No. 712,125. Patented Oct. 28, 1902.

S. ELLIOTT.

STENCIL CUTTING MACHINE.

(Application filed Oct. 23, 1901.)

(No Model.) 6 Sheets—Sheet 1.

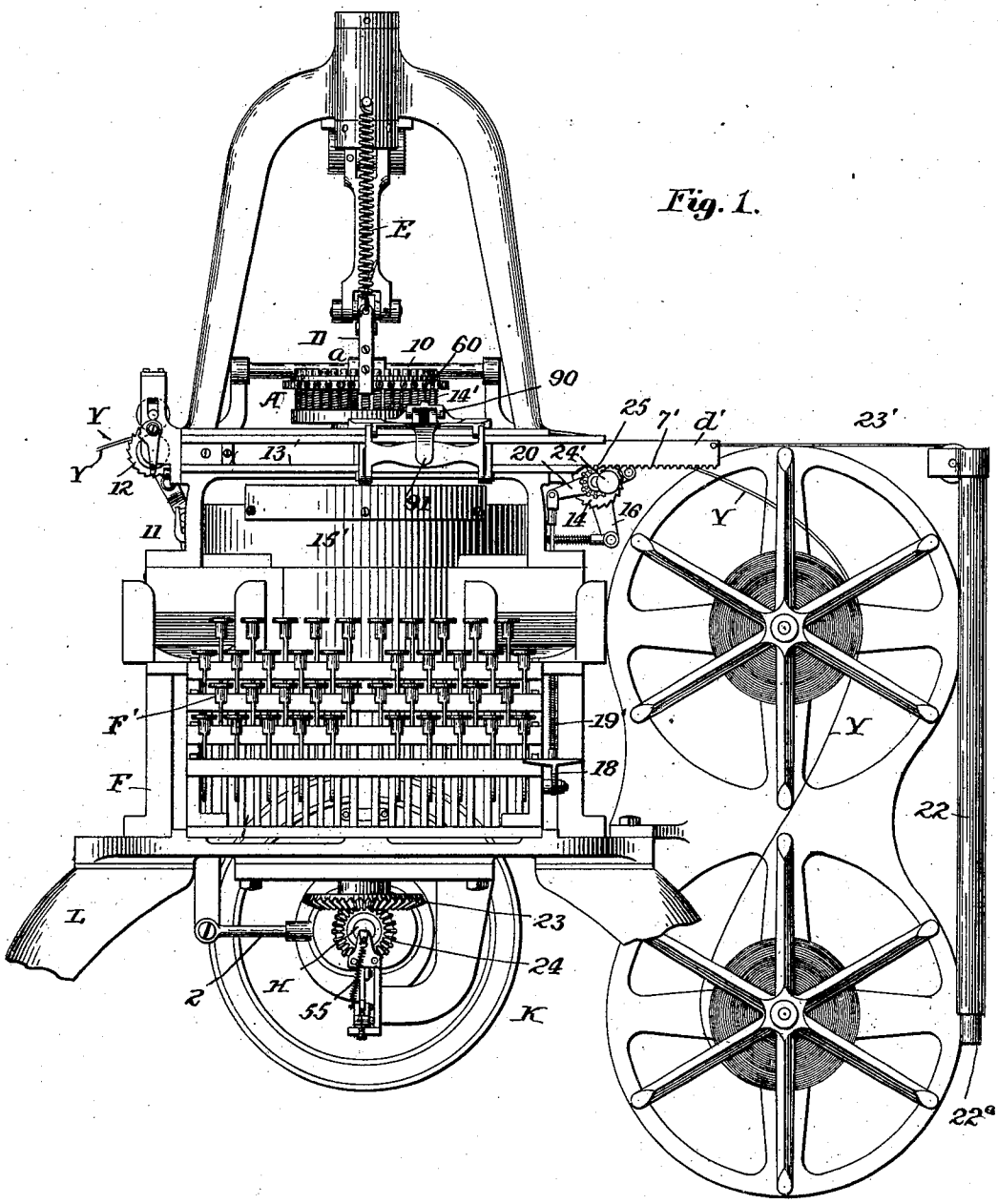


Fig. 1.

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(No Model.) 6 Sheets—Sheet 2.

