March 31, 1925.

1,531,383

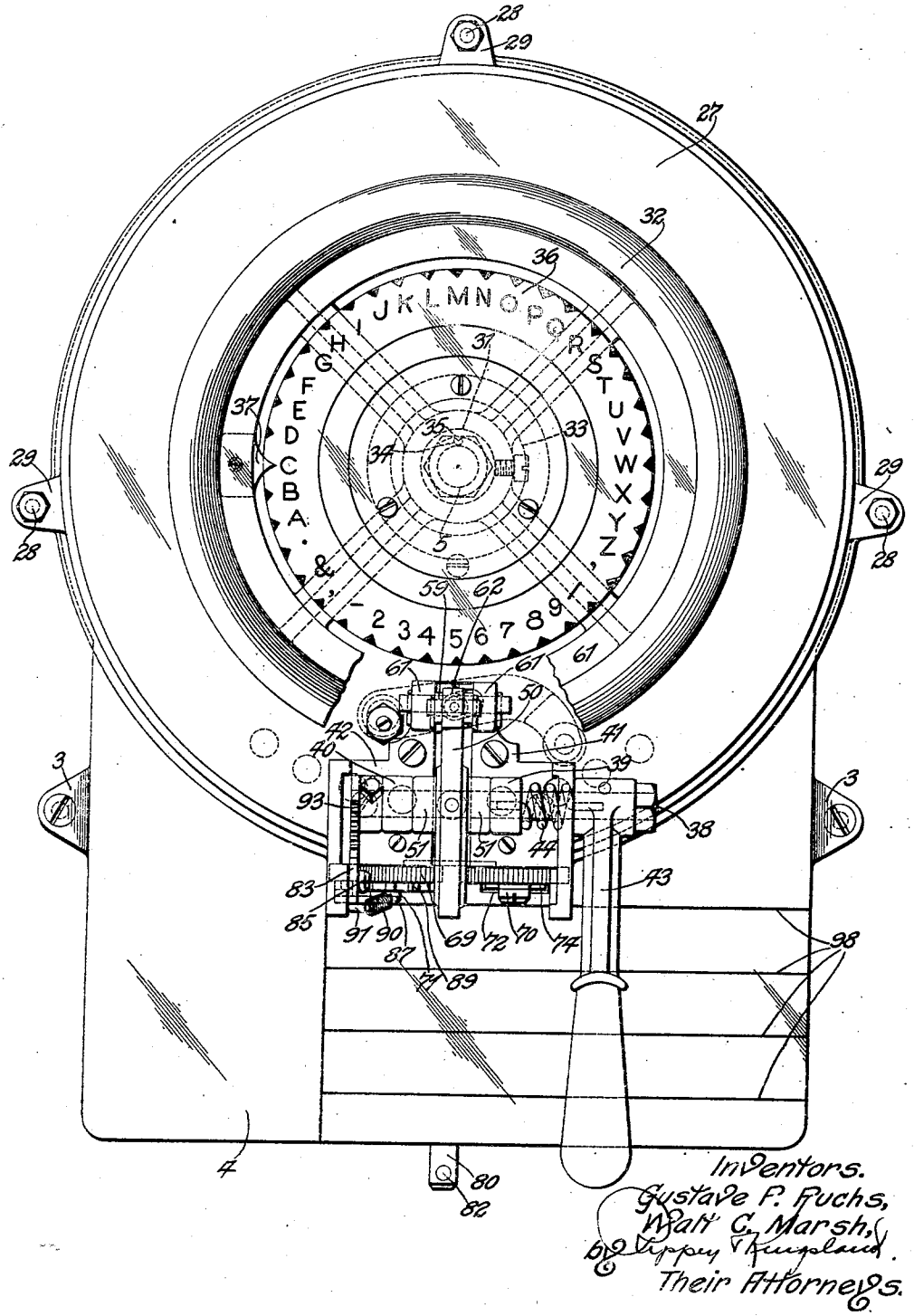
G. F. FUCHS ET AL

STENCIL CUTTING MACHINE

Filed July 30, 1923

5 Sheets-Sheet 1

Fig. 1.



Inventors.
Gustave F. Fuchs,
Walt C. Marsh,
by Lippey & Kingsland.
Their Attorneys.

March 31, 1925.

