

June 4, 1940.

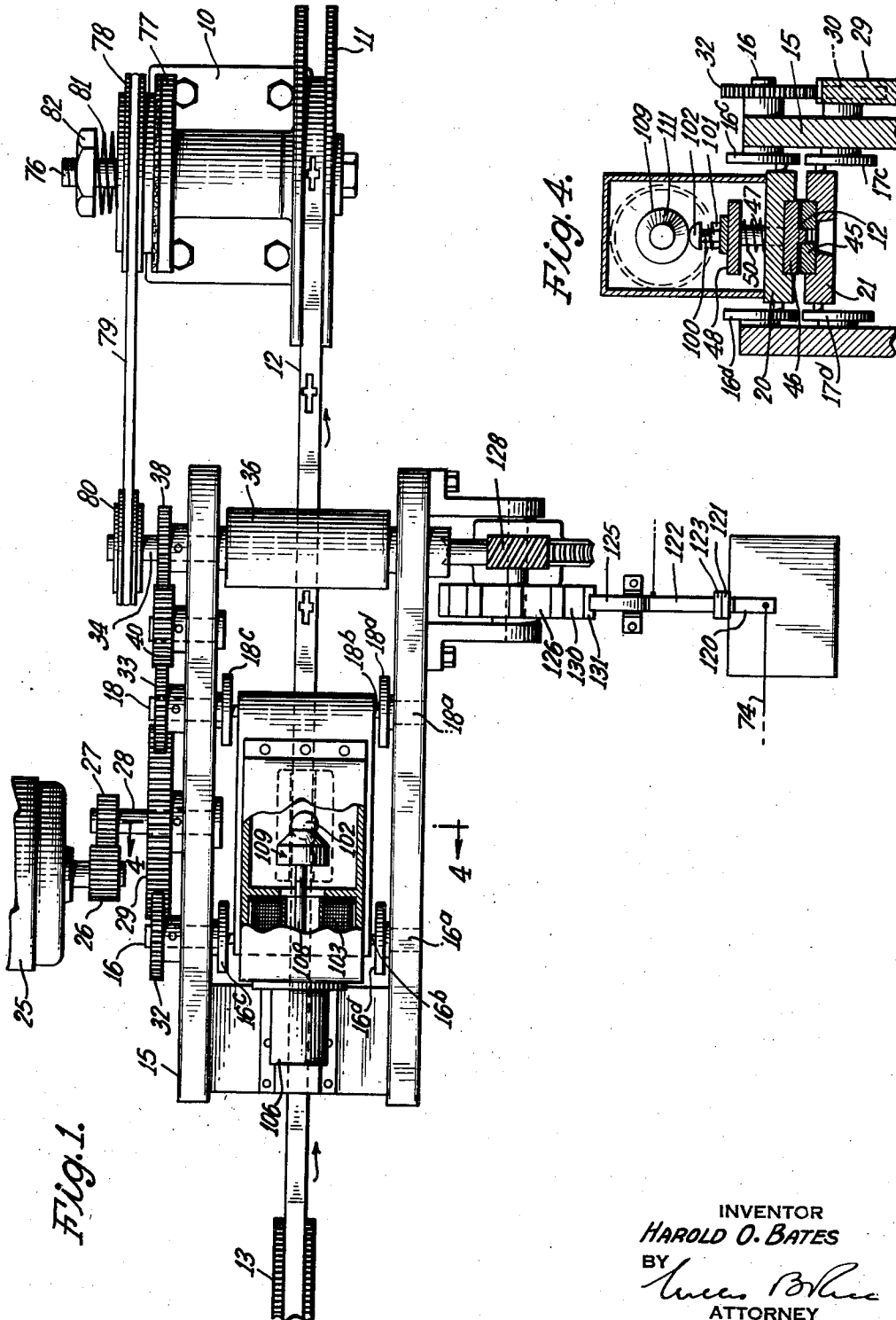
H. O. BATES

2,202,889

STRIP PUNCHING MACHINE

Filed June 13, 1939

3 Sheets-Sheet 1