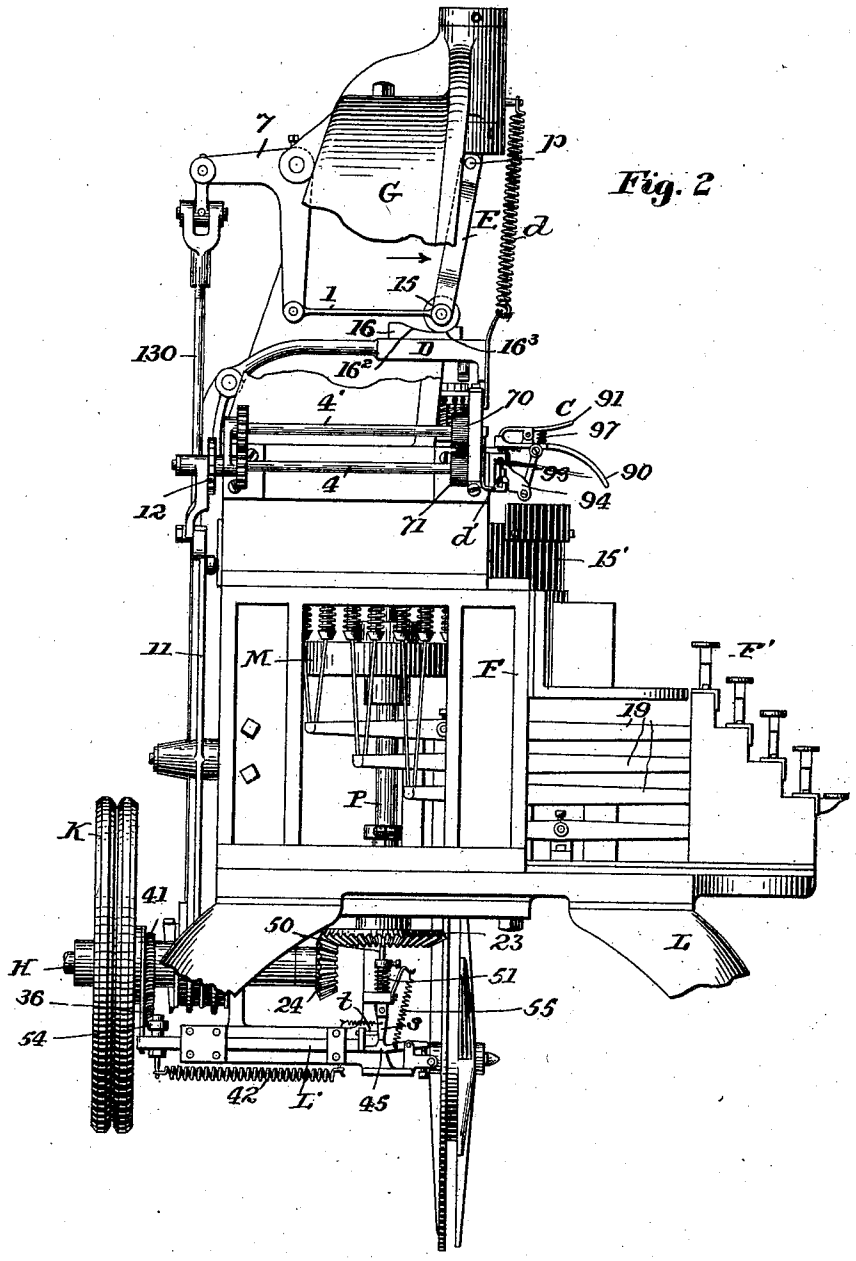


Fig. 2

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Fig. 3.

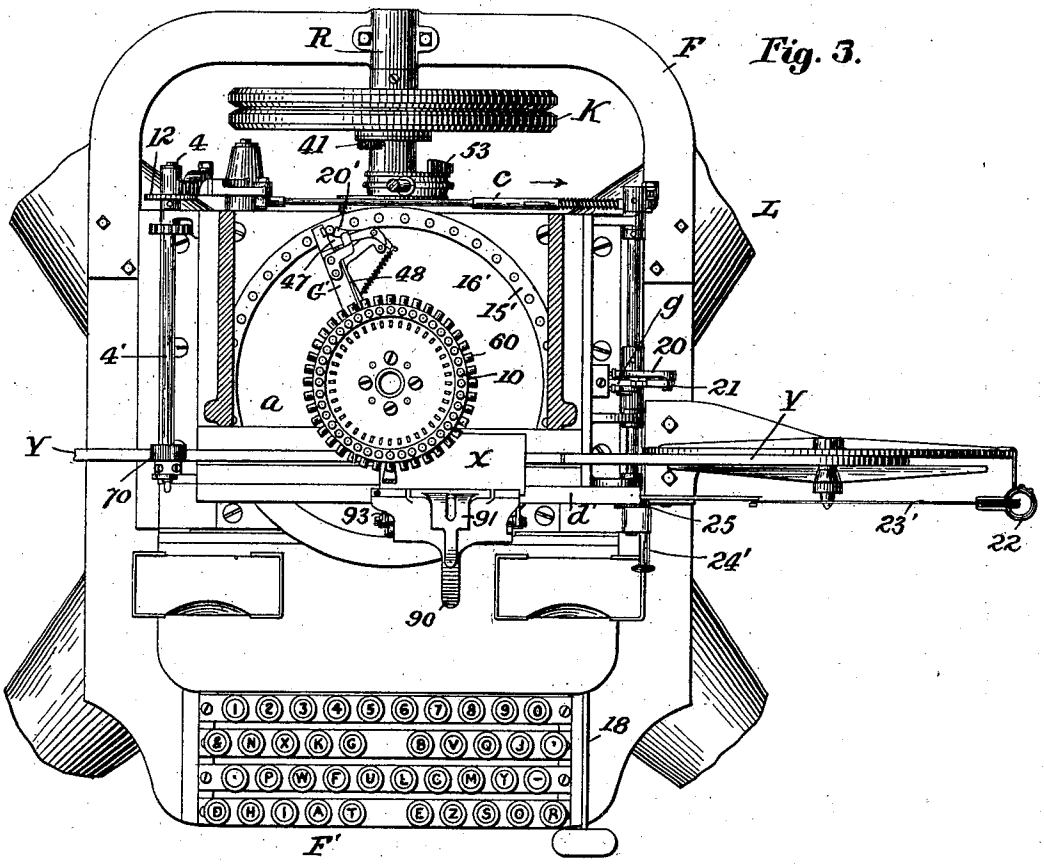
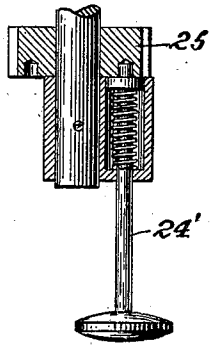


Fig. 4.