1,531,383

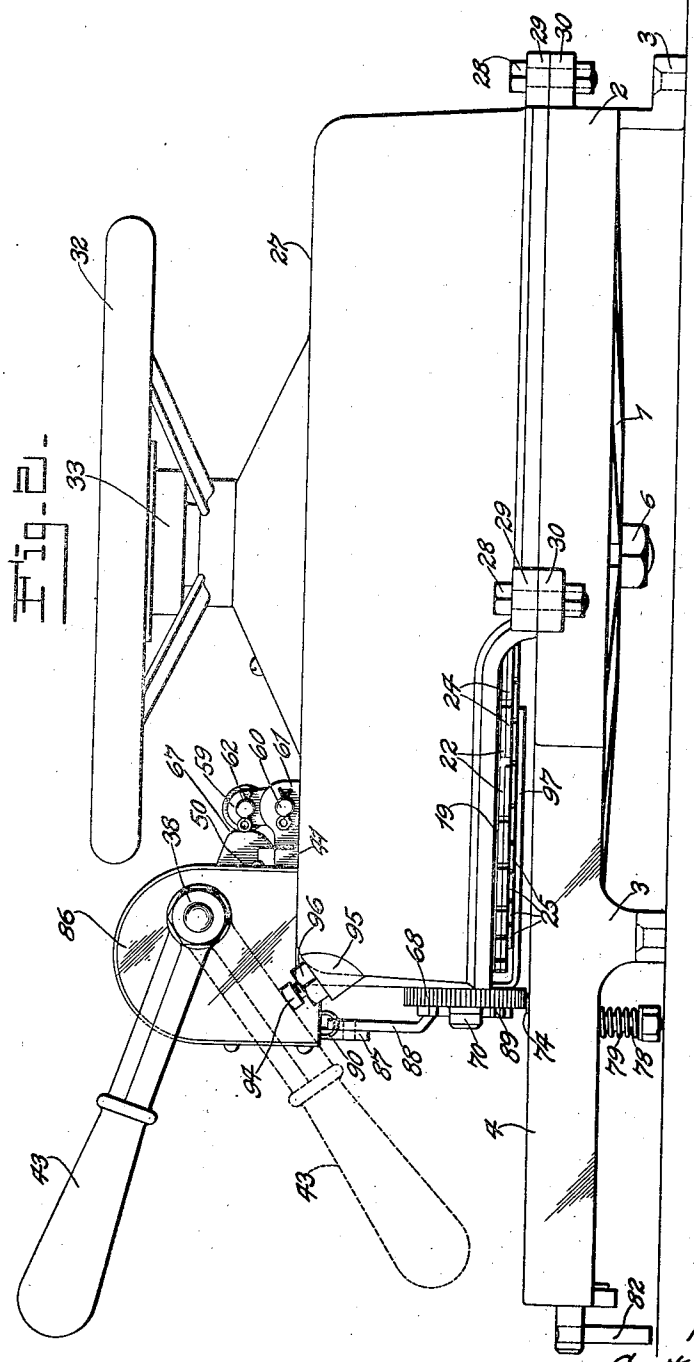
G. F. FUCHS ET AL

STENCIL CUTTING MACHINE

Filed July 30, 1923

5 Sheets-Sheet 2

Fig. 2.



Inventors.
Gustave F. Fuchs,
Walt C. Marsh,
By Dippey & Heusland.
Their Attorneys.

March 31, 1925.

