

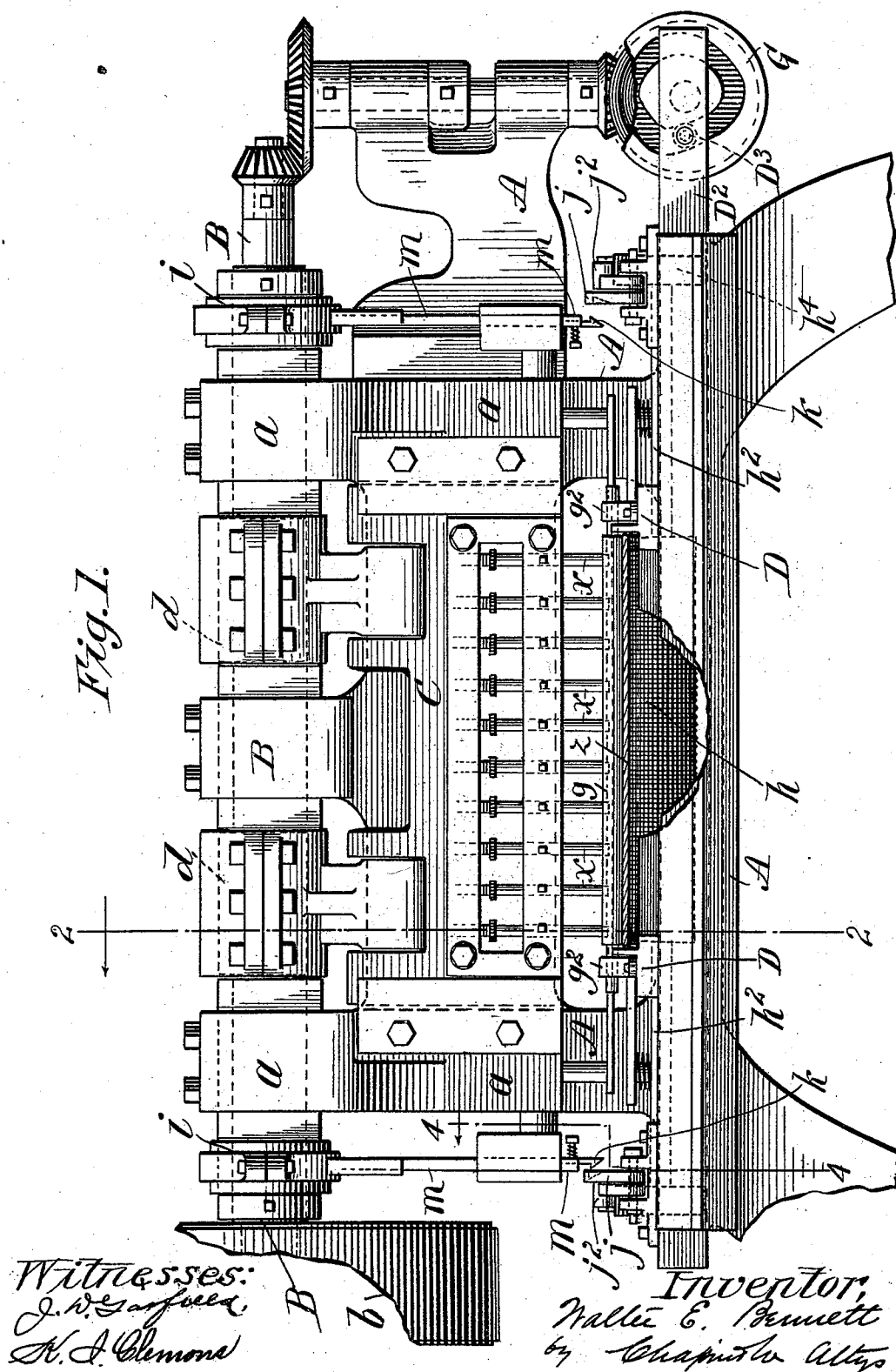
(No Model.)

3 Sheets—Sheet 1.

W. E. BENNETT.
PUNCHING MACHINE.

No. 528,502.

Patented Oct. 30, 1894.



