Sept. 5, 1939. C. J. RHODES 2,171,891

PRESS FOR CUTTING SHEET METAL

Filed April 22, 1939 2 Sheets-Sheet 1

Fig:1

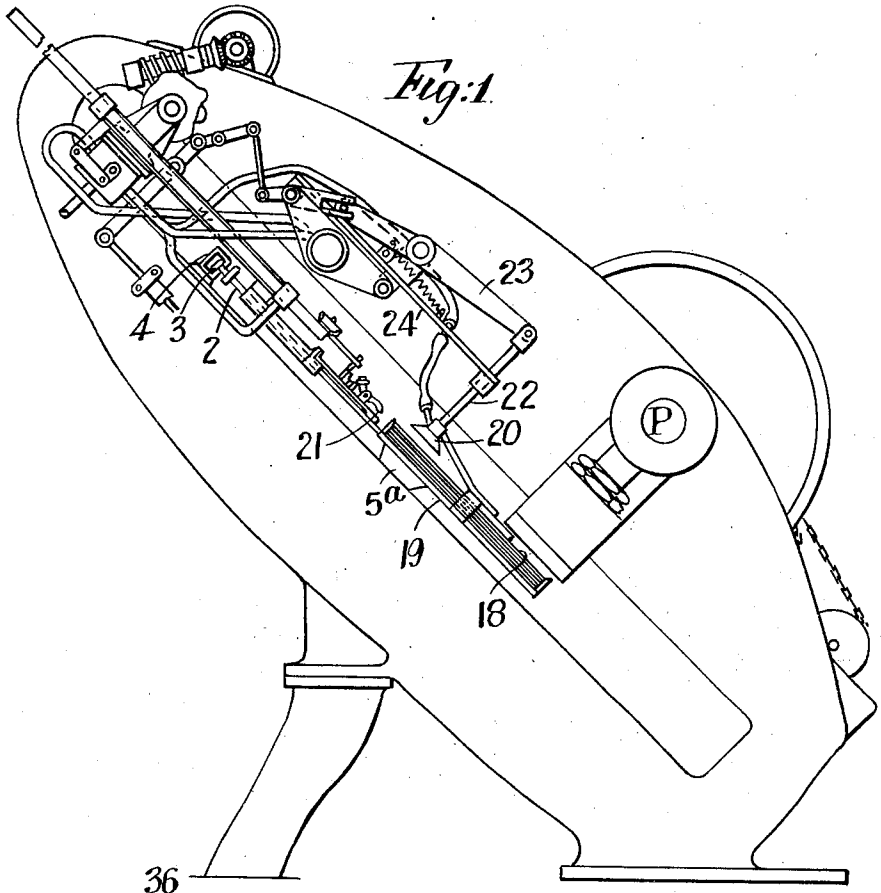


Fig:4

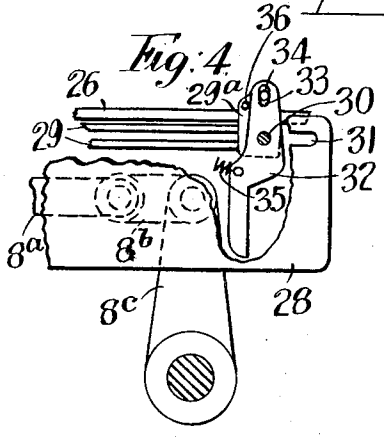
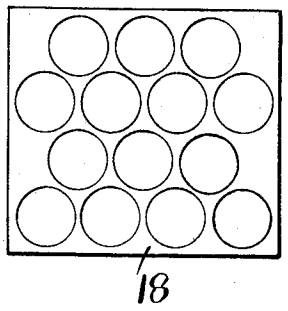


Fig:6



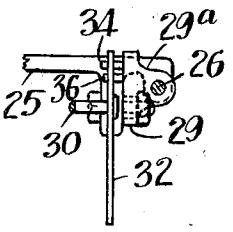


Fig:5

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PRESS FOR CUTTING SHEET METAL