1,531,383

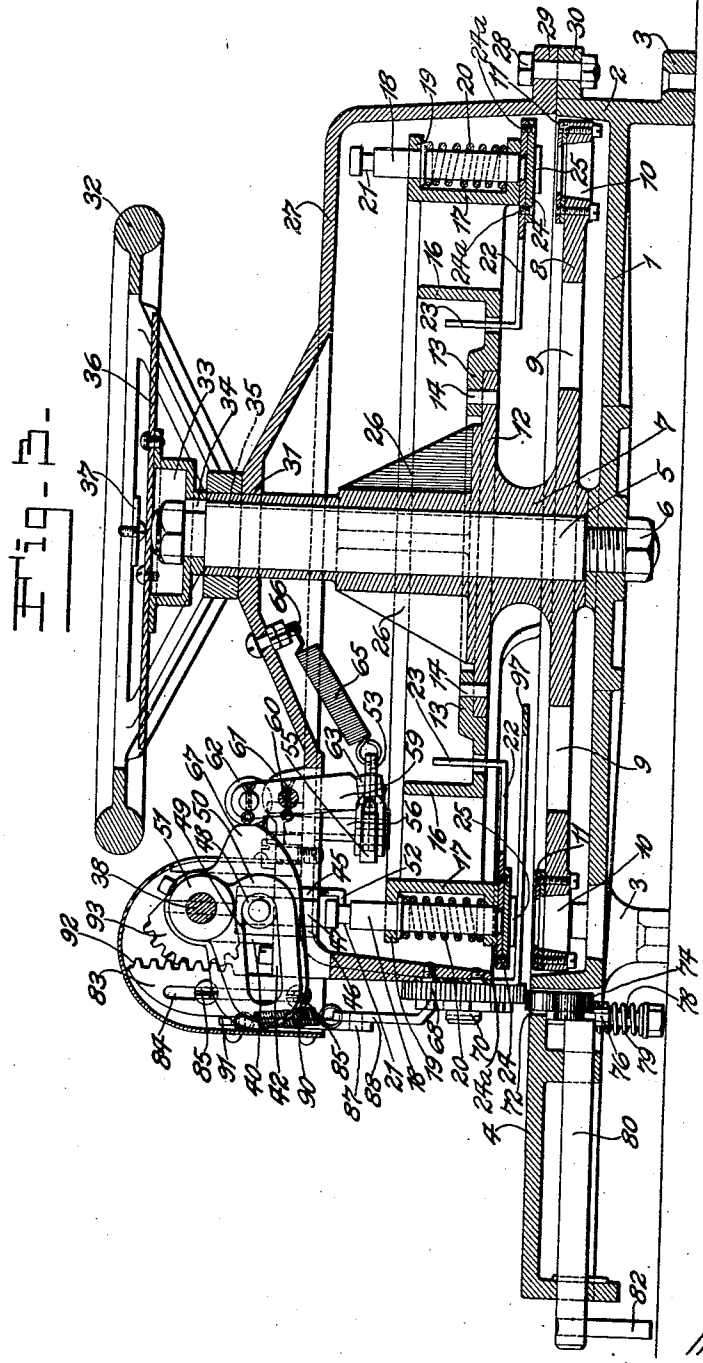
G. F. FUCHS ET AL.

STENCIL CUTTING MACHINE

Filed July 30, 1923

5 Sheets-Sheet 3

Fig. 5.



Inventors.
Gustave F. Fuchs,
Walt G. Marsh,
by Lyon & Lyon
Their Attorneys.

