Jan. 11, 1927. 1,613,766

C. F. PARCHER

CUTTING PRESS

Filed May 3, 1926 3 Sheets-Sheet 1

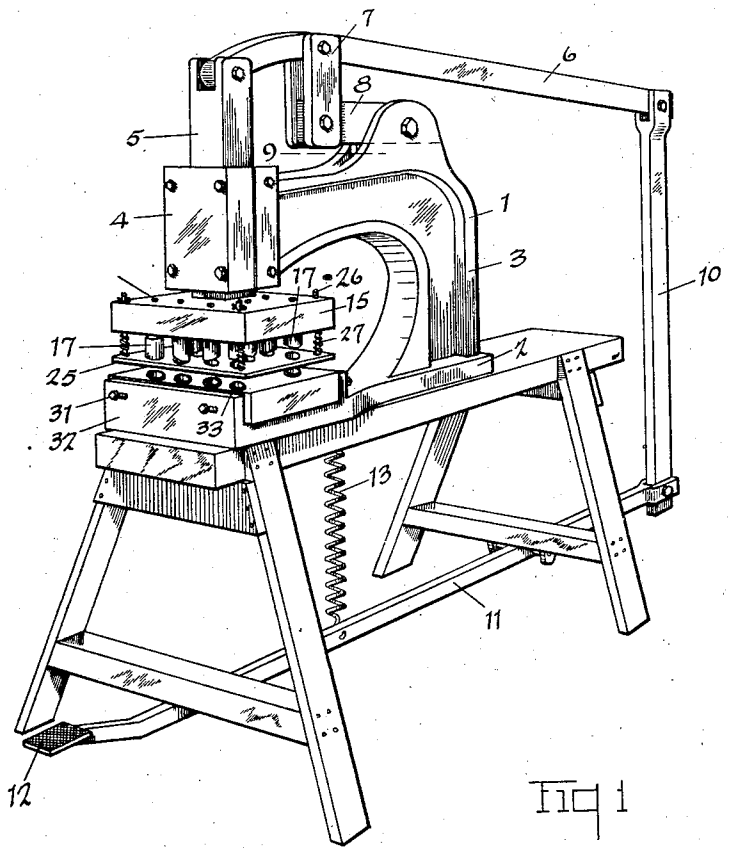


Fig 1

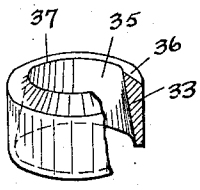


Fig 3

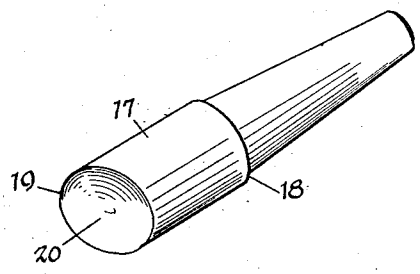


Fig 2

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C. F. PARCHER

CUTTING PRESS

Filed May 3, 1926 3 Sheets-Sheet 2

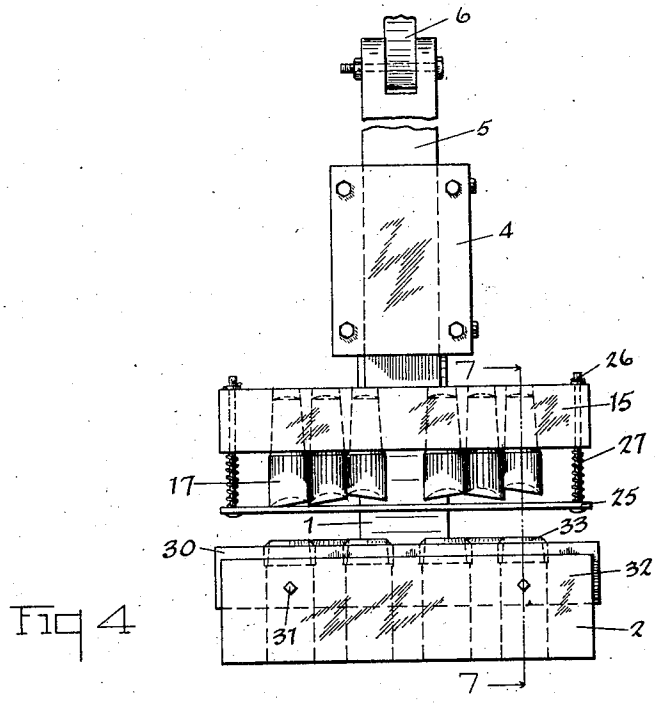


Fig 4

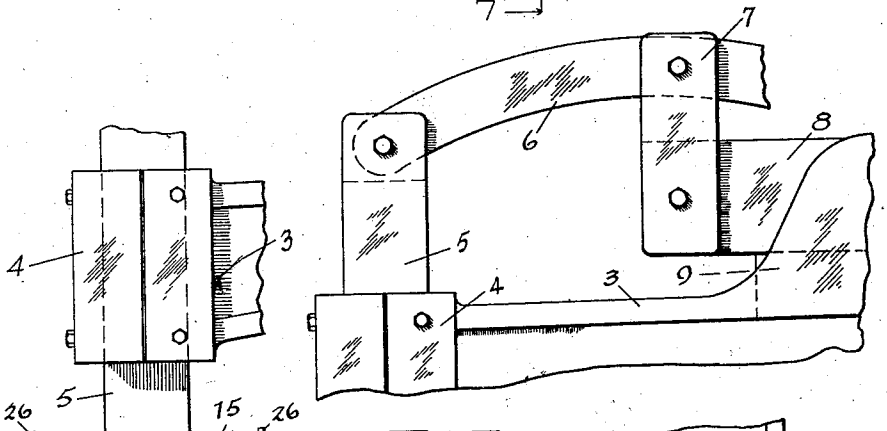


Fig 6

