or strip of plastic material applied thereto may be definitely and accurately fixed at each insertion of the said plate. The plate 17 is notched, as at 21, in its rear edge, the notch being of sufficient size to receive the stop 19 under the conditions which presently will be specified, and the depth of the notch being equal to the shift which is necessary to be made from front to back in the press in order to present in proper position beneath the punches the solid portions which remain in the sheet or strip 16 of plastic material after the first punching operation. In addition, the opening 18 is displaced somewhat to one side of the middle of the plate 17, as indicated in Fig. 4. The notch 21 also is a little to one side of midwidth of the said plate. The stop 19 is the same distance to one side of the middle of the series of punching devices, as indicated clearly in Fig. 2.

If a sheet or strip 16 of plastic material be introduced into the opening 18 of the plate 17, it being assumed that the said plate is held with the side uppermost which is visible in Fig. 4, and the said plate 17 is thrust into the space 12, the plate will be arrested when it has reached the proper position for the performance of the first punching operation by contact of the rear edge thereof with the stop 19. After the punches have descended and been lifted again the plate 17 and sheet or strip 16 are withdrawn. The sheet or strip 16 being temporarily removed from the opening 18 the plate 17 now is turned over so as to present the other side thereof on top. The sheet or strip 16 is reintroduced into the opening 18 and the plate 17 and sheet or strip 16 are again slid into the space 12. This time, in consequence of the reversal of the plate 17, as just mentioned, the sheet 16 will be shifted endwise relatively to the punches, owing to the one-sided position of the opening 18 in the plate 17. Also, inasmuch as in the reversed position of the plate 17 the notch 21 is presented in a position coinciding with that of the stop 19, said notch will receive the said stop as the plate is pushed rearwardly in the space 12, and hence the plate will enter farther than it did before by an extent equal to the depth of the notch 21. The effect of these combined changes will be to present beneath the punches, as the lat-

ter descend, the solid portions which remained after the first punching operation. The sheet or strip of plastic material is in effect, previous to the second punching operation, shifted in position beneath the punches to a slight extent laterally of the press and also to a slight extent rearwardly. I have indicated the results in Fig. 6 of the drawings, which is on a somewhat larger scale than the remaining figures, and in which the full-line circles at 22 indicate the portions which are removed by the first punching operation and the dotted-line circles at 23 indicate the portions which are removed by the second punching operation.

It will be obvious that care must be exercised to push the plate or holder 17 rearwardly in the space 12 to exactly the right position prior to each descent of the punches. To this end I combine with the said plate 17 devices whereby to control the action of the machine and prevent the punches from being operated except after the plate 17 has been carried into full contact with the stop 19, which determines its position. I have shown in the drawings a slide 24, secured upon the bed-plate 20 by screws 25 25, passing through a slot 26 in the said slide and entering the bed-plate, the said slide being free to move in the direction of its length upon the surface of the said bed-plate. The outer end of the said slide is connected in suitable manner with the upper arm of a lever 27, which latter is pivoted at 28 upon the frame 1 and joined at its lower end to a sliding block 29. A spring 30, connected with the said lever 27 and with a fixed portion, as 31, on the framing, serves to draw the slide 24 inwardly, so that its inner end extends across a part of the space 12 at the rear of the punching devices, and also to draw the block 29 into the position in which it is shown in full lines in Fig. 1. In this position of the block it acts to prevent the descent of the treadle, so that it is impossible to depress the said treadle and cause the clutching devices to act so as to occasion a downward movement of the punches. Before the treadle can be depressed and the punches operated it is necessary to withdraw the block, or at least the enlarged portion thereof which engages with the treadle, out from beneath the treadle. To effect this withdrawal of the block, I utilize the rear corners of the plate 17, the said corners being beveled off, as at 32 321, in order that when either of them contacts with the inner end of the inner end of the slide 24 it will operate as a cam to force the said slide outwardly, thereby turning the lever 27 on its fulcrum and carrying the block 29 into the position which is shown in dotted lines in Fig. 1. The withdrawal of the block is not completed until after the plate 17 has been brought home into contact with the stop 19. Since in one of its positions the notch 21 in the plate 17 is presented to the stop 19 and permits the said plate to go farther back

than in the other position of the plate, the inclined corner portion 321, which acts to move the slide 24 at this time, is made longer than the inclined corner portion 32, which acts in the other position of the plate 17.

