No. 712,124. Patented Oct. 28, 1902.

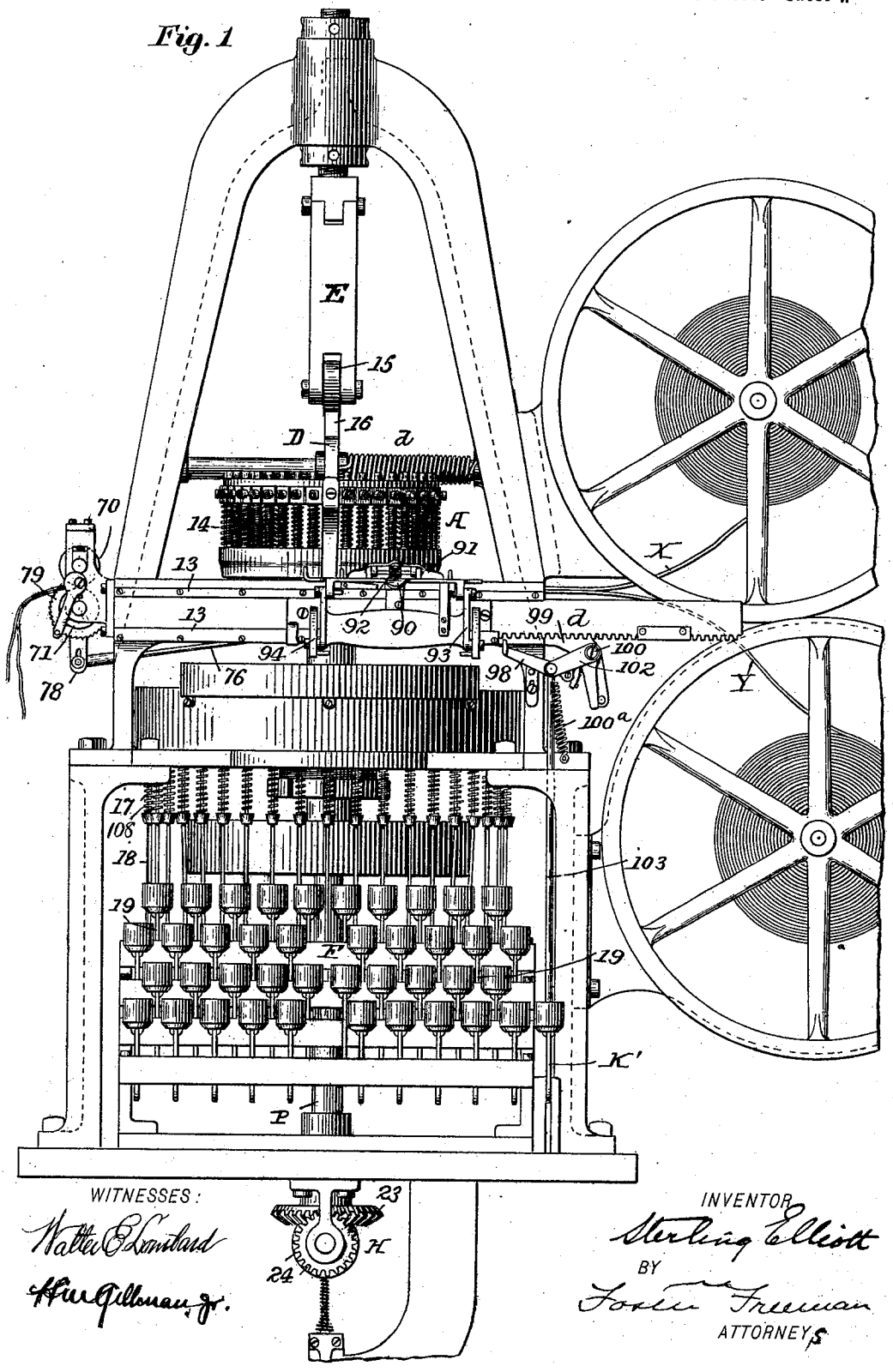
S. ELLIOTT.

APPARATUS FOR CUTTING STENCILS.

(Application filed Jan. 8, 1900. Renewed Feb. 8, 1902.)

(No Model.) 6 Sheets—Sheet 1.