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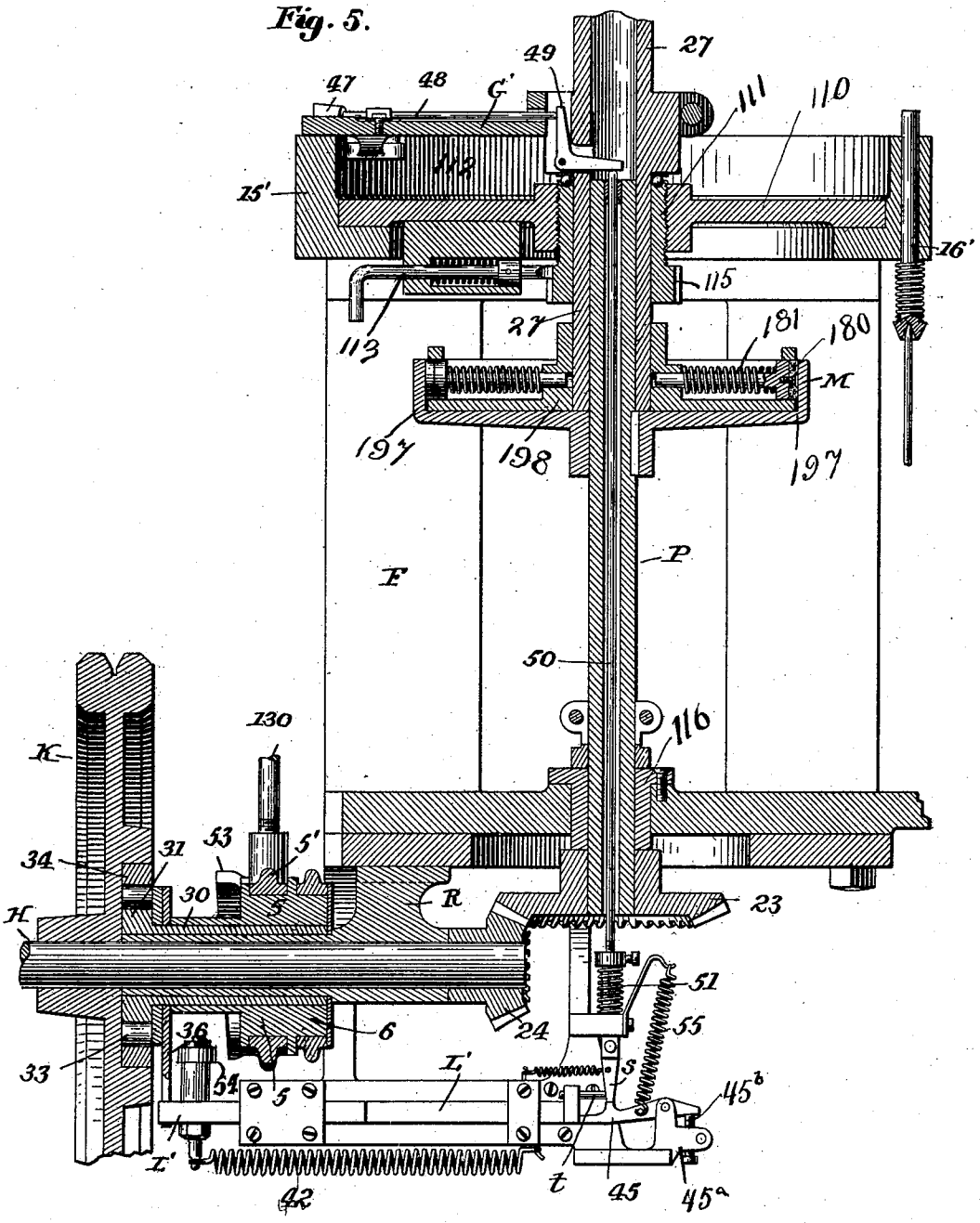
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(No Model.) 6 Sheets—Sheet 4.

Fig. 5.



