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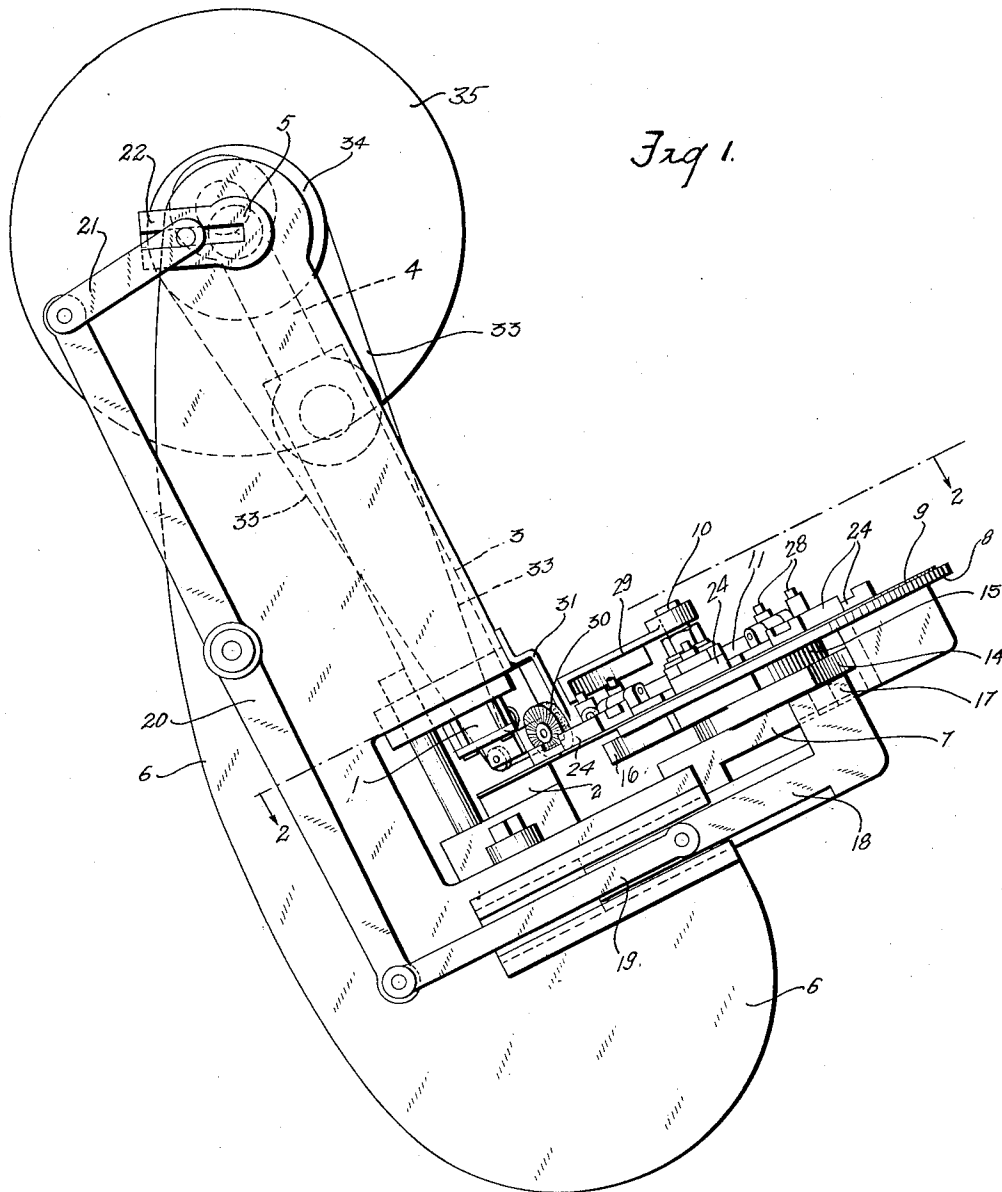
A. P. BLOOD