Fig. 1



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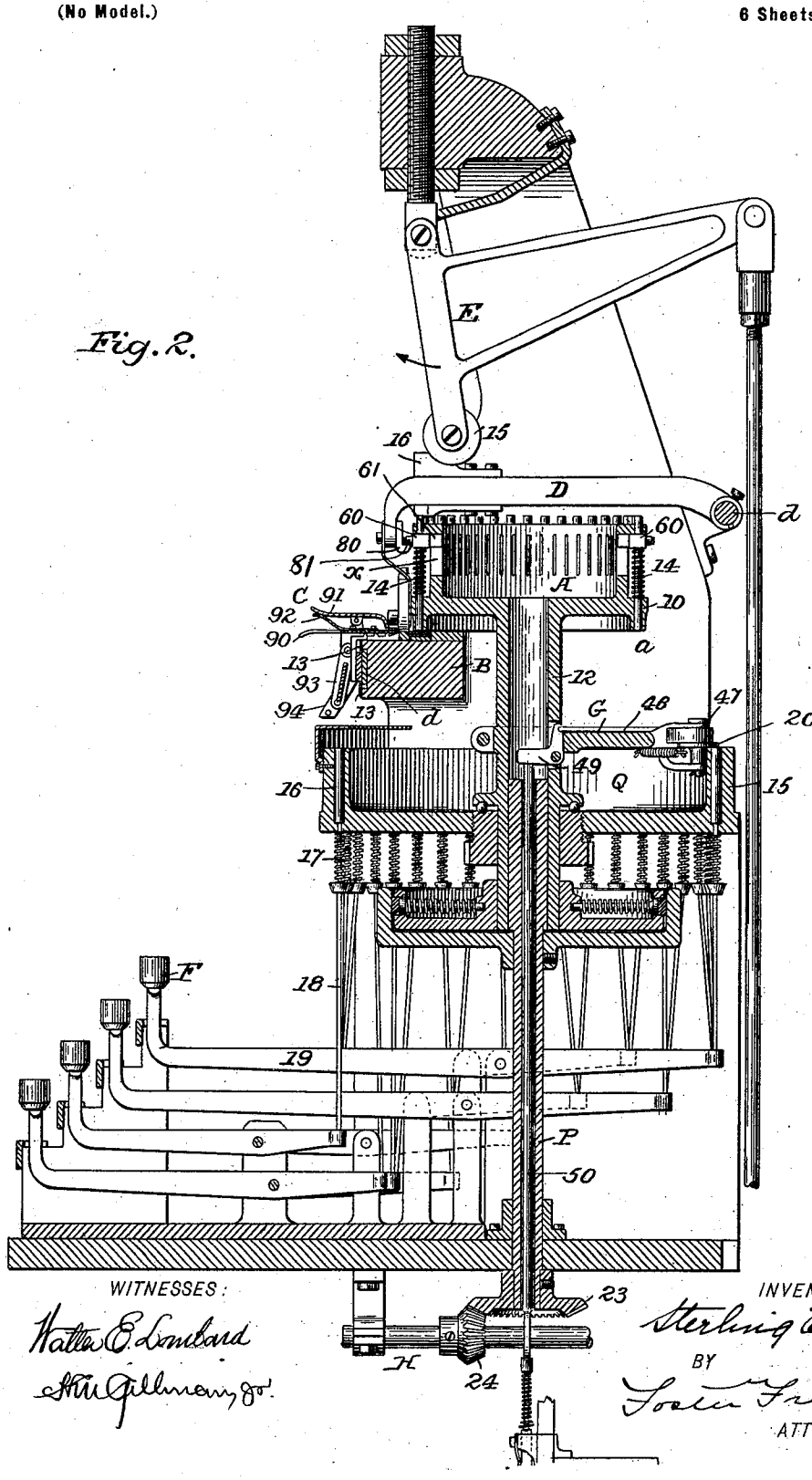
(No Model.) 6 Sheets—Sheet 2.

Fig. 2.