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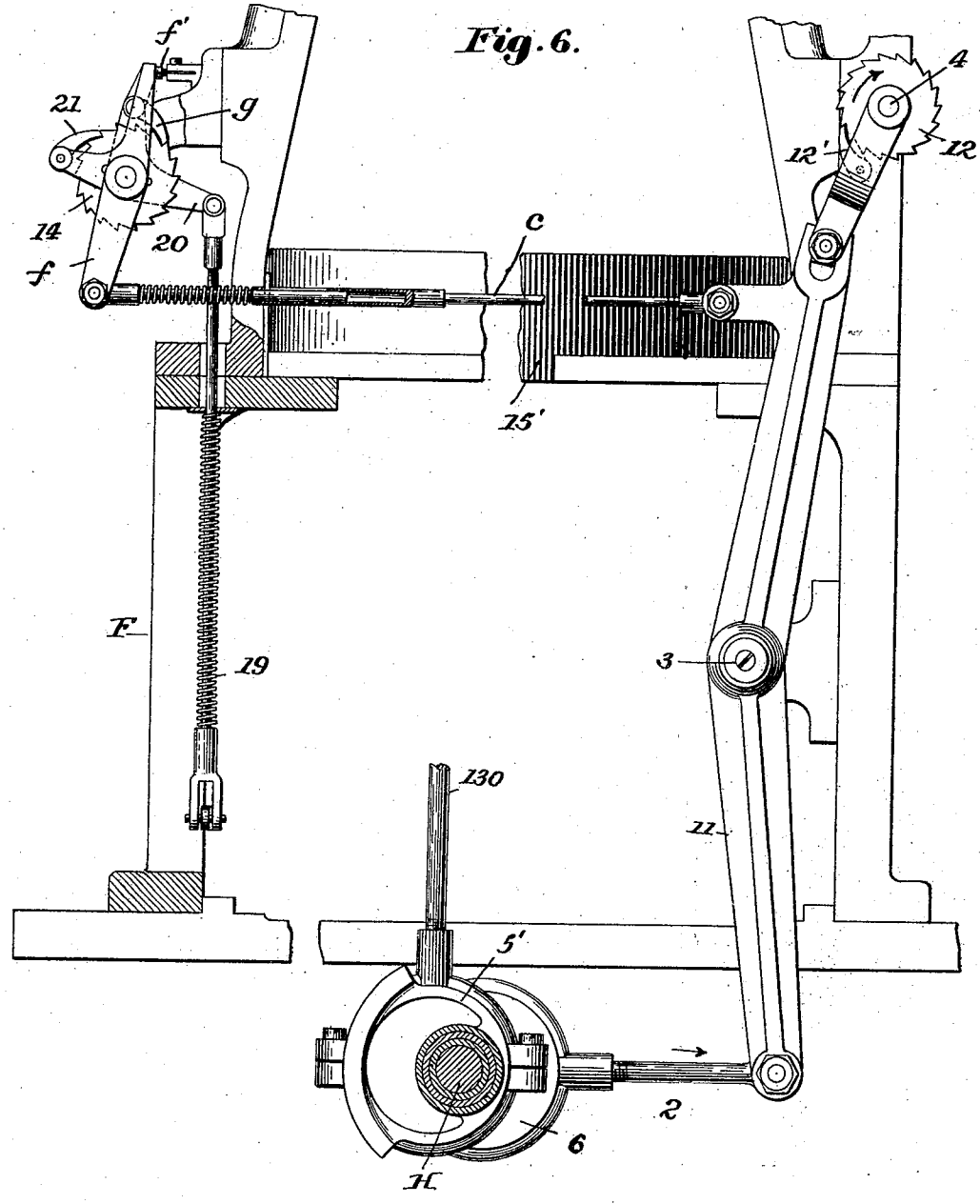
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(No Model.) 6 Sheets—Sheet 5.

Fig. 6.



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(No Model.) 6 Sheets—Sheet 6.

Fig. 7

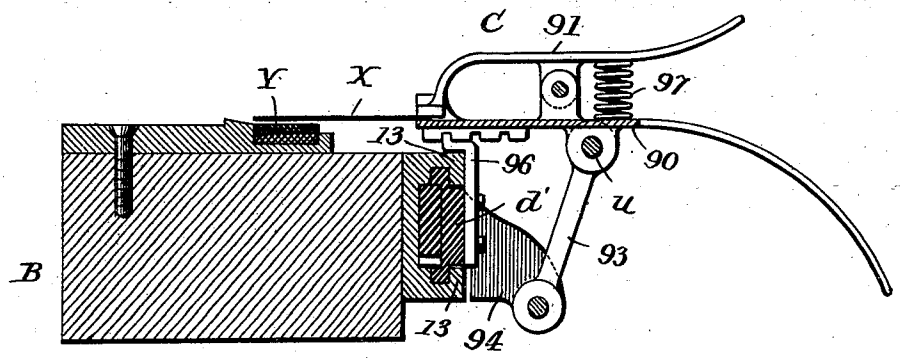
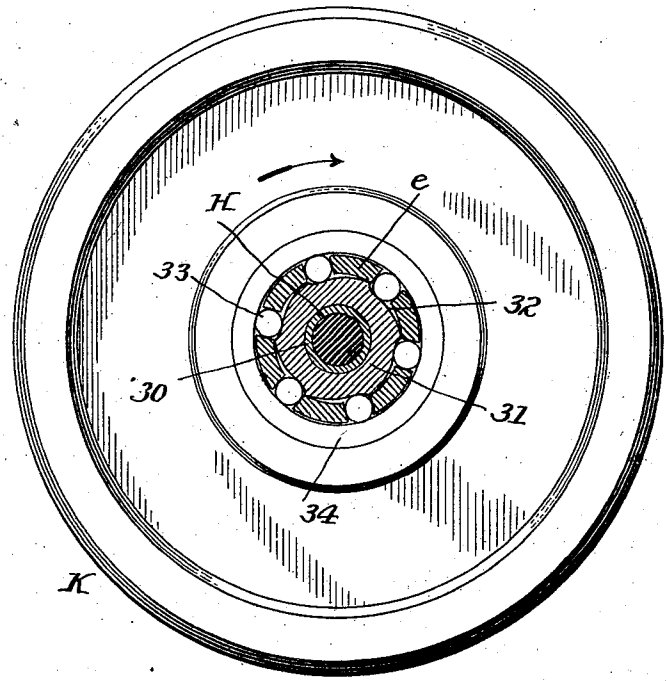


Fig. 8.