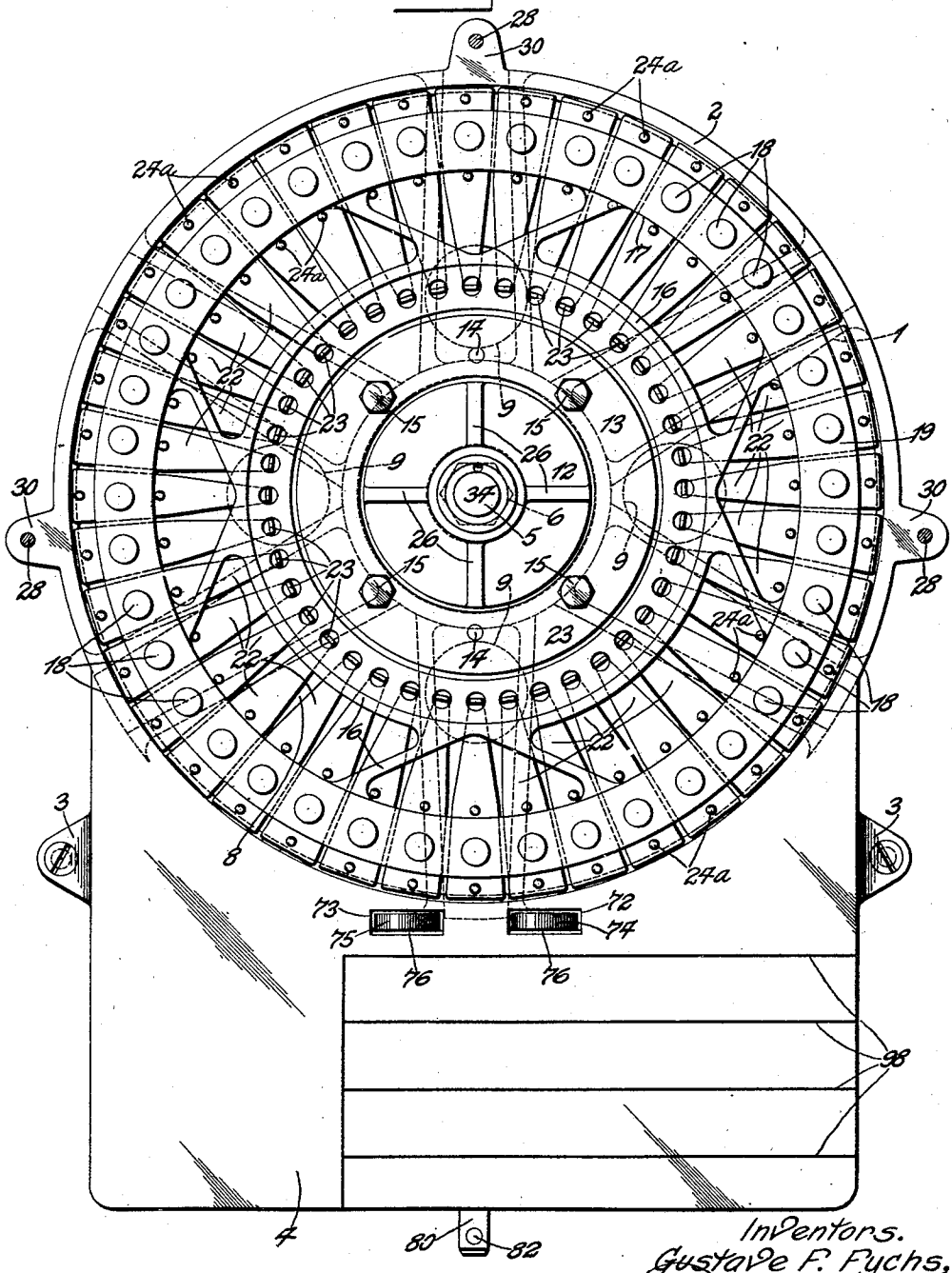
March 31, 1925. 1,531,383

G. F. FUCHS ET AL

STENCIL CUTTING MACHINE

Filed July 30, 1923 5 Sheets-Sheet 4

Fig. 4.



Inventors.
Gustave F. Fychs,
Walt C. Marsh,
by Lippey & Kingsland.
Their Attorneys.

March 31, 1925. 1,531,383

G. F. FUCHS ET AL

STENCIL CUTTING MACHINE

Filed July 30, 1923 5 Sheets-Sheet 5

Fig. 5.

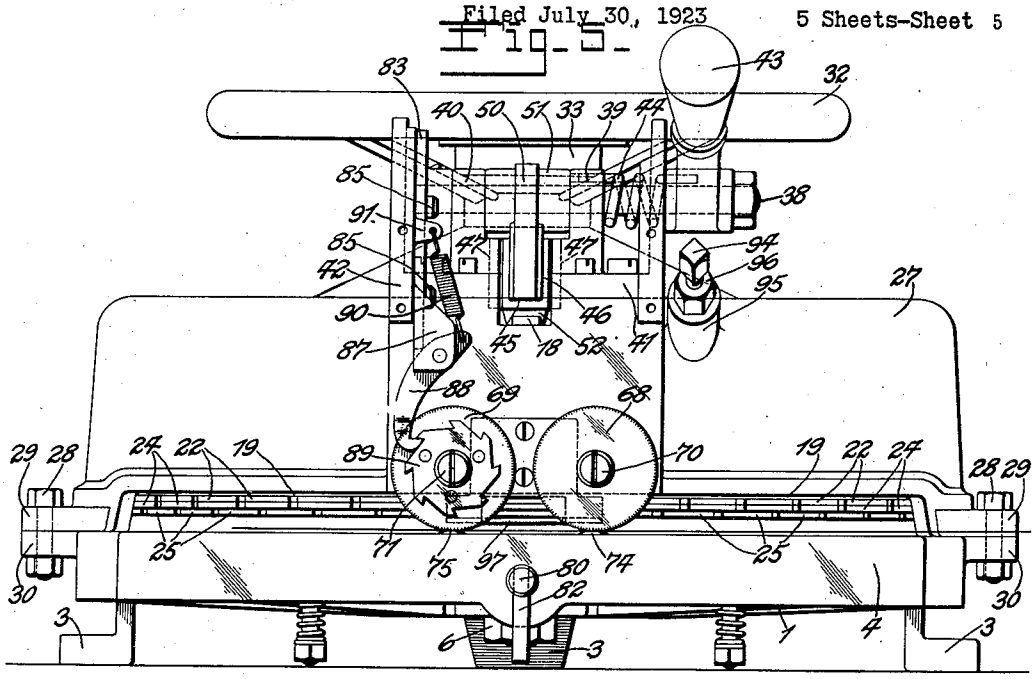


Fig. 6.

