

April 25, 1939.

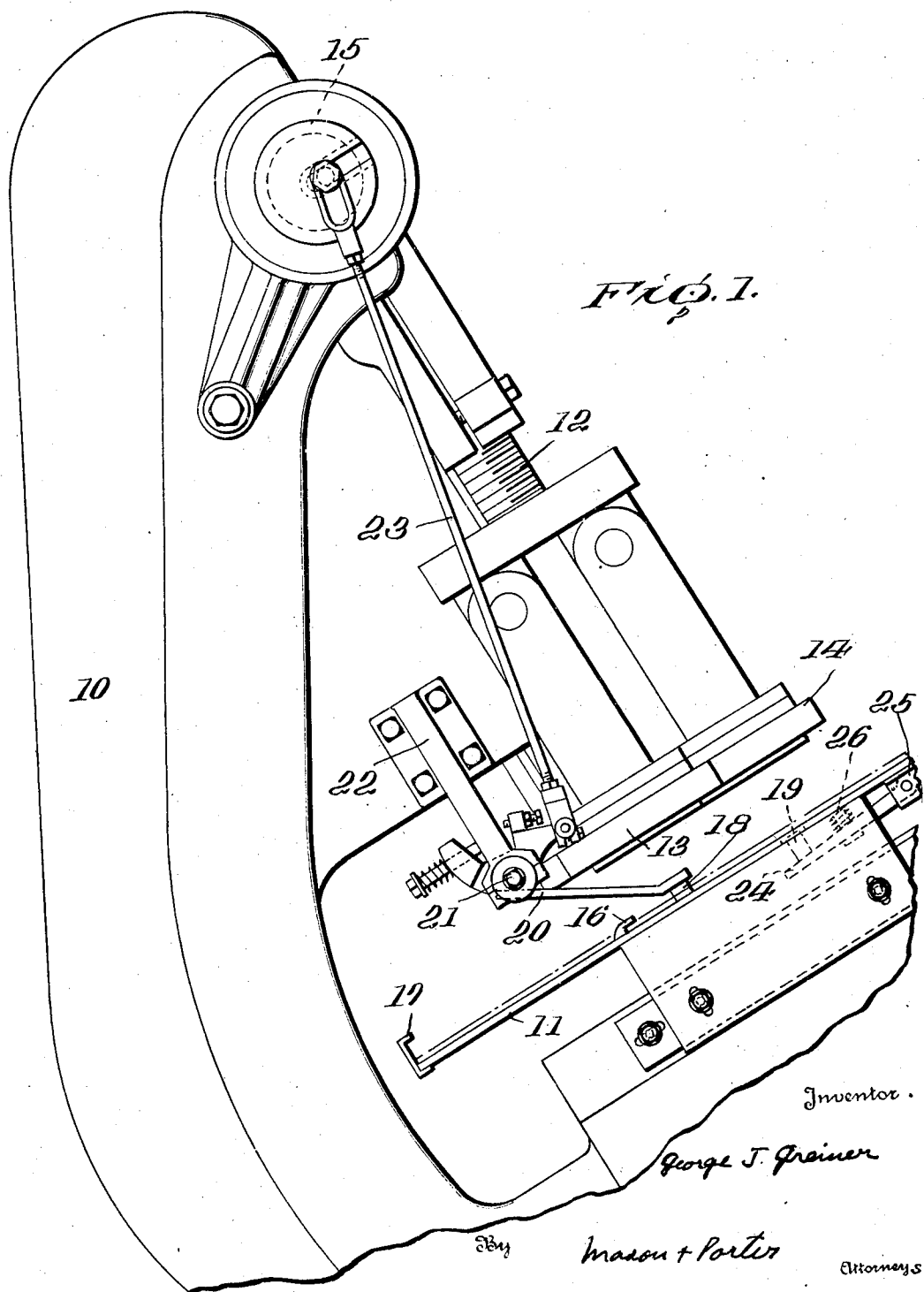
G. J. GREINER

2,156,015

METHOD AND APPARATUS FOR PUNCHING METAL SHEETS

Filed April 10, 1937

2 Sheets-Sheet 1



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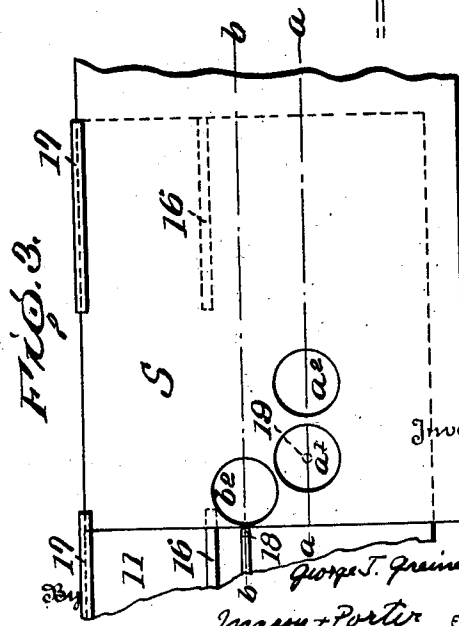
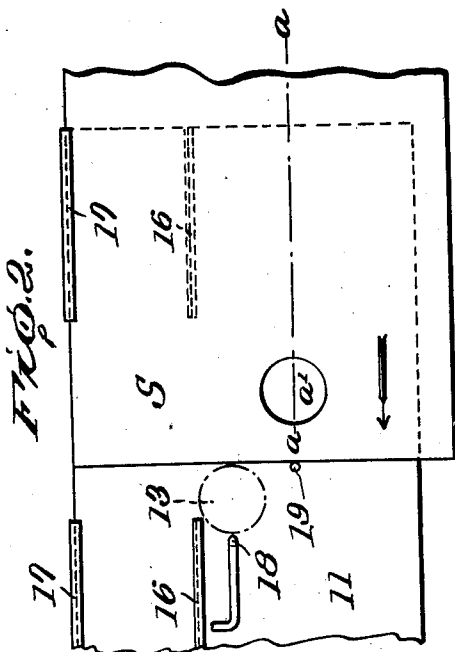
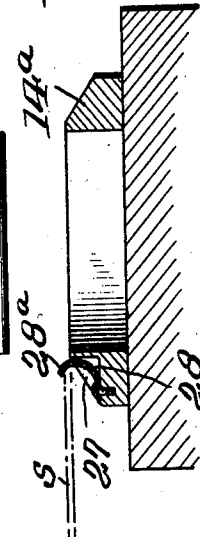
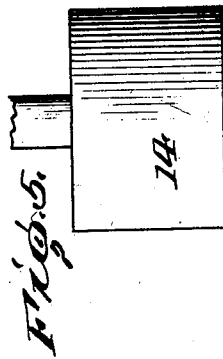
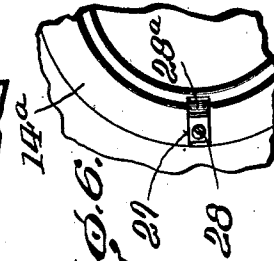
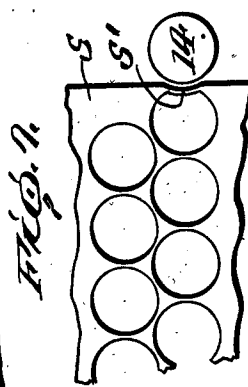
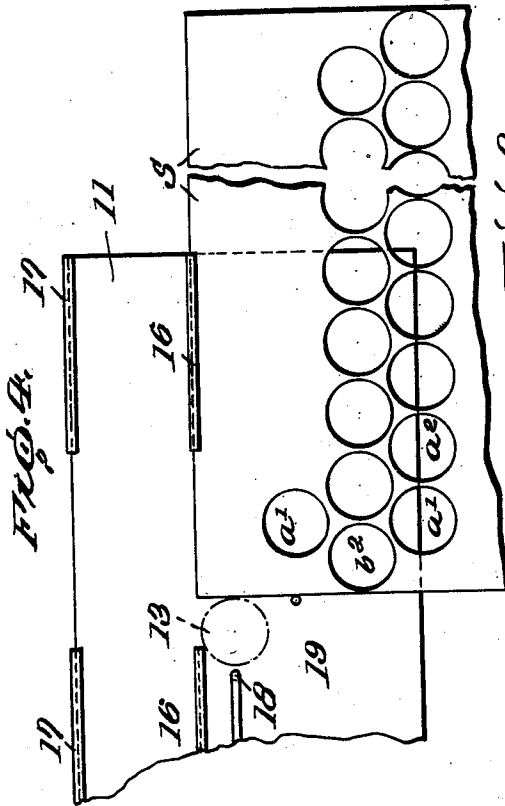
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METHOD AND APPARATUS FOR PUNCHING METAL SHEETS

Filed April 10, 1937

2 Sheets-Sheet 2



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METHOD AND APPARATUS FOR PUNCHING METAL SHEETS

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Application April 10, 1937, Serial No. 136,223

8 Claims. (Cl. 164-88)

The present invention relates to new and useful improvements in a method of punching blanks from metal sheets and to a multiple die or punch press for carrying out the method. The invention particularly relates to the simultaneous punching of a plurality of rows of blanks from a metal sheet which is fed by hand to the press.