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UNITED STATES PATENT OFFICE.

STERLING ELLIOTT, OF BOSTON, MASSACHUSETTS.

STENCIL-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 712,125, dated October 28, 1902.

Application filed October 23, 1901. Serial No. 79,692. (No model.)

To all whom it may concern:

Be it known that I, STERLING ELLIOTT, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Stencil-Cutting Machines, of which the following is a specification.

My invention relates to that class of apparatus in which a series of tools each adapted to cut or punch or cut out a separate letter or character is carried by a head or carrier actuated to bring the tools into operation as desired.

My invention consists of certain improvements upon the apparatus shown and described in application, Serial No. 730, filed January 8, 1900, said improvements relating more particularly to the means for actuating the tools, means for feeding the bed-strip and stencil-blank, and also to certain details of construction of the machine whereby the desired accuracy and speed of movements are secured with greater simplicity of construction and facility of operation than in the machine disclosed in the application referred to, my improvements being more fully set forth hereinafter and illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of my improved apparatus with the exception of the legs. Fig. 2 is a side view. Fig. 3 is a plan view, partly in section, with the upper arched casting removed. Fig. 4 is a detail sectional view of part of the feeding mechanism. Fig. 5 is a longitudinal sectional view of the parts immediately connected with the main driving-shaft. Fig. 6 is a rear elevation of the frame and the feed driving mechanism. Fig. 7 is a transverse section through the table, showing the construction and arrangement of the sheet-carrier. Fig. 8 is a sectional view through the driving-shaft and clutch devices.

Referring to the drawings, F represents the frame of the machine, which may be of any suitable shape and construction for the ends in view, and L represents the legs thereof, partly cut away. A head A is shown as a hollow cylinder carrying the punching, embossing, or printing tools *a*, and this head may be reciprocated or rotated, a rotary head being shown. Each printing-tool *a* consists of a bar 10, the lower end of which is properly shaped according to the character of the letter or figure to be cut out, and the whole series of shafts is arranged in a circle.

The strip of paper or other material X to be punched is carried by a suitable carrier C in position above the table B and is there subjected to the successive action of the different tools *a* as the carrier C is fed intermittently sidewise one step after each impression. The carrier moves freely between its guides 13 13, so that it may be set laterally by hand. It may also be pushed in or out by hand to secure successive lines of impressions.

Each bar 10 slides vertically in the head A and is provided with a collar 60, against which bears a spring 14′, which lifts the bar to the limit of its upward movement, and each bar is depressed after being brought to proper working position by the action of any suitable operating devices, which I term a "pusher." As shown, the pusher D is a lever pivoted at the rear end and extends forward beneath the toggle-like lever E, having at the lower end a roller 15. The lever E is pivoted at its upper end to the arched portion G of the frame, and when the lever is swung in the direction of its arrow, Fig. 2, the roller works upon a curved surface shown upon a projection 16 on a pusher, and so forces down the pusher against the upper end of that bar 10 which is below it, thereby depressing the latter. The upward movement of the pusher is effected by any suitable means, as a coiled spring *d*.

The head A may be reciprocated or it may be turned continuously and arrested when any tool is in operative position below the pusher. As shown, the head normally rotates in one direction, and a keyboard has different keys F′, the characters designating which corresponding to those of the tools and the depressing of any key operates stop devices which arrest the head when the corresponding tool is below the pusher, the head being held stationary as long as a key is depressed. While different means may be employed to secure these results, I will now describe those shown in the drawings and which have proved to be effective. The head is car-

ried by a shaft 27, and beneath the head A and below the table B a stop-arm G′ extends from the shaft 27 over a ring or disk 15′, having vertical sockets arranged in a circle for the reception of sliding stop-pins 16′, each supported so that its upper end is normally flush with the top of the disk 15′. Each stop-pin 16′ rests on a rod bearing with its lower end on one of a series of key-levers 19, connected with the keys F′, so that on depressing a key the rod and pin 16′ connected therewith are lifted, the pin thus lifted acting as a stop against which the arm G′ contacts to arrest the rotation of the head A when the tool *a* which is in operative position above the paper will correspond to the indication on the key depressed. To prevent the rebounding of the head from the sudden contact and cessation of rotation, the arm G′ is provided with a spring-pawl 20, Fig. 3, the end of which springs out as a stop-pin is struck by the arm and prevents rebound. The head A is driven by a shaft P, which is connected frictionally with the shaft 27 by means of friction devices M. The bottom portion 110 of the disk 15′ is shown as supporting a vertically-movable sleeve 111, within which the shaft 27 is rotatable. The sleeve 111 is made vertically adjustable in any suitable manner, as shown, it being screw-threaded on its outside to fit within the central inwardly-screw-threaded socket of the bottom portion 110 of the disk 15′, and bearings, as ball-bearings 112, are provided on the sleeve 111 for the shaft 27. The height of these bearings may then be adjusted by turning the sleeve 111. In order to secure the sleeve 111 in any desired position and prevent it from turning in the screw-threaded socket of the portion 110, any suitable means may be provided; but in this instance the sleeve 111 is provided at its lower portion with teeth 115, and a spring-detent 113, carried in a bearing fixed to the portion 110, is arranged to coöperate with said teeth, so that when the detent engages one of the teeth the sleeve may not be turned. The shaft P is rotatably supported at its lower end in a suitable bearing-sleeve 116, secured to the frame of the machine, and at the lower end of the shaft P is a bevel-gear 23, which gears with a pinion 24 on the continuously-rotating driving-shaft H. The friction means interposed between the shafts P 27 insure that they turn together until the rotation of the shaft 27 is arrested. As shown, these consist of a flanged disk 197, carried by the shaft P, and a disk 198, carried by the shaft 27 and supporting friction-pads 180, pushed outward by springs 181. As shown, the driving-shaft H is supported in suitable bearings R on the frame, Figs. 3 and 5, and the pinion 24 is so arranged on the inner end of the shaft H as to leave the space immediately below the pinion 23 clear for the arrangement of devices hereinafter to be described. The shaft P is driven continuously, while the shaft 27 and the head are arrested when any particular tool is to be stopped in operative position. The head having stopped, the pusher above the tool to be operated is depressed by the action of an eccentric 5 upon the shaft H, Figs. 5 and 6, a rod 130 being connected to the eccentric-strap 5′ at one end, while it is connected to a suitable bell-crank lever 7, pivoted on the arched portion of the frame, at the other end, Fig. 2, this bell-crank lever being in turn connected, by means of a suitable rod 1, with the lever E, so that motion of the rod 130 upward and downward will impart movement to the lever E to actuate the pusher D.