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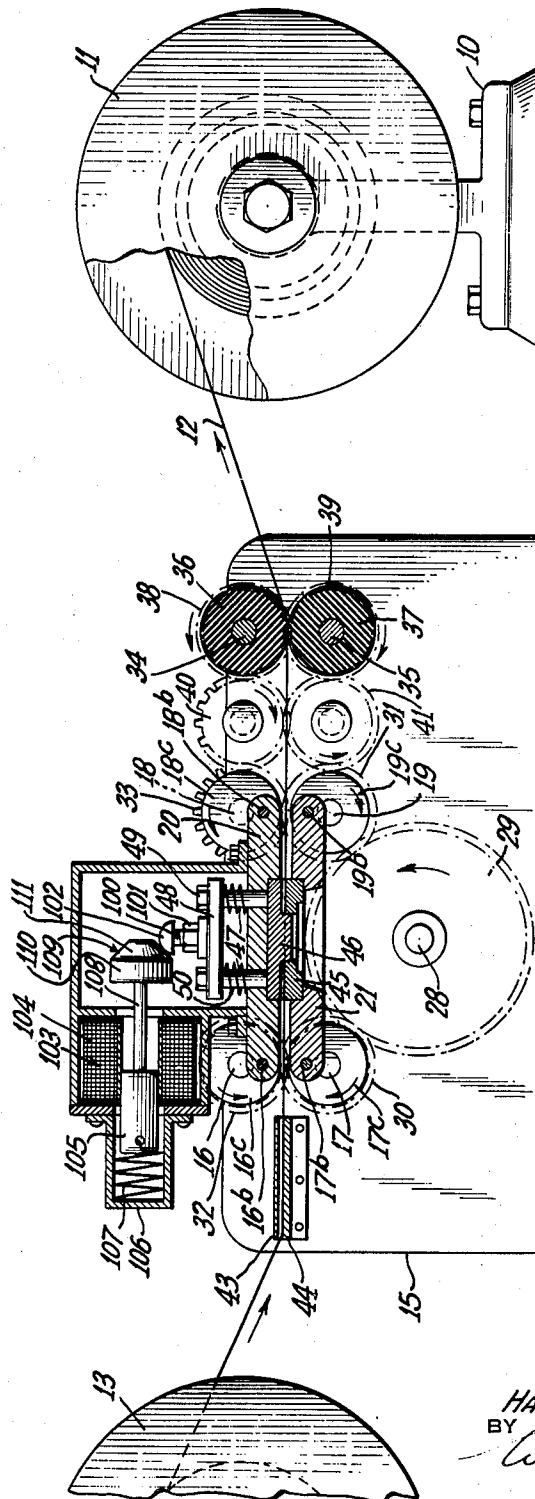
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Fig. 3.