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Fig. 2

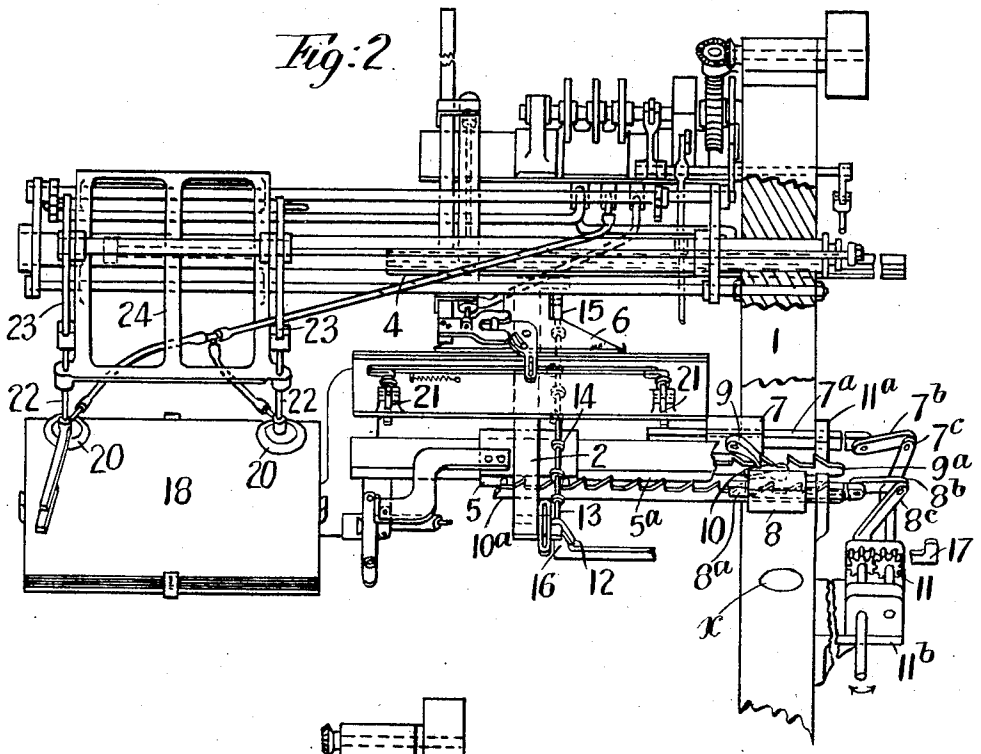
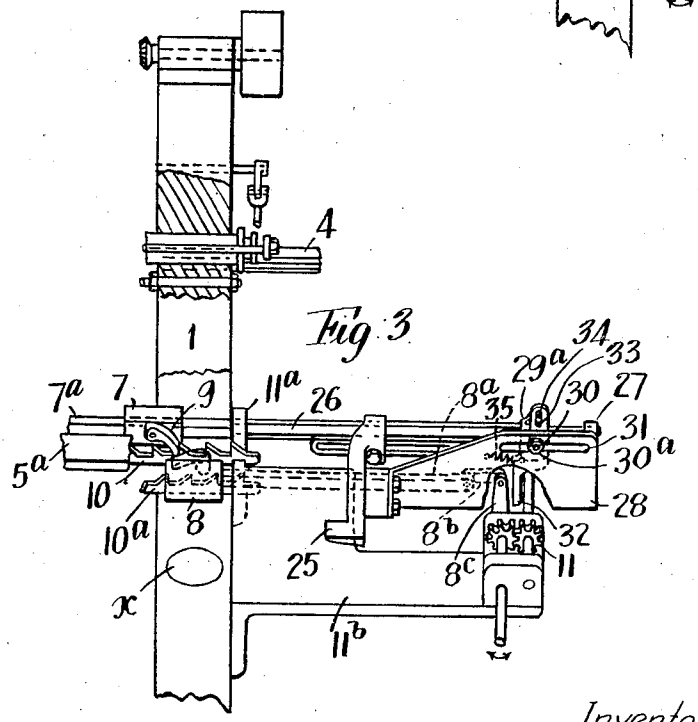