1,932,571

PUNCHING MACHINE

Filed Feb. 7, 1930

3 Sheets-Sheet 1



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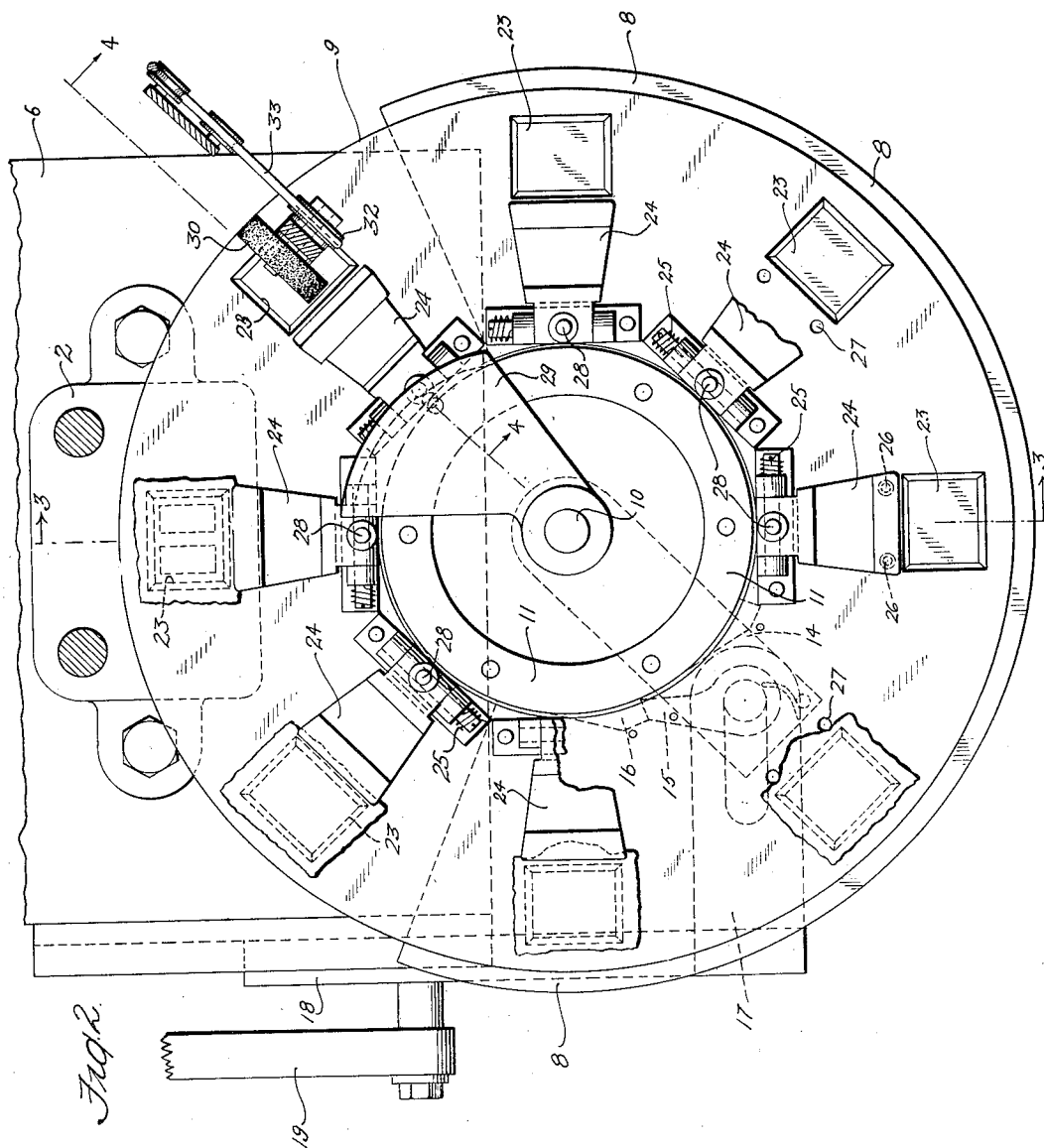
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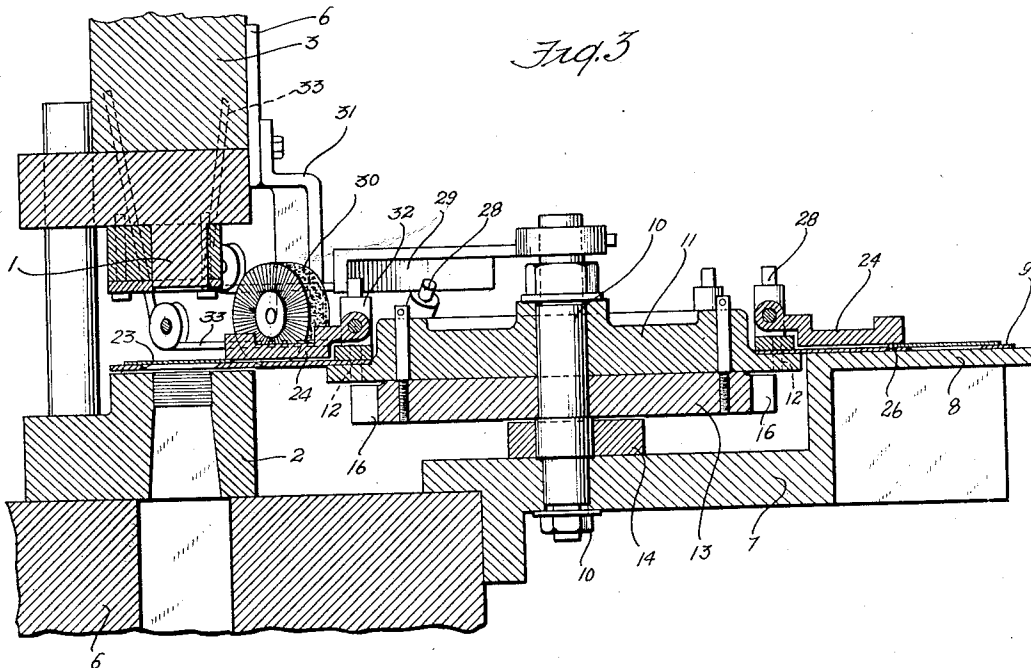