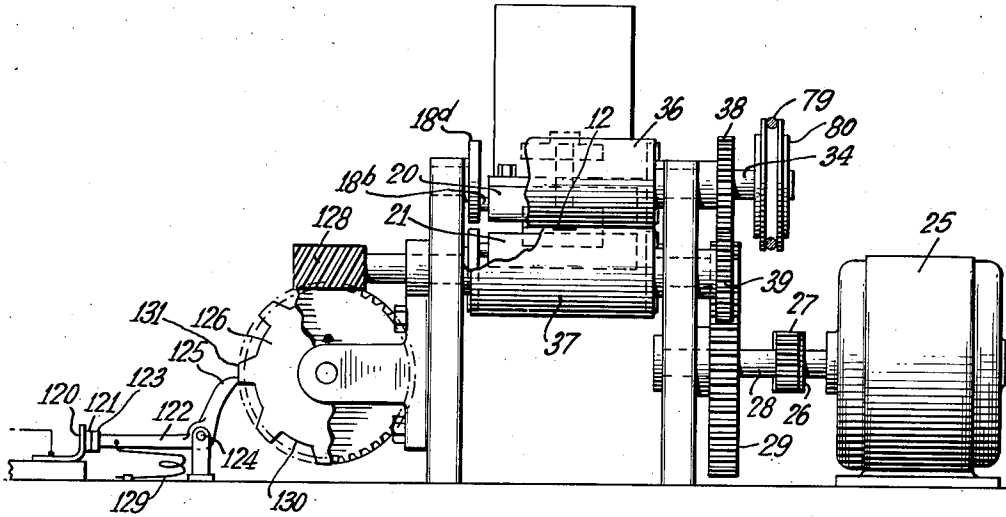


Fig. 5.

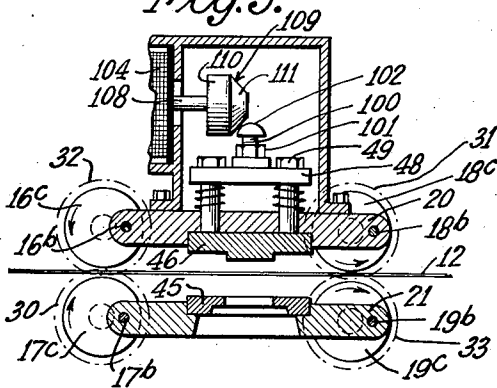


Fig. 6.

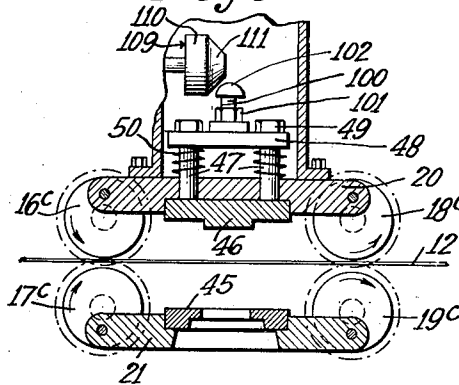
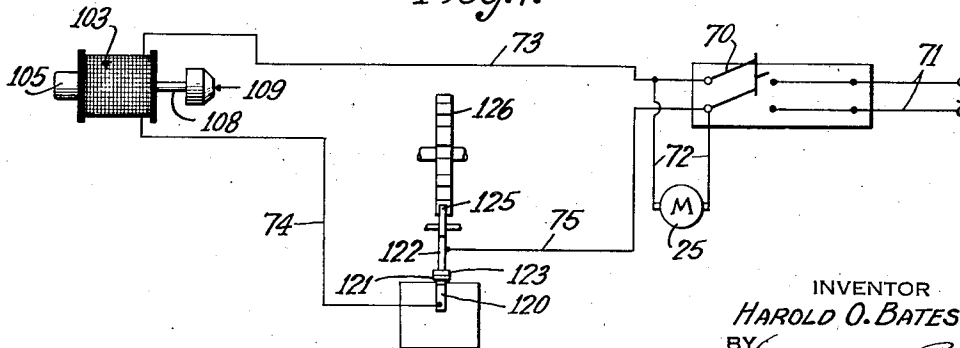


Fig. 7.



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STRIP PUNCHING MACHINE

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Application June 13, 1939, Serial No. 278,822

7 Claims. (Cl. 164—89)

This invention relates to a device for punching lettering or insignia into a strip of material at regular intervals. It is particularly useful in providing a tape which may be used in applying a trade-mark or other character or insignia to articles, as for example by applying a trade-mark number or other lettering to insulated wire.

It is an object of this invention to provide a machine which in a continuous process will punch the said insignia in the tape and particularly which will affect the punching operation during the continuous motion of the tape and more particularly which will cause the movement of the punching parts continuously with the movement of the tape during the punching operation.