The eccentric 5 is mounted upon and forms part of the sleeve 30, loose upon the bearing R, the said sleeve having at the end thereof a clutch-disk 31, Figs. 5 and 8, the periphery of which consists of a series of inclines 32. Each of these inclines acts upon a cylinder 33 within a ring 34, fixed in the recess of the drive-wheel K. When the wheel K is turned in the direction of its arrow, Fig. 8, and the clutch-disk is stationary, the cylinders 33 are forced out against the face of the ring 34, and the sleeve 30 and eccentric 5 are then turned therewith. As the eccentric rotates by means of the connections described the lever E is reciprocated, and the wheel 15 rolls upon the face of the projection 16. The face of the projection is curved, the portion 16^2 of the face being curved concentrically with the arc through which the roller 15 moves, the radius of curvature being taken from the pivot-point *p* of the lever E, so that when the roller is passing over this portion 16^2 of the projection 16 no motion is imparted to the pusher D. The portion 16^3 of the projection 16 is more abruptly curved than the other portion, so that when the roller reaches the portion 16^3 the pusher is depressed to actuate a tool.

Each revolution of the eccentric 5 would effect one operation of the pusher, and in order to arrest the eccentric after one complete revolution I provide means whereby after each operative movement of the eccentric 5 the latter and the parts connected therewith are arrested by throwing the rollers 33 out of biting action on the driving-wheel K. This is effected through the medium of a slotted cage *e*, carrying the rollers 33 and to which is connected an arm 36. A stop-bar L′ is suitably moved inward to allow the arm 36 to rotate and is carried back in position to make contact with the arm 36 after any tool is operated. When the arm 36 is in contact with the bar L′, the cage *e* keeps such position in relation to the clutch-disk 31 that the rollers 33 are held out of biting position on the ring 34. When, however, the bar L′ is carried away from the front of the arm 36, then a spring 41, Fig. 2, turns the cage *e* and its arm 36 in the direction of the arrow, Fig. 8, and carries the rollers up the inclines 32 until they bite with the driving-wheel, and the latter then carries the clutch-disk and the eccentric 5 around with it.

The stop-bar L′ is drawn away from the arm 36 as the arm G′ strikes a stop-pin by means of devices of any suitable character; but immediately after the arm 36 passes the bar L′ the latter is restored to its former position, so that when the arm 36 again approaches the bar L′ it will make contact with the same, thereby holding the cage *e*, so that the rollers are released from biting position. The bar L′ is carried back by the action of a spring 42 when a dog 45, pivoted to a bracket 45^a, is depressed from contact with the end of the bar L′.

The dog 45 is limited in motion by a stop-screw 45^b and is depressed by the action of a lever 47, carried by the arm G′ and which has a beveled end, Fig. 3, which on meeting a pin 16′ causes the lever to swing on and push in a rod 48, that bears on a bell-crank lever 49, pivoted in a slot of the shaft 27, and the latter below the lever is hollow to receive a rod 50, the lower end of which bears upon the dog 45, a spring 51 supporting the weight of the rod 50 and tending to throw it up and restore the bell-crank 47 to normal position. The bar L′ is restored to place by an inclined projection 53 upon the outer side of the eccentric 5, which before the latter completes its revolution makes contact with the side of a roller 54 upon the top of the bar L′ and forces the latter outward until its end escapes the end of the dog 45, when the latter is lifted by a spring 55 into a locking position.

As the rod 50 is lowered as the result of the depressing of a key and lifting a pin 16′ and as it is held down as long as the key is depressed, it is important that provision be made for the dog 45 to rise after being pushed down by the rod and even if the latter is held down. This is effected by providing the rod 50 with a contacting finger, which can be moved out of the way of the dog after depressing the latter. One arrangement is shown and consists in pivoting a finger or pawl *s* to the lower end of the rod and providing the bar L′ with a lug *t*, which after the rod 50 and finger descend and depress the dog 45 will as the bar L′ moves back push the finger out of the way and allow the dog to rise until it strikes the bar L′.