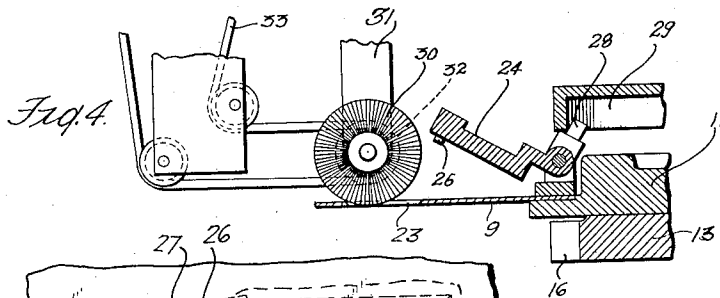
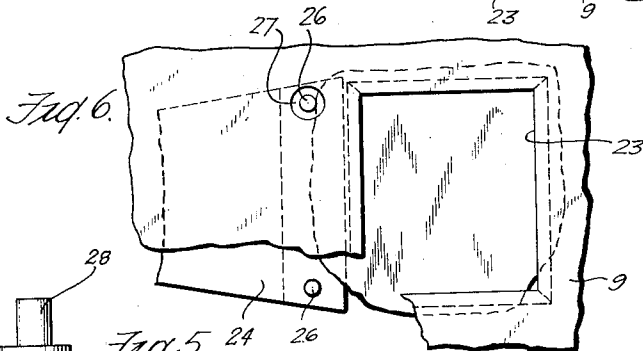
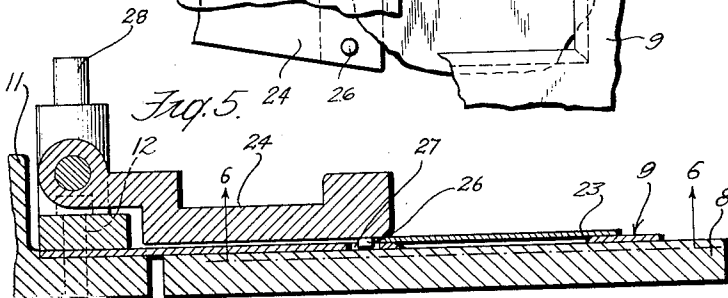
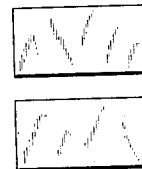
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