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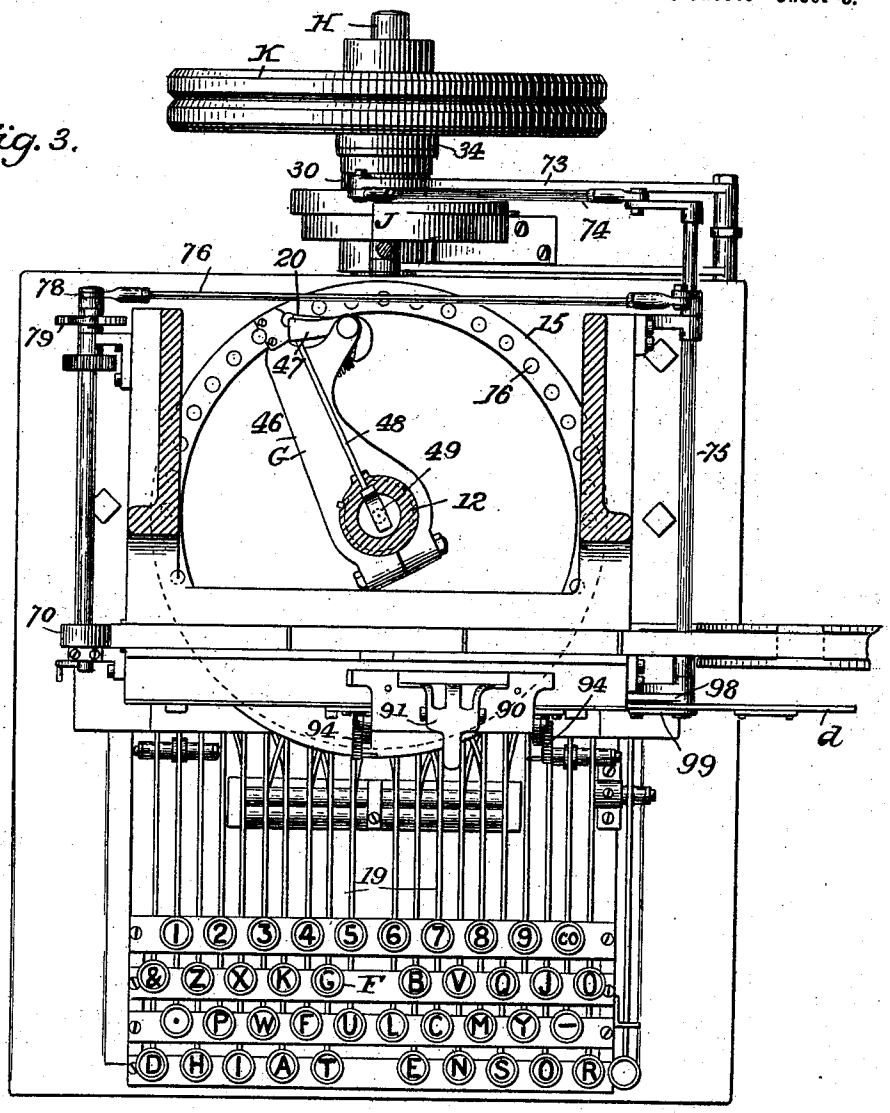
(No Model.) 6 Sheets—Sheet 3.

Fig. 3.



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(No Model.) 6 Sheets—Sheet 4.

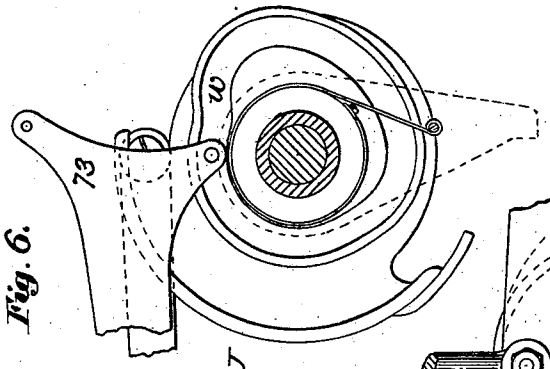

Fig. 6.