Witnesses:
J. W. Garfield
N. J. Clemons

Inventor,
Walter E. Bennett
by Chapman & Atty

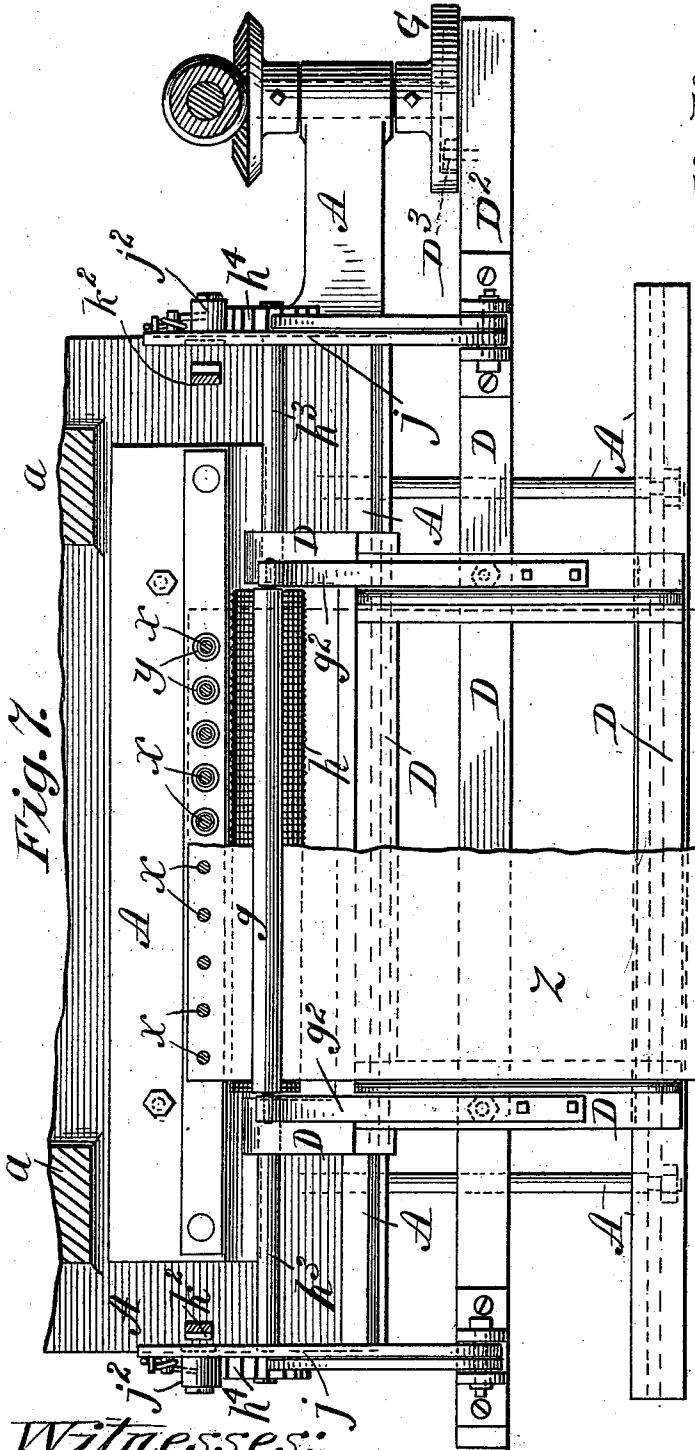
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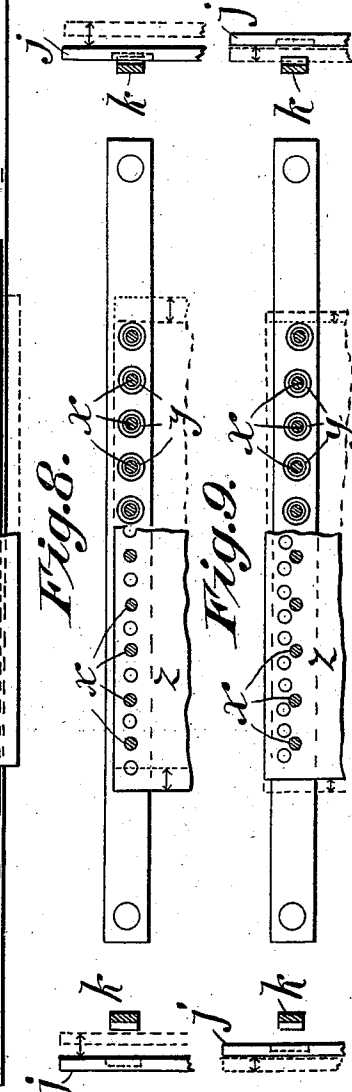
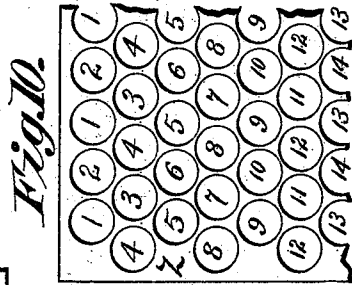
3 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

WALTER E. BENNETT, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE MORLEY BUTTON MANUFACTURING COMPANY, OF PORTSMOUTH, NEW HAMPSHIRE.

PUNCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 528,502, dated October 30, 1894.

Application filed June 18, 1894. Serial No. 514,844. (No model.)

To all whom it may concern:

Be it known that I, WALTER E. BENNETT, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Punching-Machines, of which the following is a specification.

This invention relates to improvements in machines for punching out disks, or blanks, from sheet material such as paper board, papier-maché, or other material suitable for the production therefrom of the bodies of shoe buttons, or for other purpose.

The invention more particularly relates to the feed mechanism for moving the sheet properly and in successive steps to the position for receiving the punching out operation of the punch and die mechanism.

The purpose of the invention is to produce a machine in which there is a gang of punch and die mechanism for punching out several blanks at one stroke at intervals apart slightly greater than the diameter of the blanks, and in which there is a stock-carrying and feeding mechanism which will, after one series of the blanks have been punched, place the stock so that the next punching operation will punch out the blanks in the same line, and between the holes from which the first series of blanks were punched out; and which will furthermore feed the stock so that blanks may be punched out in another line parallel to the first, but in such an arrangement that their centers are offset half their diameter relative to the centers of the first row of punched-out holes, thereby enabling the machine to punch out a line of blanks at two strokes of the punches which leave the holes from which the blanks were punched separated by only the slightest amount of waste stock, and enabling the punches and dies of the gang, from a mechanical standpoint, to be closer together and of greater number than has been heretofore considered practicable.

The invention consists in the combinations of devices and the constructions and arrangement of parts for imparting the peculiar movements to the carriage and the feed roll thereof all as will hereinafter more fully appear and be set forth in the claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a front elevation of the improved machine for punching out blanks. Fig. 2 is a vertical cross section of the same. Fig. 3 is an end view of the main shaft of the machine showing the eccentrics thereon which operate the punch carrier, and certain of the feed devices, and all as will be hereinafter more particularly referred to. Fig. 4 is an end view, or elevation with some parts in section, as seen transversely of the machine on line 4—4, Fig. 1, for more particularly showing the means for periodically actuating the feed roll. Fig. 5 is a vertical section taken on line 5—5, Fig. 4. Fig. 6 is a perspective illustration of some of the detached parts which are seen as in their operative combination in the two preceding views. Fig. 7 is a horizontal section and plan view of parts as seen below the plane indicated by line 7—7, Fig. 2. Figs. 8 and 9 are plan views of some of the principal parts shown in Fig. 7 but indicating different positions into which the stock is successfully shifted or fed. Fig. 10 is a plan view showing the appearance of a piece of sheet material after the blanks have been punched therefrom, the numerals on this view indicating the order in which the blanks are punched out.

In the drawings A represents the framing and stationary parts of the machine having the uprights, *a, a*, in which the main shaft, B, is journaled. The main shaft is driven by the pulley, *b*, and it operates the slide, C, which carries the gang of punches, *x*, through the agency of the eccentrics, *d, d*, and strap-links, *f, f*.

Upon the bed of the machine is mounted the row of tubular dies, *y, y*, corresponding to the gang of punches. The axes of the punches and dies are separated by a distance slightly greater than twice the diameter of the punch.

It will of course be appreciated that the punches and dies, *x, y*, could not practicably be mounted so close as to punch out blanks at one stroke with no more waste stock between them than indicated in Fig. 10.

The carriage for the stock has the several

portions thereof all indicated by the letter, D. The carriage is mounted to slide horizontally across the machine in an extent equal to about one and a half times the distance between the axes of two of the punches. The carriage also has at its rear part the upper and lower feed rolls, *g, h*, the journals of the lower one being in fixed bearings on the carriage D, while the upper roll rests with a spring pressure upon the lower one,—or upon the interposed sheet stock which is indicated by *z*. The pressure springs for the upper roll are indicated at *g*². The cross reciprocating movements of the carriage, bodily, are imparted by the co-operation with the rotary slotted cam, G, of the extension, D², of the carriage which is provided with the roller stud, D³, the latter entering the cam slot. The cam is so geared to the main shaft that it has its rotations slower than those of the said shaft so that the complete movements of the carriage across and back may be all as hereinafter set forth within a period in which the punches reciprocate more than once, and the said slot of the cam is so graded that the movements of the carriage are intermittent—that is, there is a dwell between each step or “hitch” of the carriage to permit the punches to operate on the then immovable stock.