It is a further object to provide a means for operating the punching mechanism which may be operated electrically whereby it may be mounted upon movable parts without mechanically affecting the operating connections.

The invention accordingly comprises an article of manufacture possessing the features, properties and the relation of elements which will be exemplified in the article hereinafter described and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description, taken in connection with the accompanying drawings, in which:

Fig. 1 represents a top plan view of a machine embodying this invention.

Fig. 2 is a side elevation thereof partly in section.

Fig. 3 is an end view.

Figs. 4, 5 and 6 are fragmentary sections on the line 4—4 of Fig. 1 showing the punching elements in various relative positions during the punching operation.

Fig. 7 is a wiring diagram.

In the drawings the numeral 10 represents a stand adapted to support a reel 11 on which is wound a strip or tape 12 after it is punched and at the other end of the machine is a reel 13 carrying the supply of material to be punched.

Between the reels 11 and 13 is situated a punching and feeding mechanism, as will be more fully described.

The punching and feeding mechanism comprises a frame 15 through which is carried in a suitable channel or guide way the strip 12.

Mounted in the back side of the frame 15 is a stub shaft 16 in alignment with a companion

shaft 16a on the front of the machine and these two shafts are connected together by a shaft 16b mounted eccentrically on discs 16c and 16d carried by shafts 16 and 16a respectively. This shaft 16b is so mounted upon the discs that as the shaft 16 is rotated the shaft 16b is moved about the axis of the shaft 16 in a circular path in the surface of a cylinder.

Similar shafts 17, 18 and 19 have companion shafts 17a, 18a and 19a provided with discs 17c, 17d, 18c, 18d, 19c, 19d which discs are connected by eccentrically disposed shafts 17b, 18b and 19b corresponding to the parts 16c, 16d and 16b respectively.

The shafts 16 and 18 are mounted above the guideway for the strip and on opposite sides of the punching mechanism to be described and the shafts 17 and 19 are directly below the shafts 16 and 18 respectively and on the opposite side of the tape. A frame 20 is journaled at one end on the shaft 16b and on the other end on the shaft 18b and a second frame 21 immediately below it is journaled at one end on the shaft 17b and at the other end on the shaft 19b and the shafts 16, 17, 18 and 19 are so geared together as will be described that the frames move in a parallel relation forward and back and toward and away from the strip. This movement being such that when the frame is in its lowermost position the frame 21 is in its uppermost position and at this time both of the frames 20 and 21 are moving at the same speed and in the same direction as the strip.

The mechanism is driven by a motor 25 having a pinion 26 meshing with a pinion 27 on a shaft 28 mounted on the frame 15.

This shaft 28 carries a gear 29 which meshes with a gear 30 on shaft 17 and with a gear 31 on shaft 19. These gears 30 and 31 mesh in turn respectively with a gear 32 on shaft 16 and a gear 33 on shaft 18. The gears being of such dimensions and so timed relatively to each other as to cause the frames 20 and 21 to move as described.

A pair of shafts 34 and 35 are journaled in the frame beyond the shafts 18b and 19b and these shafts 34 and 35 lie respectively above and below the strip 12.

Mounted upon each of these shafts is a feed roller 36—37 which may be of rubber or other suitable composition firmly to grip the strip 12. These shafts 34—35 carry gears 38 and 39 which mesh respectively with gears 33 and 31 through idle gears 40 and 41 respectively.

The strip 12 is fed from the reel 13, carried between guides 43 and 44 on the frame 15 and

then between the frames 20 and 21 between the feed rolls 36 and 37 to the take-up reel 11.

The lower or female die 45 is carried by the frame 21 and the upper or male die 46 is carried upon pins 47 slidably mounted in vertical bearings in the frame 20. These pins 47 are firmly connected at their tops by a plate 48 locked in its relation to the pins by nuts 49.

The springs 50 situated on the pins 47 between the plate 48 and the frame 20 urge the male die 46 upwardly and into a recess 51 in the underside of the frame 20.