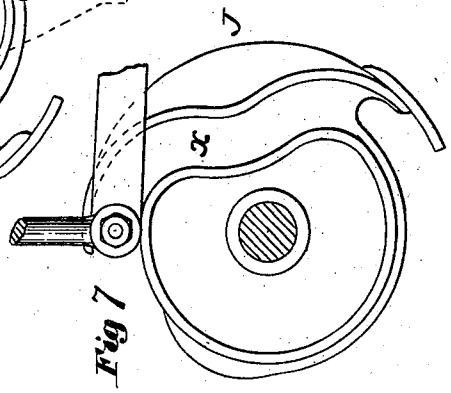

Fig 7

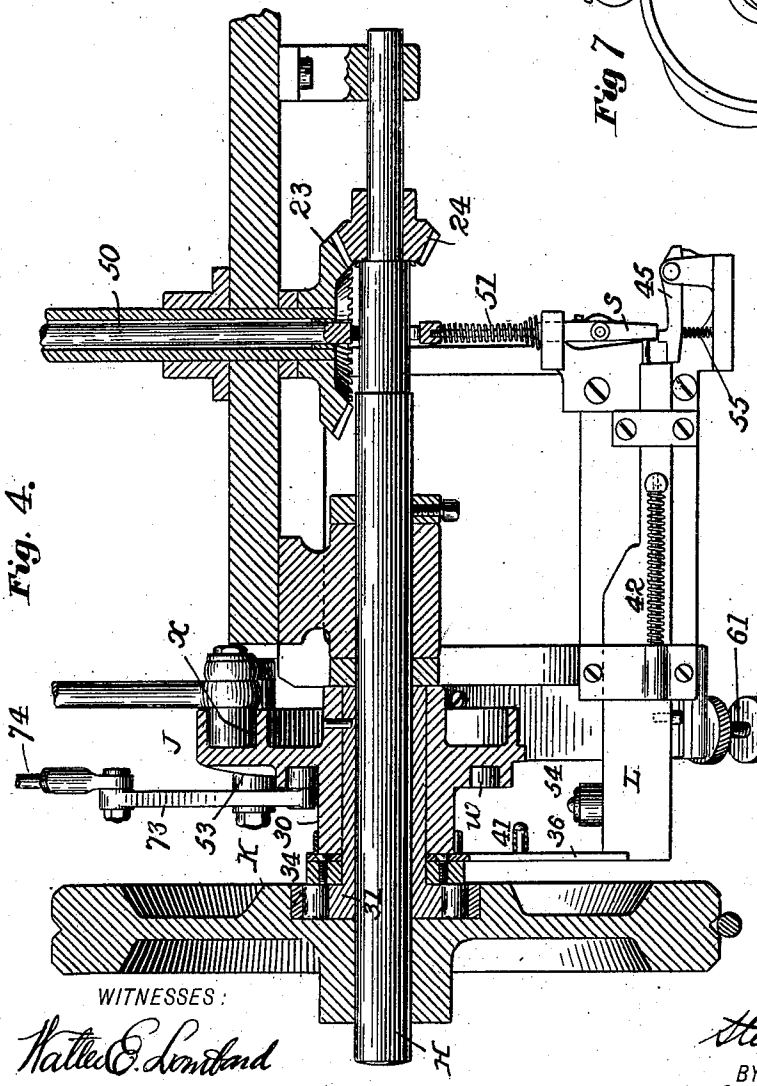

Fig. 4.