It will be obvious that my invention can be utilized in connection with punching-sheets of material of other character than those hereinabove specified.

It will be apparent that my invention in its broader phase is not restricted to the particular means which has been described of giving to the blank which is to be punched a shift in a diagonal direction at successive punching operations. With the same object in view, namely, that of enabling the material of the said blank to be more completely utilized than heretofore, I may employ modified arrangements such as I now shall describe with reference to Figs. 7, 8, and 9.

Fig. 7 shows a plate or holder, therein designated 171, that differs from the plate or holder 17, which already has been described herein, in this, that the opening 181 (which corresponds with the opening 18 of Fig. 4) is not displaced laterally in the said plate or holder 171, as in Fig. 4. For the purpose of effecting the lateral shift between successive punching operations of the plate or holder 171 and the strip or blank of plastic material that is to be punched I provide a strip or so-called "key" 172, which, in practice, is inserted at one end of the plate or holder 171 prior to one punching operation and then is shifted to the other end thereof prior to the next punching operation. The notch 211 provides for the additional rearward movement of the plate or holder, such notch coöperating with stop 19 of Fig. 2.

Fig. 8 shows a plate or holder 173, which has the opening 182 symmetrically disposed, as in the case of the opening 181 of Fig. 7. The notch 21 of Fig. 4 and 211 of Fig. 7 is omitted. To secure the diagonal shift of the plate or holder, I form the plate or holder 173 with two pairs of holes 174 174 and 175 175 to coöperate with a pair of locking-pins. The said pins, in one position of the plate or holder, enter the holes 174 174. In the other position of the plate or holder the pins enter the holes 175 175.

Fig. 9 illustrates an arrangement in which cam-shaped stops 191 191 are employed to engage with the rear edge of the sheet or blank 161 of plastic material. These cam-shaped stops are capable of being turned from the position in which they appear in Fig. 9 into positions diametrically opposite, as indicated by dotted lines. Thereby is secured the front and rear adjustment of the blank or strip 161. To adjust the said blank or strip laterally in the punching-press, I provide an L-shaped piece 176, which is placed at one end of the blank or strip prior to one punching operation and then at the other end thereof prior to the second punching operation.

What I claim is—

1. The combination with punching devices having a gang of punches arranged in parallel rows, of gaging or positioning devices to give to the blank which is to be punched a shift in a diagonal direction at successive punching operations to thereby enable the material of said blank to be utilized more completely, substantially as described.
2. The combination with punching devices having a gang of punches arranged in parallel rows, of a reversible plate or holder made with an opening therein to receive a sheet or strip of material from which portions are to be punched, said opening having lateral displacement as stated, a stop for limiting the extent to which the plate may be inserted, said plate having also a notch to one side of the middle thereof and adapted in one position of the plate or holder to receive the said stop, substantially as described.
3. The combination with punching devices, and operating mechanism therefor, including means whereby to render such devices active at the desired times, and controlling devices operated by the insertion of the blank to be punched serving to prevent the punching devices from being made operative until the blank which is to be punched has been given

the correct position between the punching devices, substantially as described.

4. The combination with punching devices having a gang of punches arranged in parallel rows, and operating mechanism therefor, including means whereby to render such devices active at the desired times, of a reversible plate or holder having a laterally-displaced opening for the reception of the sheet or strip of material to be punched, a laterally-displaced notch in its rear side, and cam-shaped portions, a stop to enter said notch in one position of the plate or holder, and controlling devices embracing a movable member which is operated upon by the said cam-shaped portions and serving to prevent the punching devices from being made operative until after the said plate or holder has been given the correct position at each insertion of the same between the punching devices, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ALANSON C. ESTABROOK.

Witnesses:

FRANK N. LOOK,
JANET L. ELLIOT.