When the tools *a* are punching or cutting tools, it is desirable that they should pass sheer through the sheet X and form a stencil cut, and in order to facilitate this I provide a traveling bed-strip Y, preferably in the form of one or more strips of thick paper which pass beneath the stencil-sheet X, moving therewith as it is fed step by step and receiving the portions which are punched from the sheet X by the action of the tools. It will therefore be seen that these strips are not platens, but bed-strips which receive and carry the parts punched out of the stencil-sheets. As shown, there are two superposed strips on the bed.

The strip Y is fed forward by means of feed-rolls 70 71, Figs. 1, 2, and 3, and, as hereinbefore stated, while one of my improvements consists in the means of actuating the pusher D, described as an eccentric, and connections therewith, another of my improvements consists in the means provided for operating the feed-rolls 70 71. The feed-rolls may be operated from any suitable portion of the machine, and, as shown, an eccentric 6 is provided, connected to the eccentric 5, which operates the pusher, these eccentrics 5 6 being preferably integral with each other. The eccentric-rod 2, connecting with the strap, is also connected with a lever 11, pivoted at 3 and actuating a pawl 12′, which operates a ratchet-wheel 12, Fig. 6, upon a shaft 4, to which is connected one of the feed-rolls, as 71, the other shaft 4′ being driven therefrom by suitable gearing.

Each throw of the eccentric in the direction of the arrow, Fig. 6, will cause rotation of the ratchet 12 to rotate the feed-rolls. As hereinbefore described in connection with the operation of eccentric 5, it will be seen that the vibrations of the lever 11 take place at the same time that the eccentric 5 is actuated; but the maximum throw of the eccentric 6 is arranged at a later interval than the maximum throw of the eccentric 5 to cause the feeding to take place just after the operation of a tool.

The carrier C, Fig. 7, may be constructed in any suitable manner, and an effective construction is shown in which there are two pivoted clamping-blades 90 91, the spring 92 bringing them together to clamp the stencil-sheet. The blade 90 is pivoted at *u* to two arms 93, pivoted in turn to inclined arms 94, extending from the sliding bar *d*′ of the carrier. The blade 90 has a rib at the under side with notches engaging a finger 96 on the bar *d*′, and a spring 97 tends to hold down the blade 91. This permits the clamp to be set in or out to cut on different lines or to be turned back to receive or permit the ready withdrawal of the sheet.

The clamp is fed step by step after successive impressions by feed devices, and another of my improvements consists in the means for feeding the carriage and clamp step by step. As shown, the bar *d*′ is provided with a rack 7′ on its under side, with which the pinion 25 engages for moving the same, and this pinion is rotated intermittently through the medium of the ratchet-wheel 14, Figs. 1 and 6. A connecting-rod *c* extends from the lever 11 to an arm *f*, which operates a pawl *g* to actuate the ratchet 14. When the bar *f* has reached the end of its movement, it strikes against a stop *f*′. A further operation of the machine is permitted on account of a spring telescoping joint in the connecting-rod *c*, this spring being sufficient to operate the feed, but so made as to yield when the feed comes to a stop or should anything occur to block the feed.

Hand-spacing is accomplished by means of a lever 18, Figs. 1 and 3, which connects at

its back end with a rod 19′, Figs. 1 and 6, which actuates a rocking arm 20′, carrying a pawl 21, engaging the ratchet 14. Thus it will be seen that when the machine is feeding automatically by means of the pawl *g* the hand-spacing pawl 21 acts as a lock, and when hand-spacing is done the machine-pawl *g* acts as a lock. The bar *d′* is constantly advanced against a resistance which may be any suitable retracting means; but, as shown, the bar is connected, by means of a cord 23′, to a weight 22, Fig. 1, working inside a stationary tube 22^a, which constantly tends to retract the bar while the bar is advanced against the pull of the weight. The weight is allowed to retract the bar *d′* by withdrawing the spring-actuated pin 24′, Figs. 1, 3, and 4, which pin is connected to the operating-shaft of the ratchet 14 and is adapted to be connected to the pinion 25, which operates the rack. The weight 22, in connection with the feeding devices described and pawls 21 and *g*, insures at all times an accurate forward feed motion of the stencil-blank, the bar *d′*, carrying the carriage and clamp, being at all times locked in the proper position for punching a letter or figure.

The operation of the machine is briefly as follows: Continuous motion being imparted to the driving-shaft H, the operator depresses a key F′, which causes one of the pins 16′, Fig. 5, to rise, the arm G′ traveling around with the shaft 12, which carries the punch-head A, being driven by the friction devices M from the continuously-rotating shaft P. When the arm G′ comes in contact with any one of the forty pins 16′, the lever 47 is thrown inward by contact with the stop-pin 16′ and through the medium of the rod 48 acts upon the bell-crank lever 49, Fig. 5, causing it to push downward the rod 50 and by means of the finger *s* at the lower end of the rod depressing the dog 45, which allows the spring 42 to withdraw the stop-bar L′ from engagement with the arm 36. This allows the arm 36 to be thrown forward, carrying with it the cage *e*, containing the cylinders 33, which form the clutch, so that the eccentrics 5 and 6 are rotated, the tool in operative position actuated, and the feeding devices also actuated.