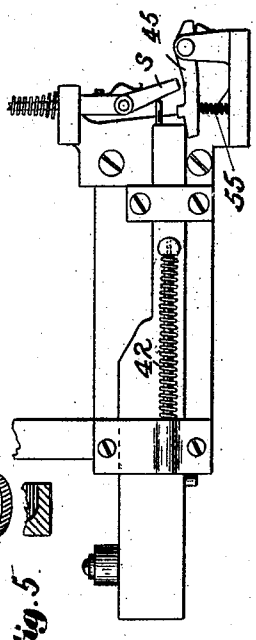

Fig. 5

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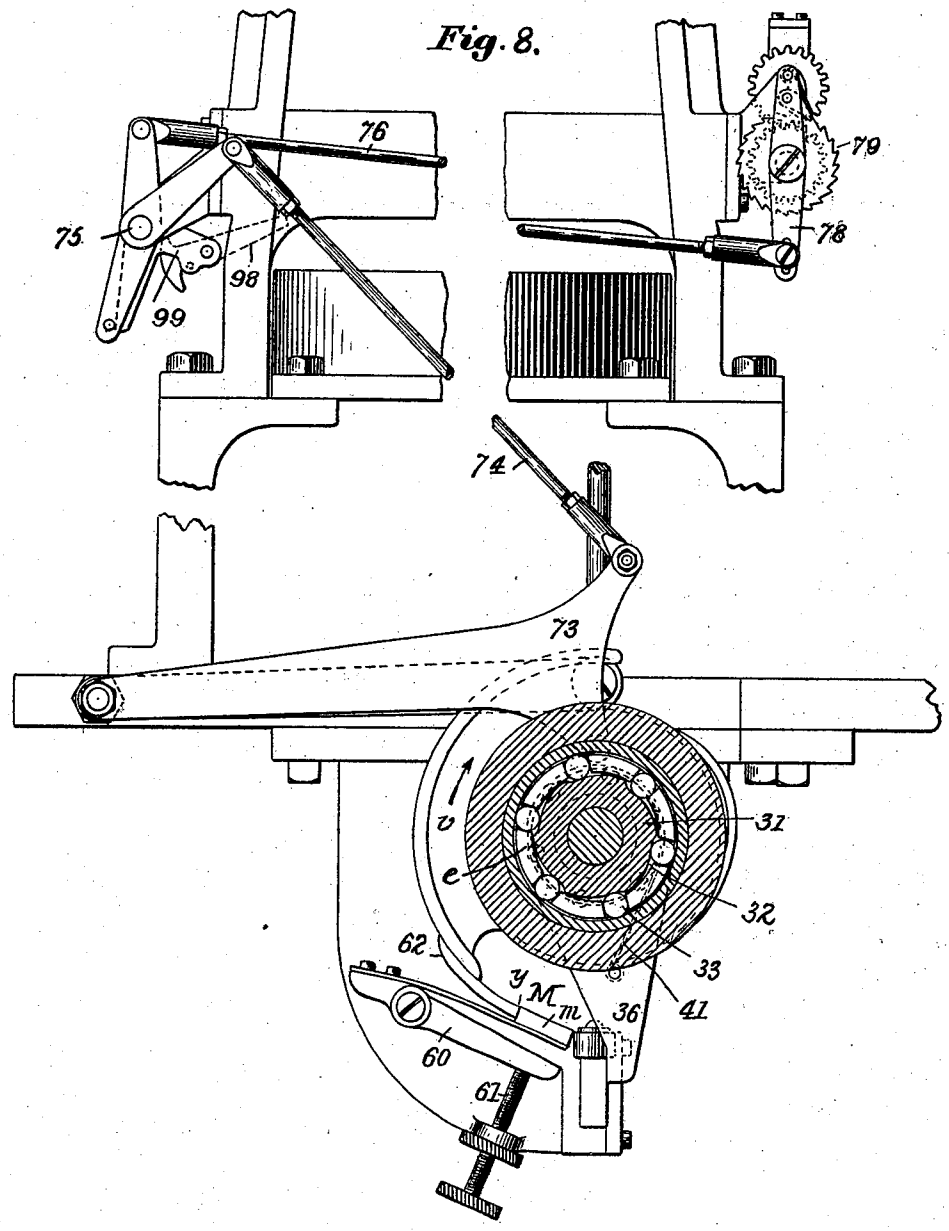
(No Model.) 6 Sheets—Sheet 5.

Fig. 8.



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(Application filed Jan. 8, 1900. Renewed Feb. 8, 1902.)

(No Model.) 6 Sheets—Sheet 6.

Fig. 9.

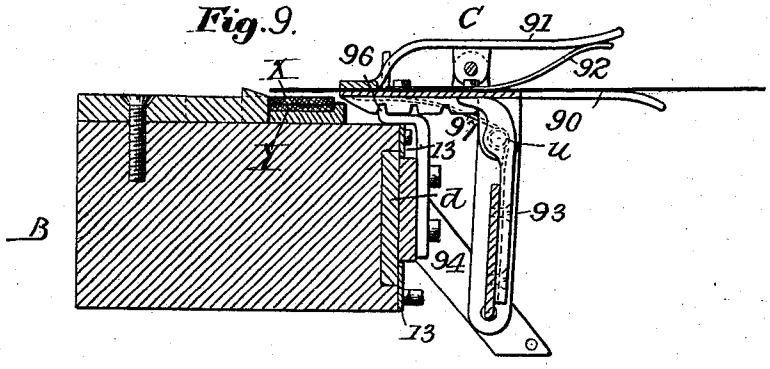


Fig. 10.