1,932,571

PUNCHING MACHINE

Alexander P. Blood, New York, N. Y.

Application February 7, 1930. Serial No. 426,507

6 Claims. (Cl. 164—20)

This invention relates to punching machines and particularly to machines for punching to size mica and like materials.

One object of the invention is to provide an efficient and durable machine for punching to size mica and like materials.

Another object is to provide such a machine with means for positioning, clamping and feeding the uncut work to the punching mechanism.

Another object is to provide such a machine with automatic means for releasing the clamping means and removing the scrap material following a punching operation.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts which will be exemplified in the structure hereinafter described and the scope of the application of which will be indicated in the sub-joined claims.

In the accompanying drawings in which is shown one of the various possible embodiments of the invention:

Fig. 1 is a side view of a punching machine embodying the invention.

Fig. 2 is an enlarged sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged sectional view taken on the line 4—4 of Fig. 2.

Fig. 5 is an enlarged side view in section of one of the positioning and clamping devices and showing a piece of work positioned on the feeding dial or conveyor.

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 5.

Fig. 7 is a top view of two pieces of the finished product of the machine.

Heretofore mica and like materials have been cut to size by placing an uncut piece of work over the die of a punching machine and then operating a punch to cut the work. In such machines it was necessary for the operator to position separately each uncut piece of work over the die. Such positioning operations resulted in considerable delay and often resulted in injury to the operator.

The present invention contemplates the positioning of a plurality of uncut pieces of work on a feed dial or conveyor at a point relatively remote from the punching mechanism, and feeding the work piece by piece to the punching mechanism; the operations of the punching mechanism and

the feed of the work being correlated to subject each piece of work in turn to the operation of the punch. Such an arrangement increases production and reduces the possibilities of injury to the operator.

The punching mechanism comprises a reciprocating punch 1 and a stationary die 2. Punch 1 is carried at the lower end of a punch holding arm 3, the upper end of which is pivotally connected to a connecting rod 4 eccentrically mounted on a driving shaft 5, so that upon rotation of shaft 5 punch 1 will be reciprocated toward and from die 2. Shaft 5 may be journaled in the upper part of a supporting frame 6 and die 2 is bolted to the lower part of supporting frame 6.

Secured to and extending from the lower portion of frame 6 is a supporting member 7 formed to extend upward and outward to provide a table 8 to support a work feeding dial or conveyor 9. As best shown in Fig. 2, the table 8 is preferably in the form of a circle segment approximating 200° of the circle, the ends of the segment preferably terminating equal distances from the punching mechanism to permit the dial to be flexed downwardly by the punch as hereinafter more fully explained.

Referring now to Fig. 3. Bolted to the support 7 is a stationary stud shaft 10. Rotatably mounted on the shaft 10 is a circular carrier 11 to which the dial 9 is secured by means of screws 12.

The mechanism for rotating carrier 11 and dial 9 to present the work to the punching mechanism is as follows:

As best shown in Fig. 3, there is bolted to the under side of carrier 11 a ratchet wheel 13. Beneath the ratchet wheel 13 a pawl carrying arm 14 is rotatably mounted on stud shaft 10. As shown in Fig. 2, arm 14 carries a pawl 15 to engage ratchet teeth 16 of ratchet wheel 13. Arm 14 has a pin and slot connection with a slotted arm 17 which is reciprocated to rotate the dial 9 intermittently. As shown in Fig. 1, arm 17 is reciprocated through a slide bar 18, a link 19, an oscillating arm 20 pivoted to frame 6, a link 21, and a crank arm 22 on drive shaft 5. The arrangement is such that the dial 9 is stationary during a punching operation and advances a step during the interval between punching operations.

Referring now to Fig. 2, dial 9 is provided with a plurality of openings 23 preferably equally spaced circumferentially, over which openings the uncut pieces of work are positioned and through which the punch operates to force the

work against the cutting die when the opening is in alignment with the punch and the die. Openings 23 are preferably formed with beveled sides to prevent cracking and breaking of the work during a punching operation.

Adjacent each opening 23 a presser foot 24 is pivotally mounted on the carrier 11 and is preferably yieldingly pressed toward the dial 9 by a spring 25 to clamp the work in position over the opening.

As best shown in Fig. 5, the under side of each presser foot 24 is provided with one or more positioning pins 26 which extend into openings 27 formed in dial 9. Pins 26 serve to position the work relative to the opening 23 and are located a sufficient distance from the front end of the presser foot to permit the edge of the work to be clamped and held against the dial. Thus the work is positioned and held over the opening 23 during the feeding movement to the punching mechanism and during the punching operation.

The mechanism for raising the presser foot after a punching operation to release the portion of the work held thereby is best shown in Figs. 3 and 4. The presser foot is provided with an upstanding pin 28, which engages a cam 29 secured to stud shaft 10. Cam 29 depresses pin 28 causing the presser foot 24 to pivot about its pivot point and thereby raise the outer end of the presser foot. When the pin 28 passes the cam 29 spring 25 will again press the presser foot into contact with the dial 9.

Located adjacent cam 29 is a revolving brush 30 for removing scrap material from the surface of dial 9. Brush 30 which contacts with the surface of dial 9 is supported by a bracket 31 secured to the frame 6 and is rotated by a pulley 32 through a belt 33 and a drive pulley 34 on drive shaft 5.

Dial 9 is preferably made of thin flexible metal so as to flex easily under the pressure of the punch and be pressed into firm contact with the upper surface of the die during a punching operation. As pointed out hereinbefore, the table 8 does not lie beneath the dial 9 adjacent the punching mechanism. The flexing of the dial 9 assists materially in reducing the tendency of the work to crack and break during punching operations. To facilitate the flexing of the dial 9 it may be made up of a plurality of segments.