I do not here claim any of the features shown herein and constituting the subject-matter of the claims of my application Serial No. 93,253.

Without limiting myself to the precise details of construction shown and described, I claim as my invention—

1. The combination of a head carrying a series of tools, a continuously-rotating driving-shaft, and connections for rotating the head, stop devices for arresting the rotation of the head with any desired tool in operative position, keys and connections for operating the stop devices, a pusher for actuating a tool when brought into operative position, an eccentric and devices for actuating the pusher therefrom, and means for connecting and disconnecting the eccentric and driving-shaft, substantially as described.

2. The combination of a head carrying a series of independently-movable tools, a continuously-rotating shaft, means for connecting it with the head, keys and stop devices operated therefrom for arresting the rotation of the head, an eccentric and devices connected therewith for actuating a tool when brought into operative position, and means for connecting and disconnecting the eccentric and driving-shaft, substantially as described.

3. The combination with the rotary head, tools, pusher, stop devices, and continuously-rotating driving-shaft, of an eccentric and connections for operating the pusher, clutch devices for connecting and disconnecting the eccentric and driving-shaft, a stop-bar for holding the clutch devices out of operation, and a rod 50 and lever 47 and connections for shifting the stop-bar, substantially as described.

4. The combination of the rotary head, independently-movable tools, means for normally continuously rotating the head, stop devices for arresting the rotation of the head, an eccentric and devices connected therewith for actuating the tools, and connections between said stop devices and the eccentric to put the eccentric in motion to actuate the tool which is in operative position when the rotation of the head is arrested, substantially as described.

5. The combination of the rotary head, movable tools, contact-arm carried with the head, a series of stops arranged in a circle and keys for shifting the same, an eccentric connected to actuate the tool which is in operative position, and devices carried with the head for operating said eccentric connected to be actuated by contact with said stops, substantially as described.

6. The combination of the rotary head and tools, pusher, stop-arm carried with the head, series of stops and actuating-keys, devices carried by the arm, an eccentric connected to the pusher, and connections whereby the eccentric is operated from said devices, substantially as described.

7. The combination of a reciprocating punch, a table, a bed-strip of yielding material, feed-rollers therefor, ratchet-and-pawl devices for actuating the feed-rollers, operative connections between said devices and an eccentric, and means for operating the eccentric, substantially as described.

8. The combination of a reciprocating punch, a table, a bed-strip of yielding material, feed-rollers therefor, ratchet-and-pawl devices for actuating the feed-rollers, operative connections between said devices and an eccentric, and means for intermittently driving the eccentric, substantially as described.

9. The combination of a reciprocating punch, a table, a bed-strip of yielding mate-

rial, and means for intermittently moving said strip consisting of feed-rollers for the strip, ratchet-and-pawl devices for actuating said rollers, levers connected to said devices and to an eccentric-shaft, and means for operating the eccentric, substantially as described.

10. The combination of the head, punching-tools, a continuously-rotating driving-shaft, means for arresting the head and actuating the tools, a bed-strip of yielding material and feed-rollers therefor, ratchet-and-pawl devices for actuating said rollers, operative connections between said devices and an eccentric and means for connecting and disconnecting the eccentric and driving-shaft, substantially as described.

11. The combination with the rotary head, punching-tools, a continuously-rotating driving-shaft, means for arresting the head and actuating the tools, of a bed-strip of yielding material and feed-rollers therefor, ratchet-and-pawl devices for operating said feed-rollers, operative connections between said devices and an eccentric, clutch devices for connecting and disconnecting the eccentric and driving-shaft, and means for holding said clutch devices out of operation, substantially as described.

12. The combination with the rotary head, punching-tools, a continuously-rotating driving-shaft, means for carrying the head normally with the shaft, means for arresting the head and for actuating the tool, a carriage having a spring-clamp for retaining the sheet to be operated upon, guides permitting the carriage to slide opposite the head, a rack and pinion operatively connected to move the carriage, ratchet-and-pawl devices for actuating the rack and pinion, an eccentric operatively connected to said ratchet-and-pawl devices, and means for connecting and disconnecting the eccentric and driving-shaft, substantially as described.

13. The combination with the head and tools, of a carriage movable opposite the head, retracting means connected to the carriage, a rack and pinion for moving the carriage against said retracting means, ratchet-and-pawl devices for actuating said rack and pinion, and means operatively connected to said devices, for intermittently driving the same, substantially as described.

14. The combination with the head and tools, of a carriage movable opposite the head, a cord and weight connected to said carriage, a rack and pinion for moving the carriage against the pull of the weight, ratchet-and-pawl devices for actuating said rack and pinion, an eccentric operatively connected to said devices, and means for intermittently driving the eccentric, substantially as described.

15. The combination with the head and tools, of a carriage movable opposite the head against a resistance, a rack and pinion for moving the carriage against the resistance, ratchet-and-pawl devices for actuating the rack and pinion, and means for operating said devices, and other hand-operated ratchet-and-pawl devices also for actuating the rack and pinion, substantially as described.

16. The combination with the head and tools, of a movable carriage opposite thereto, means connected to the carriage for moving it, ratchet-and-pawl devices for actuating said means, an eccentric operatively connected to said devices, and other hand-operated ratchet-and-pawl devices also for actuating the means for moving the carriage, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

STERLING ELLIOTT.

Witnesses:
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A. J. FITZPATRICK.