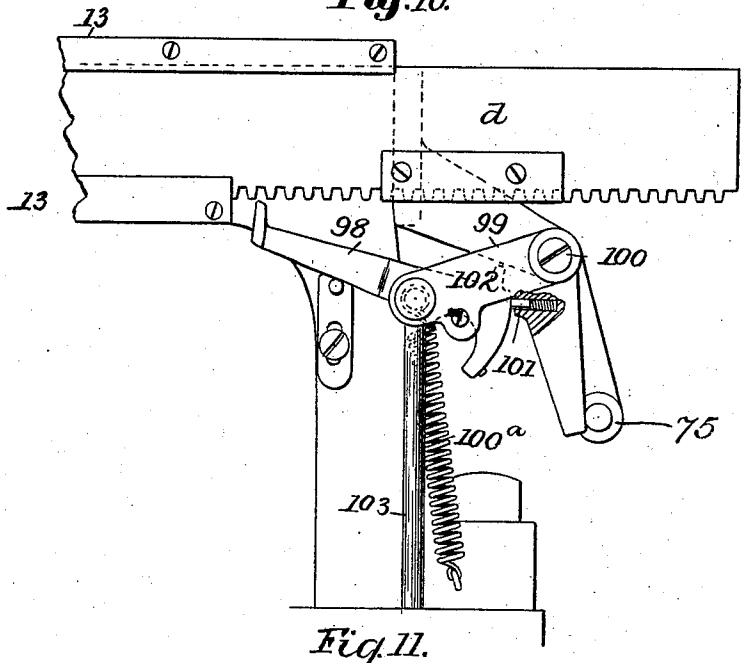
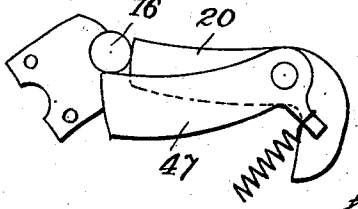


Fig. 11.



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UNITED STATES PATENT OFFICE.

STERLING ELLIOTT, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE ELLIOTT COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

APPARATUS FOR CUTTING STENCILS.

SPECIFICATION forming part of Letters Patent No. 712,124, dated October 28, 1902.

Application filed January 8, 1900. Renewed February 8, 1902. Serial No. 93,253. (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 Apparatus for Cutting Stencils, 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 the head or carrier actuated to bring the tools into operation as desired; and my invention consists in certain arrangements of parts and features of construction whereby to secure the desired accuracy and speed of movements with simplicity of construction and facility of operations, all as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of my improved apparatus. Fig. 2 is a transverse sectional elevation. Fig. 3 is a sectional plan. Fig. 4 is a longitudinal section of the parts immediately connected with the main driving-shaft. Fig. 5 is a detached view of the stop-bar and adjuncts. Figs. 6 and 7 are face views of the cam. Fig. 8 is a rear elevation, in part section, through the driving-shaft. Fig. 9 is a transverse section through the table, showing the construction and arrangement of the sheet-carrier. Fig. 10 is a face view illustrating the feeding devices for the carrier. Fig. 11 is a plan view of part of the stop-arm adjuncts.