Fig 5

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1,613,766

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CUTTING PRESS

Filed May 3, 1926

3 Sheets-Sheet 3

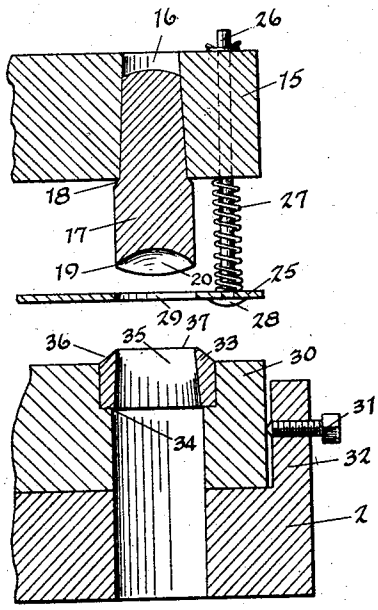


Fig 7

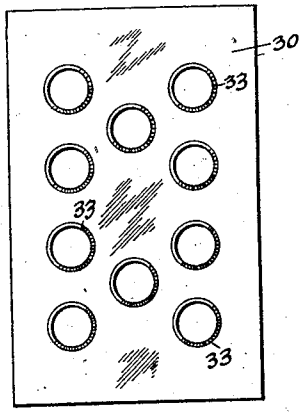


Fig 8.

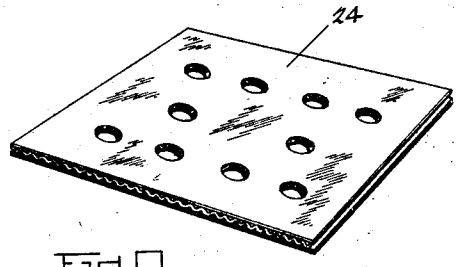


Fig 9

Inventor

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Patented Jan. 11, 1927. 1,613,766

UNITED STATES PATENT OFFICE.