The plate 48 carries an upwardly extending screw 100 which may be adjusted in its relation to the plate 48 by a nut 101. This screw 100 carries a head 102 which is rounded. Mounted on the top of the machine is a horizontal solenoid 103 having a coil 104 and a core 105, the latter being adapted to extend outwardly into a housing 106 and being normally urged into the housing by a spring 107. This core 105 carries a stem 108 which is preferably non-magnetic and at the outer end of this stem is a head 109 preferably provided with a cylindrical portion 110 and a conical portion 111, the parts being so proportioned and arranged that when the core 105 is drawn into the housing 106 by the spring 107, the head 109 frees the head 102 to permit the plate 48 to be raised by the springs 50 drawing the male die with it but as soon as the coil 104 is energized and the core 105 forced from the coil the conical portion 111 of the head 109 engages the head 102 forcing the die 46 downwardly to effect the punching operation and the further actuation of the core 105 by the coil causes the cylindrical portion 110 to pass over the head 102 (see Figure 4) holding the punch downwardly for a period of time. As soon, however, as the coil is deenergized the head 109 is drawn backwardly by the spring 107 freeing the punch.

The size of the feed rolls and the eccentricity of the shafts 165 175, 185 and 195 are such that the dies follow the strip at exactly the speed of the strip during the entire time that the dies are in actual engagement with the strip. In this manner the strip may be punched while in motion with the same effect, so far as the dies are concerned, as though the dies and strip were stationary.

In Figure 4 the strip punches are shown at the time the actual punching operation is complete but with the dies still in engagement with the strip.

In Figure 5 the eccentrics that raise the dies completely out of engagement with the strip and the frame 20—21 carrying the dies are about to start the return trip to the position to engage the strip for the new punching operation.

In Figure 6 the punch is shown with the return trip half completed.

The solenoid coil 103 is operated by a circuit breaker comprising, as here shown, a spring finger 120 carrying a contact 121 and a contact arm 122 carrying a movable contact 123. The contact arm 122 is pivoted at 124 in a position to permit the contact 123 to be brought into engagement with the contact 121 with sufficient pressure to insure a good contact and then to be moved away from it with a wiping-breaking action to insure the maintenance of a clean contact surface. The arm 122 is also arranged to be moved into the contact making position by the mechanism but to be snapped out of contact making position by spring means. To accomplish this purpose the arm has an upwardly ex-

tending finger 125 adapted to engage a notched disc 126, which disc is driven by a worm 128 upon the feed roll shaft. A spring 129 is arranged to move the contact arm 122 upwardly from a contact making position to a contact breaking position and the arm is so mounted relative to the notched disc 126 that when the finger 125 rests upon the outer periphery of the disc the contact arm 122 is moved into a position to bring the contacts 121 and 123 into engagement. This outer portion, however, at the point where it is interrupted by the notches has a precipitous drop so that when this point in the periphery is reached by the finger 125 the latter may be snapped into contact breaking position by the spring 129. It will be obvious that the duration of the open circuit and the duration of the closed circuit may be adjusted by the relative arc occupied by the inner or open circuit diameter 130 of the disc 126 and of the outer or closed circuit diameter 131.

As will be seen from Figure 7 there may be provided a two pole switch 70 connected at one side to the line wires 71 and having the other side connected to the motor by conductors 72. In parallel with the motor there is a circuit comprising a conductor 73 leading to the solenoid coil 103 and a conductor 74 leading the other terminal of the solenoid coil to the spring finger 120 and the conductor 75 connecting the other spring finger 125 back to the switch. Thus, when the switch 70 is thrown the motor starts in operation to drive the strip and at the same time the solenoid is actuated every time one of the strips 61 completes the circuit through the solenoid coil 103.