The head A is reciprocated or rotated, a rotary head being shown and, as shown, is a hollow cylinder carrying the punching, embossing, or printing tools *a*, each consisting of a bar 10, the lower end of which is properly shaped, according to the character of the letter of 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 has an adjustable collar 60, with a lug 61 extending into a vertical slot *x* in the cylinder and preventing the tool from turning. Against the collar 60 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 device, 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, which when the lever is swung in the direction of its arrow, Fig. 2, works upon an inclined projection 16 on the pusher to force down the pusher against the upper end of that bar which is below, thereby depressing the latter. The upward movement of the pusher is effected by a coiled spring *d*. The head 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 correspond 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 the 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 carried by a shaft 12, and beneath the head A and below the table B a stop-arm G extends from the shaft 12 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. Each stop-pin rests on a rod, bearing with its lower end on one of a series of key-levers 19, connected with the keys, so that on depressing a key the rod and the 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, the end of which springs out as a stop-pin is struck by the arm and prevents rebound. The head is driven by a shaft P, which is connected frictionally with the shaft 12. At the lower end of the shaft P is a bevel-gear 23, which gears with a pinion 24 on the driving-shaft H. The shaft P is driven continuously, while the shaft 12 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 a cam J, having a face-groove receiving a roller-pin *x*, Fig. 4, at the lower end of a rod 130, connected to the end of the lever E upon the shaft H, Figs. 3 and 4, and mounted upon and forming a part of the sleeve 30, loose upon the shaft and having at the end a clutch-disk 31, Figs. 4 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 a 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, and the sleeve 30 and cam J are then turned therewith. Each revolution of the cam J would effect one operation of the pusher, and in order to arrest the cam after one complete rotation I provide means whereby after each operative movement of the cam J the latter and the parts connected therewith are arrested by throwing the rollers 33 out of biting action upon 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 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 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 in front of the arm 36, then a spring 41 turns the cage and its arm 36 in the direction of the arrow *v*, 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 cam J 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 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 is depressed from contact with the end of the bar L. The dog 45 is depressed by the action of a lever 47, carried by the arm G. This lever 47 is connected by a rod 48 with a bell-crank lever 49, pivoted into a slot of the shaft 12, 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 cam J, which before the latter completes its revolution makes contact with 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 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 pushes the finger out of the way as the bar moves back.

It is desirable to arrest the movement of the cam J and the parts connected therewith as soon as practicable after the pusher is operated. I therefore provide a brake M, Fig. 8, with a pad *m*, operating on the periphery of the cam J and carried by a spring on a lever 60 and adjusted by a set-screw 61. The cam has an inclined blade 62, which pushes back the pad against the pressure of the spring, gradually reducing the motion of the cam, and there is a shoulder or end *y*, back of which the pad springs into position, locking the cam in place.

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-strip. The strip Y is fed forward by means of feed-rolls 70 71, Figs. 1 and 3, operated from any suitable portion of the machine. For instance, there is a cam-groove *w*, Figs. 6 and 8, in the outer face of the cam J, which groove operates a lever 73 and connects with an arm on a rock-shaft 75,

a rod connected to which extends to a lever 78, carrying a pawl which engages a ratchet on one of the shafts of the feed-rolls, which are geared together and so that the vibration of the lever at the time the carriage is moved also turns the feed-roll shaft and feeds the bed-strip.

It is extremely desirable that the tools *a* shall operate with absolute certainty on their upward movement. As possibly the spring 14 might not act, I provide for positively lifting each tool which is down by means of a hook 80, extending from the pusher D in position to engage a lug 81 upon the bar 10, so that if the bar tends to remain down it will be positively lifted.

The carrier C may be constructed in any suitable manner, and an effective construction is shown in which there are two pivoted clamping-blades 90 91, a spring 92 bringing them together to clamp the sheet X. The blade 90 is pivoted at *u* to two arms 93, pivoted to inclined arms 94, extending from the sliding bar *d* of the carrier and provided with stop-pins 95, limiting the outward swing 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. 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 X. The clamp may be fed step by step after successive impressions by any suitable feed devices. As shown, there is a pawl 98, carried by an arm 99 on the rock-shaft 75, which as the pawl 98 is carried upward engages one of the rack-teeth on the bar *d* and acts to move the carriage to the left as the bed-strip is fed by the feed-rolls 70 71. A spring 100^a draws down the pawl, and a friction-pad 101 is forced by a spring against the curved end of the pawl to prevent the latter from rebounding. To insure precision of movement of the carriage and prevent it from being thrown beyond one step at a time by momentum, the pawl 98 is provided with a locking-lug 102, which as the pawl is raised to a horizontal position engages one of the teeth of the rack of the bar *d*. As in spacing it is necessary to feed the carriage by hand, I connect the pawl by a rod 103 with the lever of a key K′, which may be depressed to operate the pawl.

While the stop-pins may be connected with the key-levers in any suitable manner, a simple and inexpensive construction is shown in which the lower end of each pin and the inner end of each key-lever has a conical socket. A rod fits at the end into the sockets, and a spring 108 depresses each pin and holds the rod in the sockets.

Any suitable frictional connection may be used to frictionally connect the shafts P 12. As shown, there is a cup 120 on the shaft P, receiving a disk 121 on the shaft 12, and said disk has an annular flange with openings for friction-pads 113, against which press spring-actuated rods 114, which thus force the pads against the inner face of the flange with the desired frictional effect.