Fig. 3



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UNITED STATES PATENT OFFICE

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PRESS FOR CUTTING SHEET METAL

Charles Joseph Rhodes, Wakefield, England

Application April 22, 1939, Serial No. 269,428
In Great Britain August 11, 1938

2 Claims. (Cl. 164—87)

This invention relates to presses for cutting sheet metal and punching a number of articles from sheets which are individually presented thereto, and of the kind having mechanism whereby the sheet is automatically fed, for the punching operation, with a series of step by step motions, first in one direction and then, after being displaced laterally to the first line of movement, in the opposite direction.

For the purpose of preventing waste of material in the case where certain shaped articles are being punched from the sheet, the machine is provided with sheet feeding means, which, although feeding the sheet in the manner just described, will cause the sheets to be so perforated that the perforations in one row are staggered with respect to those of the next row, in order that the maximum possible number of articles can be punched from each sheet.

A press in which the feeding of the sheet is effected in this manner is known as a "stagger press".

The punching means is arranged to reciprocate along a fixed axis, and the sheet being operated upon is fed under said punching means whilst being maintained in a plane at a right angle to the said axis, the sheet being carried upon a gravity or other suitably actuated slide designed to displace the sheet laterally to each row of completed perforations, for the succeeding row to be punched, this slide being hereinafter referred to as the "row displacing slide", which latter is mounted upon a transverse slide which feeds the sheet from side to side of the press, underneath the punching means, for the individual perforations of each row to be punched.

After each horizontally extending row of perforations has been made in the sheet, as a result of a number of punching operations, the means controlling the effective movement of the row displacing slide is tripped to allow this slide to move an amount necessary to bring an unperforated portion of the sheet into position to be fed beneath the punching means upon the reverse movement of the transverse slide.

The sheet is secured in position upon the row displacing slide by gripping means, which is operated to release the sheet after it has been completely perforated by the punching means.

Hitherto the tripping of the means controlling the movement of the row displacing slide to release the latter sufficiently to allow it to move an amount necessary to bring an unperforated portion of the sheet into position to be fed beneath the punching means for the succeeding row of perforations to be made, has been effected by the controlling means being carried by the movement of the transverse slide, after the punch has moved out of engagement with the last perforation of each row, into tripping engagement with a fixed trip member.

There are two such trip members as that just described, arranged one at each end of the path of travel of the transverse slide, so that the tripping action takes place at the end of each traverse of the transverse slide.

This has proved to be satisfactory in cases where the numbers of perforations in the successive rows have been equal to each other.

Difficulty has, however, been experienced when it has been desired to punch large blanks from the sheet in a manner such that a row consisting of an even number of perforations will be succeeded by a row of an uneven number, or vice versa, owing to the fact that, when running the machine at a normal or economical speed, the time interval between the punching of the last perforation of each row and the succeeding operative movement of the punch, was too small to permit the sheet to be shifted to the correct position for the next row of perforations to be punched.

This difficulty was not experienced in the punching of small blanks, but large blanks could only be punched by running the press at considerably below the normal speed, in fact, at an uneconomical speed.

The object of the present invention is to overcome this difficulty.

According to the present invention, instead of the trip members being fixed, they are caused to move into engagement with and trip the means controlling the movement of the row displacing slide to release same from said control means while the punch is punching the final perforation of each row, in order that as soon as the dies disengage the sheet, said slide is free to immediately move into position for the first perforation of the next row to be punched.

From the foregoing it will be readily seen that by so arranging matters that the row displacement slide is free to perform its effective movement immediately the dies become disengaged from the sheet, at the end of each row, considerably more time is allowed for the said slide to move before the next operative movement of the punching means takes place.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a side view showing a form of stagger press to which the present invention is applicable.

Fig. 2 is a fragmentary part sectional view showing certain of the parts of the machine, embodying the gravity slide tripping means which the present invention is intended to supplant.