CHARLY F. PARCHER, OF NAPOLEON, OHIO.

CUTTING PRESS.

Application filed May 3, 1926. Serial No. 106,190.

My invention has for its object to provide a cutting press whereby a sheet material may be cut or punctured at a plurality of points by the consumption of the least amount of energy or by the use of the least amount of change in the force required to cause the press to perform its functions and without tearing or drawing the material during the cutting operation. The invention is particularly applicable to cutting or puncturing paper cardboard and composite paper board. When used for forming holes in composite board or corrugated board the machine will puncture the holes without causing material permanent depressions in the board about the edges of the openings that are formed. The invention also has for its object other advantages and features which are described hereinafter and will appear upon examination of the drawings.

The invention may be contained in punch presses of different forms for punching sheet material of different kinds to be used for different purposes and to illustrate a practical application of the invention I have selected a structure as an example of structures that contain the invention and shall describe it hereinafter. The structure selected is shown in the accompanying drawings.

Figure 1 is a perspective view of the cutting press. Fig. 2 is a perspective view of one of the punches. Fig. 3 is a view of a cutting die that cooperates with one of the punches to form openings in sheet material. Fig. 4 is a side view of the cutting press shown in Fig. 1 and Fig. 5 is an end view of the cutting press. Fig. 6 is a broken view illustrating the manner in which the parts are connected to the plunger member. Fig. 7 is a view of a section of a part of the press taken on the plane of the line 7—7 indicated in Fig. 4. Fig. 8 is a top view of the bed plate of the press and Fig. 9 is a perspective view of a composite board that has been punctured by the press.

In the form of construction shown in the drawings, the press 1 is supported on any suitable standard in order to position it for convenience of operation. It has the bed 2 and integrally formed therewith is a goose neck 3 which terminates in a guiding head 4. A plunger 5 is located in the head 4 whereby it is guided in its reciprocatory movements. The plunger 5 is connected to a lever 6 which is pivotally supported on a pair of substantially vertically located links 7. The lower ends of the links are pivotally supported on an arm 8 that is bolted to the top of the goose neck 3 and is held firmly by an inwardly extending ridge 9 as against movements that would ordinarily be produced by the pressure transmitted from the lever 6 through the links 7. The outer end of the lever 6 is connected by means of a link 10 to a lever 11. The lever 11 is pivoted to a frame or the supporting standard of the bed and terminates in the pedal 12. When, therefore, it is desired to depress the plunger 5, the pedal 12 is pressed by the foot and the movement is transmitted through the levers 6 and 11 to the plunger 5. It is raised by the spring 13.

A press plate 15 is connected to the plunger 5. It has a plurality of openings 16 in which are located punches 17 that are suitably shouldered as at 18 in order to engage the lower surface of the press plate and be held in proper position relative to the press plate during the operations of the plunger. The punches 17 have cutting edges that are located in planes that are positioned at an angle other than a right angle to the axis of each punch. The surfaces of the end portion of the punches are cylindrical in form and consequently the edges 19 of the punches are elliptical in form. Also the end 20 of each punch is concave. It preferably conforms to a section of a sphere which produces an exceedingly sharp edge for cutting the sheet material and is particularly of advantage where the press is used in cutting composite paper board to avoid permanently depressing the edge portions that are located about the openings that may be produced. The location of the lowermost points of the edges of the punches are arranged symmetrical with respect to each other, and so that the shearing action