The feed mechanism,—which includes the carriage, D, and the feed rolls, *g, h*, thereon,—imparts to the stock, after the punches have descended to punch out half of the blanks of the first row, for instance, first, a full step, or a movement to the left equal to the whole of the distance between two of the punches, then a movement to the right equal to half a step, and also a forward movement to advance the stock for the second row of blanks to be punched out with their centers offset from those of the first row; then a full step to the right, next the half step to the left and the forward feed and so on. The shifts, or steps, of the stock, are as already intimated, given by the cam-imparted movements of the carriage, while the forward feed, seasonably in advance of each half-step movement of the carriage is imparted by the turning of the lower feed roll, *h*, through mechanism which will be now described.

The lower feed roll has on its axially extended arbor, *h*³, at each end, the ratchet wheel, *h*⁴, adjacent which is the pawl-carrying lever, *j*, the pawl, *j*², which is pivoted thereon engaging the adjacent ratchet-wheel. This pawl-carrying-lever, in its upward swing, places the pawl in engagement with the new tooth of the ratchet wheel so that on the downward forcing of the lever the pawl must move the ratchet around to the extent of a tooth, the roll correspondingly partaking of the rotational movement.

Near both ends of the machine are vertically sliding bars, *m*, suitably guided for their movements in fixed paths, and which derive their reciprocatory movements from the ec-

centrics, *i, i*, on the main shaft. The lower end of each bar has the hook, *k*, which is articulated thereto, as seen in Fig. 5, for a laterally yielding pressure. The hook also has the beveled nose, *k*². As specifically constructed the lower extremity of the vertical reciprocating bar, *m*, has a depression, *m*², in its side between its edges, which leads to its end. The shank of the hook, *k*, is accommodated in this depression and is there held by the screw, *k*³, which loosely passes through the perforation in the hook and with a screw engagement into the bar. The spring, *k*⁴, between the head of the screw and the side of the hook holds the hook normally vertically in line with the bar, *m*, although the yield of the hook ensues when the hook descends and impinges against the lever, *j*, which may be in the vertical plane of movement of the hook. The hook is restrained from edgewise movements by the opposite borders of the depression, *m*².

The pawl-carrying-lever has at its side the notch, or shoulder, *j*³, with which the hook may engage. The engagement of the hook with the pawl-carrying-lever takes place on the downward stroke of the bar (at a time when the cam has caused the carriage to be brought into the proper position therefor). Then as the bar ascends, the pawl-carrying-lever is swung up so that the pawl takes into a new tooth of the ratchet wheel. Now, on the next descent of the bar, its lower end which bears upon the top of the lever, forces said lever downward, the pawl then driving the ratchet-wheel and feed-roll around in the required extent.

On reference to Sheet 3 of the drawings, it will be seen that, by reason of the crosswise shifting of the carriage as insured by the operation of the cam, the carriage has a position, first, to present the stock for the first punching out of half the blanks of the row. (See Fig. 7.) The punches having descended and risen to clear the stock, the cam, G, has by this time rotated so far as to shift the carriage crosswise the whole step to the left, to the position seen in Fig. 8, whereupon the blanks are punched out in the same row intermediate between those first punched. At this time the right-hand pawl-carrying-lever has been brought leftward into the path of the right-hand hook, *k*. Now, while the punches are clearing from the stock, the right-hand pawl-carrying lever, *j*, is, by the now rising hook-carrying bar, *m*, being lifted to place the pawl in engagement with the new tooth of the ratchet-wheel, so that before the next descent of the punches the lower end of the hook-carrying bar, on the descent of the latter, forces the pawl-carrying lever downward to insure the forward feed of the stock, and now after such forward feed of the stock and even before the punches again descend to punch on the new row, the carriage has by the cam, G, been shifted the half space to the right to bring the centers of the punches in the off-

set relation to the holes already punched out, for the economy of the stock (see Figs. 9), and the reversed operations are given and repeated rapidly time and time again.