An object of the invention is to provide a method and apparatus for the simultaneous punching of a plurality of rows of blanks from a metal sheet wherein the blanks in at least one of the rows are staggered with respect to the blanks in another, and wherein the die for punching the blanks in the staggered row is prevented from contacting with the metal sheet during its idle stroke while the last blank in another row is being punched.

A further object of the invention is to provide a method and apparatus for a multiple row punching operation, as indicated above, wherein the scrap of metal at the end of the row from which the relatively staggered blanks are punched, is deformed out of the path of the die for that row during its idle stroke while the last blank in another row is being punched.

The above and other objects of the invention will be obvious and will be hereinafter more fully pointed out.

In the drawings:

Fig. 1 is a side elevation of a portion of the press employed for punching the blanks.

Fig. 2 is a diagrammatic plan view showing the metal sheet in its initial set position on the supporting bed of the press for punching the first blank in the staggered row at the beginning of the first multiple row punching operation.

Fig. 3 is a view similar to Fig. 2, showing the metal sheet in its next set position for the simultaneous punching of blanks from a plurality of rows during the first multiple row punching operation.

Fig. 4 is a view, similar to Fig. 2, showing the metal sheet in its initial set position on the supporting bed of the press for punching the first blank in the staggered row at the beginning of the second multiple row punching operation.

Fig. 5 is a detail view, partly in section, showing the cooperating male and female dies for the row of staggered blanks and the improved means for preventing the male die from contacting with the metal sheet during its idle stroke.

Fig. 6 is a fragmentary plan view of the female die shown in Fig. 5.

Fig. 7 is a fragmentary diagrammatic plan view showing the deformed scrap of metal at the end

of the row containing the staggered blanks and the position of the male die for this row during its idle stroke while the last blank in another row is being punched.

The invention relates generally to a method and an apparatus for punching a plurality of rows of blanks from a metal sheet during a single multiple row punching operation. The invention contemplates the use of a multiple punch or die press, one of the die members being located in advance of another so that the blanks in at least one of the rows are offset with respect to the blanks in another row. The gauging mechanism for properly positioning the metal sheet for each multiple row punching operation is of the type shown and described in my prior Patent No. 1,934,303 of November 7, 1933. In the simultaneous punching of a plurality of rows of blanks from a metal sheet wherein the blanks in one of the rows are staggered with respect to the blanks in another row, it has been found that the die for the row of staggered blanks often contacts with the thin scrap of metal left at the edge of that row, because the sheets often vary slightly in length. When one of the sheets extends into the path of the die for the row of staggered blanks, uneven wear and often damage results to the cooperating dies for this row. According to the present invention, the female die for the row of staggered blanks is provided with a spring retaining finger which, by proper manipulation of the hand fed sheet, is adapted to engage the scrap of metal left at the edge of the sheet adjacent the row of staggered blanks so that it may be deformed inwardly, thus permitting the male die to pass by the sheet during its idle stroke.

It is believed that the invention will be better understood by referring to the illustrated embodiment thereof in the accompanying drawings. The punch press is of the type shown in my aforesaid patent, and includes a frame 10 on which is mounted a bed 11 for supporting the sheets S to be punched. A plunger 12 is mounted on the frame 10 and carries at the lower end thereof a pair of male dies 13, 14. With respect to the direction in which the sheet is fed, the dies 13, 14 are offset and the die 13 is disposed in advance of the die 14. The male dies cooperate with female dies 13a, 14a which are similarly located and mounted in the bed 11. The plunger 12 is reciprocated from a main rotating shaft 15 mounted in the frame 10 of the machine. The supporting bed 11 is provided with a pair of guides 16, 17, both of which are made up in sections, as indicated in Figs. 2, 3 and 4. The sections of

the guides are separated from one another in the region of the dies where the punching operation takes place. The sheet S is placed against one of the guides, properly positioned, and fed by hand beneath the punching head so that during the step-by-step feeding of the sheet, a plurality of rows of blanks are simultaneously punched from the sheet with the blanks in one row staggered with respect to the blanks in another row.

The sheet is positioned for punching by a gauge finger 18 and a placing finger 19 which are similar in operation and construction to the showing in my aforesaid patent. The gauge finger 18 is carried by an arm 20 which is bent at right angles intermediate its ends so that the portion thereof adjacent the gauge finger extends in a direction parallel to the guides 16, 17. The gauge finger 18 is disposed in advance of the die 13 and in line with the center of the row of blanks punched thereby. The arm 20 is supported by an oscillating shaft 21 carried by a bracket 22 which is mounted on the frame 10. The arm 20 is connected by a link 23 to the main rotating shaft 15 and is operated thereby in the manner shown and described in my aforesaid patent so that the gauge finger 18 is thus raised and lowered in timed relation with the plunger 12.