Without limiting myself to the precise construction and arrangement of parts shown, I claim—

1. The combination of means for feeding a continuous bed-strip, a head carrying a series of parallel reciprocating tools, means 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, and means independent of the keys for applying a continued pressure during the movement of the tool through the strip to operate said tool with a punching effect when brought into operative position, substantially as set forth.

2. The combination of the slotted head, vertically-sliding tools each with an adjustable collar having a lug projecting into a slot of the head, substantially as described.

3. The combination of the rotary head, tools and tool-actuating devices, of a series of stops and keys for shifting the same, a stop-arm carried with the head, and devices also carried with said head, and arranged to make contact with the stops, and connections between said devices and the tool-actuating devices for operating the latter, substantially as described.

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

5. The combination with the head, its shaft, tools and continuously-rotating shaft for driving the head-shaft, and friction connections between the two shafts, of keys, and stopping devices operated therefrom for overcoming the friction and stopping the head-shaft and head, substantially as described.

6. The combination of the head, continuously-rotating shaft and friction-wheel carried thereby, of friction-pads carried in unison with the head, and springs forcing said pads into contact with the friction-wheel, substantially as described.

7. The combination of the rotary head, tools, pusher and stop devices, of a continuously-rotating driving-shaft, means for operating the pusher, clutch devices for engaging the driving-shaft with said means, a stop-bar for holding the clutch devices out of action and means connected with the stop devices for actuating the stop-bar, substantially as described.

8. The combination with the rotary head, tools, pusher, continuously-rotating driving-shaft and stop devices, of the cam J and connection for operating the pusher, clutch devices for connecting and disconnecting the cam J and driving-shaft, a stop-bar for hold-

ing the clutch devices out of operation, and rod 50, and lever 47 and connections for shifting the stop-bar, substantially as described.

9. The combination with the driving-shaft, cam J, clutch devices and stop-bar I and spring 42, dog 45, and rod 50, of the head, tools, and stop-arm, and lever carried by the stop-arm and connected with the rod 50, substantially as described.

10. The combination with the driving-shaft, cam J, clutch devices and stop-bar L, and spring 42, dog 45 and rod 50, of the head, tools, and stop-arm lever carried by the head and means for putting the rod when lowered out of engagement with the dog, substantially as described.

11. The combination with the driving-shaft, cam J, clutch devices and stop-bar I and spring 42, dog 45, and rod 50, of the head and tools and stop-arm, lever carried by the stop-arm and connected with the rod 50, and means for putting the rod when lowered out of contact with the dog, the said rod having a pivoted lower section, and a lug on the stop-bar, substantially as described.

12. The combination of the rotary head, tools, and pusher, of a shaft carrying the head, and a stop-arm and lever 47 carried thereby, a stationary disk, and series of movable stop-pins carried thereby, keys connected to actuate said pins, and means for operating the pusher from the lever 47, substantially as described.

13. The combination with a reciprocating punch of a base-plate and a movable punching-bed consisting of a continuous strip of yielding material to receive the blanks punched from the sheet, and means for moving said bed, substantially as described.

14. The combination with a reciprocating punch of a bed-strip of yielding material, a guide beneath the punch for said strip and means for feeding said strip, substantially as described.

15. The combination with a reciprocating punch of a bed-strip of yielding material composed of superposed layers, a guide beneath the punch for said strip and means for feeding said strip, substantially as described.

16. The combination of the head-punching tools and means for rotating and arresting the head and actuating the tools, a bed-strip of yielding material and means for feeding the same intermittently, substantially as described.

17. The combination of the head-punching tools and means for rotating and arresting the head and actuating the tools, a bed-strip of yielding material, guides therefor and means for feeding the same intermittently, substantially as described.

18. The combination of the head-punching tools and means for rotating and arresting the head and actuating the tools of a bed-strip of yielding material guides therefor, and means for feeding the same intermittently, and means for throwing the feed means into and out of operation, substantially as described.

19. The combination of the carriage, clamp-rack connected to the carriage and actuating-pawl provided with a retaining-lug for engaging the rack and friction-brake engaging the pawl, 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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HENRY C. NICKERSON.