Fig. 3 is also a fragmentary part sectional view showing gravity slide tripping means according to the present invention.

Fig. 4 is an enlarged front elevation of certain details.

Fig. 5 is an end elevation of certain of these details.

Fig. 6 is a plan of a sheet after the machine has operated upon it.

Referring to Figs. 1 and 2 of the accompanying drawings, 1 indicates generally the main machine or stagger press having the usual form of transverse slide 2 carried at its upper end by rollers 3 which are located within and adapted to travel along a hollow slotted rail member 4, secured to the frame of the machine. The transverse slide is, at a point near its lower end, secured to a shoe 5 slidingly mounted upon a rail 5*a*, in the known manner, which rail is mounted upon the machine frame in any suitable manner (not shown).

Mounted upon the transverse slide 2 is a vertical slide 6.

Carried by blocks 7, 8, mounted on rods 7*a*, 8*a*, are pawls 9, 10, the said rods being slidingly mounted in brackets such as 11*a* mounted upon the frame 1.

The rods 7*a*, 8*a*, are adapted to be oppositely reciprocated, through links 7*b*, 8*b*, and arms 7*c*, 8*c* from gearing 11, carried by a bracket 11*b* and operatively connected to the crank shaft P of the punch, and the pawls 9, 10, are adapted to be alternately lowered and raised by means (not shown) usually employed in this type of press, into and out of engagement with the respective racks 9*a*, 10*a* carried upon the transverse slide 2, whereby the transverse slide, together with the gravity slide, which latter also carries the sheet, is given a step by step motion beneath and in timed relationship with respect to the operation of the punch, and over the die *x*, first in one direction, for one row of perforations to be punched, and then (after the gravity slide has moved downward) in the opposite direction for the next row of perforations to be punched.

The downward movement of the gravity slide is controlled by an arm 12 which is tripped, after each horizontal row of perforations has been punched, to rotate a shaft 13 provided with a series of staggered projections 14 and carried by the transverse slide 2, the said projections being so arranged that they are successively engaged by a pawl 15 carried by the upper end of the gravity slide, whereby the latter is permitted to move downward after each horizontal row of perforations is produced in the sheet.

16, 17 indicate the projections against which the arm 12 is tripped, at the end of each row of perforations.

The staggering of the rows of perforations in the sheet is effected by virtue of the fact that the ratchet teeth of one rack are staggered with respect to those of the other rack.

Indexing or detent means (not shown), such as are usually employed on this type of machine, are provided for holding the transverse slide as the pawls 9, 10, ride over the respective racks and whereby said slide is prevented from shifting during each punching operation.

The whole of the construction, arrangement and operation of the transverse slide 2 and vertical or gravity slide 6 just described is similar in principle to that of the well known arrangements with which such presses are usually provided.

Sheets of metal, indicated by 18, are contained in a magazine 19, from which they are successively lifted by suckers 20 and carried along and presented to automatically operated grippers 21 of the vertical or gravity slide, which grippers then grip the top edge portion of the sheet to this slide, in readiness for it to be fed back and forth, under the punching means, in the manner previously described.

The suckers just described are carried at the lower ends of rods 22 the upper ends of which are pivoted to levers 23 in turn pivoted upon a carriage 24, the operation of the suckers, carriage, and grippers, being effected in suitably timed relationship with the other parts of the machine, in the manner described in United States Patent, Serial No. 148,701, and therefore not described herein in detail.

From the foregoing description, it will be readily seen that the lever 12 is not tripped until after the last perforation of each horizontal row has been punched, as it is then necessary for the transverse slide to be fed one step further in the same direction as that in which it was moved just prior to this last perforation being punched. This further movement, however, takes place during the time that the crank is moving the punch into position for its next working stroke, and consequently, a very short space of time remains for the gravity slide to then drop, and the transverse slide to be moved by the pawl 10 and the ratchet bar 10*a* a sufficient distance horizontally in the reverse direction to that in which it has just been moved, for the succeeding row of perforations to be staggered with respect to the row just punched, as shown in Fig. 6.