The placing finger 19 is carried by a lever 24 pivotally mounted in a bracket 25 on the under face of the supporting bed 11. The finger 19 passes up through an opening in the supporting bed 11 and a spring 26 operates against the lever to normally retract the finger 19 away from the upper surface of the supporting bed. The placing finger 19 is disposed in advance of the die 14 and in line with the center of the row of blanks punched thereby. Thus, the gauge finger 18 is in advance of the placing finger 19 with respect to the direction in which the sheet is fed. The distance between the gauge finger 18 and the placing finger 19 along a line parallel to the direction in which the sheet is fed, is substantially equal to the diameter of the blanks punched from the sheet. The placing finger 19 is thus manually operable to initially position the sheet for the punching of the first blank in a manner to be hereinafter pointed out.

The female die 14a, which is located in rear of the die 13, is provided with a recess 27, as shown in Fig. 5, in line with the center of the row of blanks punched by the die 14. A spring retaining finger 28 is secured within the recess 27 and the upper end 28a thereof is curled in the direction in which the sheet is fed. In positioning the sheet for the last punching operation by the die 13, the rear edge of the sheet is passed over the hooked end of the finger 28 and is then forced back into engagement with the hooked end 28a so that, in this manner, the scrap of metal remaining at the end of the row from which the staggered blanks have been punched, may be deformed or bent inwardly, as shown in Fig. 7, so that it will not extend into the path of movement of the male die 14 during its idle stroke.

The manner in which the sheet is fed and positioned for the punching operations will now be described, reference being had to Figs. 2 through 7. One edge of the sheet S is placed in the guide 17 and the lever 24 is manually operated to elevate the placing finger 19 above the upper surface of the supporting bed 11. The sheet S is moved forwardly in the direction of the arrow A until the front edge thereof abuts against the placing finger 19, as shown in Fig. 2. When the

sheet is in this position, the plunger 12 and dies 13, 14 are moved downwardly so that the die 14, cooperating with the female die 14a, punches the first blank a^1 in the row $a-a$, as shown in Fig. 2. There is an idle stroke of the die 13 during this punching operation, after which the lever 24 is released so that the placing finger 19 is retracted beneath the upper surface of the supporting bed 11. The sheet S is then fed in the direction of the arrow A until the front edge thereof abuts against the gauge finger 18, which has been raised and lowered in timed relation with the stroke of the plunger 12. The position of the sheet for the next punching operation is shown in Fig. 3 wherein the die 13 punches the first blank b^2 in the line $b-b$ and the die 14 punches the blank a^2 in the line $a-a$. During the subsequent feeding of the sheet, the placing finger 19 remains inoperative and the gauge finger 18 is raised and lowered with the upward and downward stroke of the plunger 12. As the gauge finger 18 is lifted above the sheet, the operator slides the sheet along the guide 17 so that, when the gauge finger 18 is lowered again, it will descend into the opening previously punched by the die 13, and engage the edge of this opening for the positioning of the sheet for the next multiple row punching operation, in the manner shown and described in my aforesaid patent. The blanks in the row $a-a$ are designated as being staggered with respect to the blanks in the row $b-b$. When the last blank in the row $a-a$ has been punched, the operator slides the sheet forwardly over the spring finger 28 and then rearwardly into engagement with the hooked end 28a thereof, as shown in Fig. 5. Further movement of the sheet in a rearward direction against the spring finger 28 will effect a deforming or inward bending of the scrap of metal S1 left at the end of the row $a-a$ of staggered blanks, as shown in Fig. 7. The sheet is now positioned with the gauge finger 18 abutting against the edge of the last opening punched in the row $b-b$ so that, upon the next down stroke of the plunger 12, the final blank will be punched by the die 13 from the row $b-b$. There is an idle stroke of the die 14 during this final punching operation. The scrap of metal left at the end of the staggered row $a-a$, having been deformed in the manner indicated above, is out of the path of the die 14 so that it will not be damaged or worn during its idle stroke. The hooked end 28a of the spring finger 28, opening in the direction in which the sheet is fed, permits the sheet to pass thereover and to depress the same into the recess 27 as the sheet is fed toward the punch.