5 A glance at Fig. 3 will suffice to show that the eccentrics i , for operating the reciprocatory hook-carrying bars are set somewhat in advance of the eccentric, d , which operate the punches so that the forward feeding of
10 the stock for every other punching operation may be properly in advance of the descent of the punches. Therefore, incidental to the operation described, the left-hand hook-carrying-bar lifts a pawl-carrying lever and then
15 depresses such lever at the left-hand side of the machine, while the right hook-bar plays clear of, and without effect upon, the adjacent pawl-carrying lever. Then both hook-bars have their reciprocatory movements clear of
20 their pawl-carrying levers and without effect thereon, and then the right-hand hook-carrying bar engages and lifts and then depresses the right-hand pawl-carrying lever; and to render this operation perhaps still more clear,
25 a glance at Fig. 10 and a notice of the numerals thereon will show the order of the punching operation. The holes numbered 1 are punched at the start. Stock moves one space to left and holes 2 are punched. Stock now
30 moves one-half space to right and has its roll-feed forward whereupon holes 3 are punched. Stock now moves a full step to the right and holes 4 are punched. Stock now moves the half space to the left and has the roll-feed
35 forward so that the holes 5 may be punched, and so on. The said view, Fig. 10, indicates how closely the punched out holes may lie in the stock and how little may be the intermediate waste; and while it is not herein as-
40 serted that it is new to punch out blanks from the stock "at offsets," as here shown, it is not known that such has even heretofore been done by using a machine with a gang of punches and dies so that half of the row may
45 be punched and then the intermediate unpunched spaces next punched out; nor one in which there was embodied a stock-supporting and feeding carriage having the peculiar movements described.

50 Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a blank punching machine, the combination with a set of reciprocatory punches,
55 of a shiftable stock-supporting carriage with a mechanism thereon for feeding the stock forwardly on the carriage, devices for imparting to the carriage, intermittently, a half step and a full step in one direction, and then
60 a half and a full step in the reverse direction, and mechanism operating relatively to each half step shifting of the carriage upon the feed mechanism to impart thereto a for-

ward feed movement, substantially as and for the purposes set forth.

2. In a punching machine, the combination with the row of reciprocatory punches, of the carriage, D, mounted to slide horizontally in one direction and having the roll, h , for feeding the stock at right angles to such slide
65 movement, and provided on its arbor at each end with a ratchet wheel, a pawl carrier, j , adjacent each ratchet wheel with a pawl thereon which engages such ratchet wheel, a cam with which engages a member of the
70 said carriage, and which imparts separate step-like slide movements of the carriage to and fro, and a pair of vertically reciprocatory hook-bars in proximity to which the pawl-carrying-levers are alternately brought
75 at the termination of the slide movements of the carriage, substantially as described.

3. In a punching machine, the combination with the set of punches mounted for reciprocatory movements, of the carriage, D, having
85 thereon the feed roll, h , with the ratchet wheels, h^2 , h^3 , at each end, the levers, j , pivotally mounted on the carriage adjacent the ratchet wheel each with the pawl, j^2 , which engages the said wheel, the reciprocatory bars, m , m ,
90 with the hooks which are arranged to engage the levers sidewise to lift them, the extremities of the bars, m , and said levers being so arranged that the bars will on their descent contact upon and depress an upswung pawl-
95 carrying-lever, and the cam, G, for imparting the step-like slide movements to and fro of the carriage, substantially as described.

4. In a punching machine, the combination with the bed, or frame, having the slide-ways
100 thereon, and provided with a series of dies, y , y , the main shaft, B, having the eccentrics, d , d , and the eccentrics, i , i , which are set in advance of those, d , and the cam, G, and its shaft which is geared to the main shaft, of
105 the carriage to slide on the bed having the member which is in engagement with the said cam, provided with the feed-roll, h , with the ratchet-wheels, h^4 , h^4 , thereon, and the pawl-carrying-levers, j , each with the ratchet
110 engaging pawl, j^2 , and the notch, or shoulder, j^3 , the slide, C, with the series of punches, x , and the strap-links, f , connecting it with the eccentrics, d , and the vertically reciprocatory bars, m , operatively connected with the ec-
115 centrics, i , i , and having the laterally yielding hooks, which bars and hooks co-operate with such one of the pawl-carrying levers as is by the cam-controlled position of the carriage brought subject to engagement thereby,
120 substantially as described.

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Witnesses:

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