of the one-half of the punches will be towards the other half of the punches as well as downward, that is, the edges of the punches being inclined with respect to the vertical, the pressure of the sheet material is not only vertical, but slightly lateral and the punches are so arranged that this lateral pressure produced by each punch will be offset by the lateral pressure produced by the other punches. This prevents shifting of the sheet material operated on. The punches are thus arranged so that the lowermost points of one-half of the punches are located on the same side with respect to the sides of the press, and the lowermost points of the other one-half of the punches are located on the opposite side preferably the punches are divided into two groups and the same rule as to location of the lowermost point of the punches is followed in locating the relative punches of the lowermost points of their edges. Furthermore, the lowermost points of the edges of the punches are located in stepped relation with respect to the direction of movement of the plate in which they are located. Consequently when the plunger is depressed the punches will engage the paper in the order in which the lowermost point of their edges are located with reference to the bed plate of the press, and there will be a sequential operation of the punches. Thus when the plunger is depressed the punches will engage one after the other, so that the resistance to the movement of the pedal which produces the downward movement of the plunger will be substantially uniform. Where the sheet material is to be engaged, that is, cut or formed, in the central portion, while the material is to be engaged, that is, cut or formed, exterior to the central portion, it is preferable to locate the outer punches or dies more remote from the bed plate than the punches or dies that operate on the sheet material at points in the central portion since the central punches or dies will engage the sheet material and hold the sheet material in position while the outer punches or dies are operating. In the particular form of construction shown the punches are divided into two groups and a number of the punches are located centrally with respect to the punches in each of the groups, the outer punches being located more remote from the bed plate than the central punches with respect to each group. Also since the punches engage sequentially the sheet material will be held in position by the punches that first engage the sheet material while the other punches are engaging the sheet material. Thus the material will be securely held in position during the downward stroke of the plunger.

Any number of the punches may be used in the press. In the arrangement shown four punches are located in two rows and two punches are located in the central row but any number of these punches may be removed in order to form holes at desired distances apart and in order to form desired groupings of the punches, that is, desired arrangement of the openings that are formed in the sheet material. In order that the sheet material 24 may be engaged in advance of the engagement by the punches, a plate 25 is supported by means of rods 26 below the edges of the punches. Springs 27 are located on the rods 26 to elastically press the plate against the heads 28 of the rods. Consequently as the plunger is depressed, the plate 25 will be pressed against the sheet material and the punches will follow while the springs 27 are being compressed. Openings 29 are formed in the plate 25 through which the punches pass to engage the sheet material 24.

The bed plate 30 is located on the bed 2 and may be secured in position by means of key bolts 31 that extend through flanges 32 located at opposite ends of the bed plate 30.

The bed plate 30 is provided with a plurality of cutting dies or rings 33. The cutting dies are substantially cylindrical in form and fit into cylindrical openings that are formed in the bed plate 30. Suitable shoulders 34 are formed for securing the dies 33 in position. Each die 33 has a conical interior surface 35 and a conical exterior surface or end surface 36 that form the edge 37 where they meet. The diameter of the edge 37 is substantially the same as the diameter of the cylindrical surface of each punch 17 and consequently the two sharp cutting edges 19 of the punch and 37 of the cutting die operate to shear the sheet material when the plunger is depressed. By reason of the formation of the edges of the punches and the cutting dies, the material of the character of composite board may be readily cut without causing permanent deformation of the board which is very advantageous when the composite board is used for certain purposes. Furthermore, the edges being formed as described, an efficient shearing operation is produced which prevents tearing of the sheet material not only at points where the material is being cut, but also prevents tearing or straining of the material between the points at which it is being cut by the punches. Consequently when the press operates upon the sheet material, there is no creeping of the material nor of parts of the sheet material which causes deformation of the sheet material.

I claim:

In a cutting press, a plurality of cylindrical punches having elliptical cutting edges formed by the intersection of the cylindrical surface of each punch and a concave

end surface, the lowermost points of one half of the number of punches being located on one side, with respect to the sides of the press, and the other half located on the other side, and the lowermost points of the punches located in stepped relation to each other with reference to the direction of the cutting movement of the press, one of the punches located centrally with respect to the other of the punches and having the lowermost point of its edge located lowest with respect to the stepped relation of the edges of the punches.

In testimony whereof I have hereunto signed my name to this specification.

CHARLY F. PARCHER.