Drive shaft 5 may be rotated by a drive pulley 35 through a belt connection with a source of power.

The operation of the machine is as follows:

With drive shaft 5 connected to and rotated by a source of power the punch 1 is reciprocated toward and from die 2, and the dial 9 is rotated intermittently, each opening 23 stopping in turn beneath the punch 1. The operator places a piece of work over each opening 23 as the opening passes him, and presses the piece of work beneath the presser foot 24 and against positioning pins 26. Each piece of work is fed by the dial 9 to the punching mechanism where the punch descends, depressing the flexible dial and the work against the die and cutting the work to size. The punch then rises and the dial moves another step to present the next piece of work to the punch. As each presser foot 24 moves from the punching mechanism its upstanding pin 28 engages cam 29 and releases the scraps of work held thereby. Revolving brush 30 removes the scraps while the presser foot is raised. When the presser foot has passed the

cam 29 its spring returns the presser foot into pressing contact with the dial ready to receive, position and clamp another piece of work.

The die shown for illustration is adapted to cut two pieces dimensioned as shown in Fig. 7.

It will be understood, however, that different forms of dies may be employed and that different dials may be substituted having larger or smaller openings.

It will be seen that there is provided a construction of an essentially practical nature in which the several objects of this invention are attained.

Among other advantages, the invention provides a high speed punching machine which is particularly well adapted for cutting mica and like materials to size without cracking or breaking the same.

As many other embodiments may be made without departing from the scope of this invention it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A machine for punching to size mica and like materials comprising, in combination, punching mechanism including a relatively movable punch and a cutting die, a flexible circular conveyor provided circumferentially with a plurality of openings having bevelled edges, means to position a piece of work over each opening, presser means adjacent each opening to clamp a piece of work thereover, means to rotate the conveyor between the relatively movable punch and die to present the work to the operation of the punching mechanism, a cam operating on the presser means to raise the same after a punching operation, and a revolving brush to remove from the conveyor the pieces of work released from the presser means; the flexible conveyor being out of contact with the punch and die during rotation of the conveyor and being flexed into contact with the die during a punching operation.

2. A machine for punching to size mica and like materials comprising, in combination, punching mechanism including a relatively movable punch and a cutting die, a flexible circular conveyor provided circumferentially with a plurality of openings, presser means adjacent each opening to clamp a piece of work thereover, means to rotate the conveyor between the punch and die to present the work to the operation of the punching mechanism, means to raise the presser means after a punching operation, and means to remove from the conveyor the pieces of work released from the presser means; the flexible conveyor being out of contact with the punch and die during movement of the conveyor and being flexed toward the die during a punching operation.

3. A machine for punching to size mica and like materials, comprising, in combination, punching mechanism including a punch and a cutting die, a flexible work conveyor consisting of a metal plate provided with a plurality of openings, means to position a piece of work on said conveyor over an opening, and means to move the conveyor between the punch and the die to present the opening and the work to the operation of the punching mechanism; the flexible conveyor being out of contact with the punch and die during movement of the conveyor and being

flexed toward the die during a punching operation.

4. A machine for punching to size mica and like materials, comprising, in combination, punching mechanism including a punch and a cutting die, a flexible work conveyor consisting of a metal plate provided with an opening, means to position and clamp a piece of work on said conveyor over said opening, and means to move the conveyor between the punch and the die to present the opening and the work to the operation of the punching mechanism; the flexible conveyor being out of contact with the punch and die during movement of the conveyor and being flexed toward the die during a punching operation.

5. A machine for punching to size mica and like materials, comprising, in combination, punching mechanism including a punch and die, a work conveyor consisting of a revoluble plate provided with a plurality of openings, means adjacent each opening and yieldingly pressed against the conveyor to clamp a piece of work

over the opening, and means to move the conveyor intermittently between the punch and die to present in turn each opening and the work positioned thereover to the operation of the punching mechanism; said conveyor comprising a plurality of segments each mounted to be flexed by the punch toward the die during a punching operation.

6. A machine for punching to size mica and like materials comprising, in combination, punching mechanism including a punch and a cutting die, a conveyor consisting of a segmental plate provided with a plurality of spaced openings, presser means adjacent each opening to clamp a piece of work thereover, and means to advance the conveyor between the punch and die to present the work to the operation of the punching mechanism; said conveyor comprising a plurality of segments each mounted to be flexed by the punch toward the die during a punching operation.

ALEXANDER P. BLOOD.

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