Obviously this, at the right hand side of the part of the machine shown in Fig. 2, amounts to a problem when large perforations are to be punched, and as previously described, it necessitates the machine being run at an uneconomical speed, as should it be attempted to run it at a greater speed, sufficient time is not allowed for the required movement of the feeding means to effect the correct displacement of the sheet for the succeeding row of perforations to be punched.

This problem does not however arise at the left hand side of the machine, as on that side the sheet is carried completely clear of the punching means when the sheet is displaced for a succeeding row of perforations to be punched.

Referring now to Fig. 3 it will be seen that the projection 17 has been replaced by a projection 25.

This projection 25 is slidingly mounted upon a rod 26 carried between one of the aforesaid brackets 11*a* and a lug 27 cast upon a bracket 28 carried upon the aforementioned bracket 11*b*.

The projection is adjustably fixed to a slotted bar 29 which at its outer end is provided with a boss 29*a* slidingly mounted upon the rod 26.

Pivoted upon a pin 30 adjustably clamped, by a nut 30*a*, within a horizontal slot 31, in the bracket 28, is a vertically disposed lever 32, the lower arm of which is disposed in the path in which rocks the lever 8*c*, the upper arm of this lever being provided with a slot 33 with which engages a pin 34 carried by the boss 29*a*, as shown more clearly in Figs. 4 and 5.

The lower portion of the lever 32 is loaded by a spring 35, tending to rotate the lever in a

clockwise direction and normally maintaining its upper arm pressed against a stop pin **36** carried by the boss **29***a*.

Each time the arm **8***c* rocks in a clockwise direction, it contacts with the lower arm of the lever **32** and rocks this lever in an anti-clockwise direction, against the action of the spring **35**, and, in so doing, moves the projection **25** inward in a direction toward the punching means.

The arrangement is such that the projection **25** is caused to reciprocate toward and away from the machine, in such a manner as to trip the arm **12** and free the gravity slide while the punch is punching the perforation at the left hand end of each alternate row.

Consequently, the gravity slide moves downward immediately the punch rises out of engagement with the sheet.

I claim:

1. In a press for cutting sheet metal and punching, in staggered rows, articles therefrom, and of the kind having a sheet metal holder, sheet grippers upon said holder, for holding the sheet firmly thereon until all of said articles have been punched from said sheet, step by step feeding means for traversing said holder beneath the punching means, and displacing mechanism, movable with said holder during its traverse, for displacing the sheet holder laterally to its line of traverse, between traverses, in combination, a trip upon said displacing mechanism, and tripping means disposed in the line of movement in which said trip is carried upon the traversing of said sheet holder, and operated by said step by step feeding means, so that after said holder has reached the forward end of its forward traverse said trip has been carried thereby into a position in which it is engageable by said tripping means in order that while the punching means is in operative engagement with the sheet at the end of this traverse, said tripping means moves into operative engagement with said trip, to thereby enable said lateral displacement to take place immediately said punching means moves out of engagement with the sheet.

2. In a press for cutting sheet metal and punching, in staggered rows, articles therefrom, and of the kind having a transverse slide, a gravity slide carried upon said transverse slide, sheet grippers upon said gravity slide, for holding the sheet firmly thereon until all of said articles have been punched from said sheet, step by step feeding means for traversing said transverse slide beneath the punching means, and displacing mechanism, movable with said transverse slide, for permitting displacement of said gravity slide laterally to the direction of movement of said transverse slide between traverses, in combination, a trip upon said gravity slide, and tripping means disposed in the line of movement in which said trip is carried by the movement of the transverse slide, and operated by said step by step feeding means, so that after said transverse slide has reached the end of its forward traverse said trip has been carried thereby into a position in which it is engageable by said tripping means in order that while the punching means is in engagement with the final perforation of the row, said tripping means moves into operative engagement with said trip to thereby enable the movement of said gravity slide to take place immediately said punching means moves out of engagement with the sheet.

CHARLES JOSEPH RHODES.