At the end of the first multiple row punching operation, the sheet is moved rearwardly and the edge thereof placed in the guides 16, as shown in Fig. 4. When the sheet is so positioned, the placing finger 19 is again elevated and the sheet moved forwardly until the front edge thereof abuts against the placing finger. During this second multiple row punching operation, the sheet is fed and positioned by the placing finger 19 and the gauge finger 18 operates to position the sheet for each punching operation in the same manner indicated above. For the final multiple row punching operation, the sheet is reversed and the opposite edge thereof is placed in the guide 16 and fed in the same manner.

It is of course to be clearly understood that more than two dies may be employed, in which case the positioning of the sheet against the placing finger 19 for the initial punching operation

and the subsequent positioning of the sheet by the gauge finger 18 will be identical with that described above.

It is to be clearly understood that minor changes in the details of construction and arrangement of parts may be made without departing from the scope of the invention as set forth in the appended claims.

I claim:

10 1. A method of simultaneously punching a plurality of rows of blanks from a metal sheet with the blanks in one row staggered with respect to the blanks in another row, which consists in feeding and positioning the sheet for each punching operation, and preventing movement of the scrap of metal left at the end of the row of staggered blanks while the sheet is being fed and positioned for punching the last blank in another row whereby to prevent the scrap of metal from extending into the path of the die for the staggered row during its idle stroke.

2. A method of simultaneously punching a plurality of rows of blanks from a metal sheet with the blanks in one row staggered with respect to the blanks in another row, which consists in feeding and positioning the sheet for each punching operation, and deforming the scrap of metal left at the end of the row of staggered blanks inwardly of the sheet while positioning the sheet for punching the last blank in another row whereby to prevent the scrap of metal from extending into the path of the die for the staggered row during its idle stroke.

3. A die press for punching blanks from a metal sheet, comprising a bed for supporting the sheet to be punched, a plurality of dies arranged in offset relation for punching a plurality of rows of blanks from the sheet with the blanks in one row staggered with respect to the blanks in another row, means including guides for positioning the sheet for each punching operation, and means disposed in line with the row of staggered blanks and engageable with the scrap of metal left at the end of the staggered row for preventing the scrap of metal from extending into the path of the die for the staggered row during its idle stroke.

4. A die press for punching blanks from a metal sheet, comprising a bed for supporting the sheet to be punched, a plurality of dies arranged in offset relation for punching a plurality of rows of blanks from the metal sheet with the blanks in one row staggered with respect to the blanks in another row, means including guides for positioning the sheet for each punching operation, and means associated with the die for the staggered row and engageable with the scrap of metal left at the end of the staggered row for preventing the scrap of metal from extending into the path of the die for the staggered row during its idle stroke.

5. A method of simultaneously punching a plu-

rality of rows of blanks from a metal sheet with the blanks in one row staggered with respect to the blanks in another row, which consists in feeding the sheet into abutting relationship with a stop located in line with the row containing the staggered blanks for the first punching operation, then feeding the sheet into abutting relationship with a second stop in line with another row for a multiple punching operation, continuing the feeding and positioning of the sheet by said second stop, and finally deforming the scrap of metal left at the end of the row of staggered blanks prior to punching the last blank in another row whereby to prevent the sheet from extending into the path of the die for the staggered row during its idle stroke.

6. A die press for punching blanks from a metal sheet, comprising a bed for supporting the sheet to be punched, a plurality of cooperating male and female dies arranged in offset relation for punching a plurality of rows of blanks from the sheet with the blanks in one row staggered with respect to the blanks in another row, means including guides for positioning the sheet for each punching operation, and a spring retaining finger secured to the female die for the row of staggered blanks, said retaining finger having a hooked end curled in the direction in which the sheet is fed and adapted to engage the scrap of metal left at the rear edge of the sheet at the end of the row of staggered blanks when the sheet is moved rearwardly to deform the remaining scrap of metal whereby to prevent the sheet from extending into the path of the cooperating male die during its idle stroke.

7. A die press for punching blanks from a metal sheet, comprising means for supporting the sheet to be punched, a plurality of dies arranged in offset relation for punching a plurality of rows of blanks from the sheet with the blanks in one row staggered with respect to the blanks in another row, means for positioning the sheet for each punching operation, and means engageable with the edge of the scrap of metal left at the end of the row of staggered blanks for deforming the same to prevent the sheet from extending into the path of the die for this staggered row during its idle stroke.

8. A die press for punching blanks from a metal sheet, comprising means for supporting the sheet to be punched, a plurality of dies arranged in offset relation for punching a plurality of rows of blanks from the sheet with the blanks in one row staggered with respect to the blanks in another row, means for positioning the sheet for each punching operation, and means for deforming the scrap of metal left at the end of the row of staggered blanks inwardly of the metal sheet to prevent the sheet from extending into the path of the die for this staggered row during its idle stroke.

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