The take up reel 11 is mounted upon a shaft 76 carrying a disc 77, a pulley 78 driven by a belt 79 from a pulley 80 on shaft 34 is loosely mounted on shaft 76 in position to bear against the side of the disc 77 and form therewith a friction drive and a spring 81 held by a nut 82 urges the pulley 78 against the disc 77 whereby the degree of friction may be adjusted by adjusting the nut 82.

It will be readily understood that this friction can be made to compensate for the difference in rate of take up of the take up reel as the amount of the strip upon the reel increases, thereby increasing the effective diameter. With the friction drive as herein provided the proportions of the pulleys 78 and 80 may be made such as to take up the strip as fast as it is fed from the punching machines when the reel is first started to be wound and its diameter is small and that there will be considerable slippage in the take up drive as the diameter of the reel increases.

The operation of the machine will be evident from the foregoing description.

As the mechanism is operating it will feed the strip through the device affecting a punching operation for each rotation of the gear 16 and this operation is conducted without any slowing up of the tape through the machines by reason of the punching.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following

claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a continuous strip punching device comprising means for feeding a strip, a moving frame for supporting a male die on one side of said strip and a second moving frame for supporting a female die on the other side of said strip, means for moving said supporting means in the direction of and in the speed of the strip when opposite the position where the punching operation is to take place and means carried by said second supporting means for moving the male die against the female die, means for moving the male die comprising a solenoid connected to one of said dies to operate the same and means positively geared to the feed mechanism for the strip for operating said solenoid at predetermined intervals along the strip at the time when said dies reach the punching position.

2. A strip punching mechanism comprising a main frame, a plurality of eccentric members rotatable in said frame, said members being arranged in sets and the members of each set being rotatable parallel to each other, a pair of die frames each carried by the eccentric members of one set, means for feeding the strip between said frame continuously, said eccentric members being geared together so as to move said frames each in parallel about a circular path toward and from each other and to cause said frames to move in the direction and at the speed of the strip when in the nearest position toward each other, a die carried by one of said frames and a die movably mounted on the other of said frames for motion toward and away from said strip and means upon said other frame for operating said die and means upon the main frame for actuating said die operating means.

3. A device according to claim 2 in which the die operating means comprises a solenoid having a core arranged to engage said movably mounted die to move the same toward the strip and the actuating means comprises a circuit making device and having connections between said circuit making device and said machine to oper-

ate said circuit making device in timed relation to the movement of the die carrying frames.

4. A device in accordance with claim 2 in which said eccentric members comprise shafts on each side of the main frame, discs on the internal end of each shaft and a connecting shaft eccentrically mounted upon each of said discs and extending between them and in which the die carrying frames are journaled on said eccentrically mounted shafts.

5. A strip punching mechanism comprising a main frame, a plurality of eccentric members rotatable in said frame, said members being arranged in sets and the members of each set being rotatable parallel to each other, a pair of die frames each carried by the eccentric members of one set, means for feeding the strip between said frame continuously, said eccentric members being geared together so as to move said frames each in parallel about a circular path toward and from each other and to cause said frames to move in the direction and at the speed of the strip when in the nearest position toward each other, a die carried by one of said frames and a die movably mounted on the other of said frames for motion toward and away from said strip and means upon said other frame for operating said die and means upon the main frame for actuating said die operating means, said strip feeding means comprising a pair of rollers engaging both faces of the strip and means to take up the strip after it is passed from the punching mechanism comprising a reel driven by said feed mechanism.

6. A device in accordance with claim 5 in which the means for driving the take-up roll is geared to take up said roll at a variable rate, the minimum rate being at least as fast as the strip is fed and the drive mechanism including a friction drive to permit said reel to slip backwardly whenever the speed of the take up exceeds the speed of the feed.

7. A device in accordance with claim 5 in which the strip take-up comprises a reel, a drive wheel frictionally connected with said reel including spring means for regulating said friction and mechanical connections between said drive wheel and a driven part of said punching mechanism at a rate at least sufficient to cause a strip take-up as fast as a strip is fed.

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