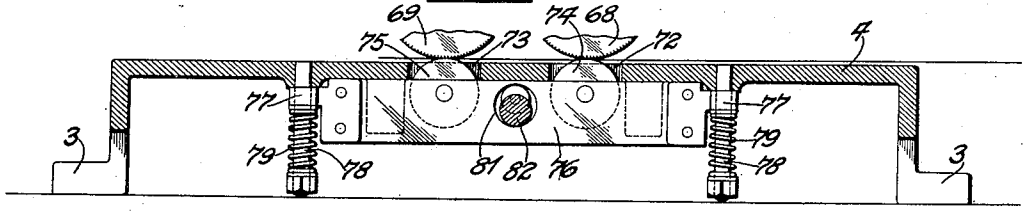
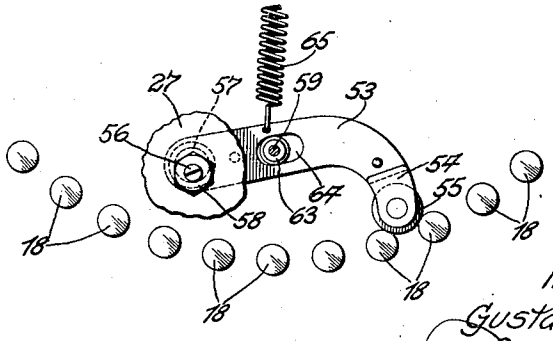


Fig. 7.



Inventors.
Gustave F. Fuchs,
Walt C. Marsh,
by Thompson & Thompson
their Attorneys.

Patented Mar. 31, 1925. 1,531,383

UNITED STATES PATENT OFFICE.

GUSTAVE F. FUCHS AND WALT C. MARSH, OF BELLEVILLE, ILLINOIS, ASSIGNORS TO MARSH STENCIL MACHINE COMPANY, OF BELLEVILLE, ILLINOIS, A CORPORATION OF ILLINOIS.

STENCIL-CUTTING MACHINE.

Application filed July 30, 1923. Serial No. 654,608.

To all whom it may concern:

Be it known that we, GUSTAVE F. FUCHS and WALT C. MARSH, citizens of the United States, residing at the city of Belleville, St. Clair County, State of Illinois, have invented new and useful Improvements in Stencil-Cutting Machines, of which the following is a specification.

This invention relates to improvements in stencil cutting machines, and consists in the novel construction hereinafter disclosed.

An object of the invention is to provide in a machine of the class described an improved form of operating mechanism for the punch elements arranged to cooperate with means for centering the punch elements during the punching operation.

Another object of the invention is to provide in a machine of the class described an improved form of feeding mechanism operated in cooperation with the punch operating mechanism and the centering mechanism, said feeding device having improved means for maintaining proper tension on the work.

Another object of the invention is to equip a machine of the class described with means for limiting the downward stroke of the punch elements during the cutting operations.

Another object of the invention is to provide in a machine of the class described an improved form of cutting die so arranged as to cut a sharp stencil opening, with provisions for the release of the punch elements after the stencil has been cut.

Another object of the invention is to construct a machine of the class described so as to provide an efficient lubricating system for the mechanism.

Another object of the invention is to generally simplify the construction of machines of the class described so that the manufacture thereof may be standardized and so that economy in manufacture may be effected.

Additional advantages of the construction will be apparent from the following detailed description thereof taken in connection with the accompanying drawings in which—

Fig. 1 is a plan view of the machine with portions broken away to better illustrate certain of the parts.

Fig. 2 is a side elevation.

Fig. 3 is a vertical section through the machine,

Fig. 4 is a plan view with the upper casing removed.

Fig. 5 is a front end view.

Fig. 6 is a section through the front end of the machine illustrating certain details of the feeding mechanism.

Fig. 7 is a fragmentary view illustrating the elements of the centering mechanism.

In the embodiment of the invention illustrated in the drawings the base frame of the machine is shown as comprising a casting having a central portion 1 at the edges of which is a vertical annular flange 2. Extending from the bottom of the central portion 1 are supporting legs 3. Extending forwardly from the central portion of the base and integrally formed therewith is an extension 4 constituting a support for the work. A spindle 5 is supported by the central portion 1 of the base, the lower end of the spindle extending through an opening approximately at the center of the wall 1, said extension being threaded to receive a nut 6 for removably supporting the spindle in place. A hub member 7 is mounted over the spindle 5 and extends upwardly through the housing of the machine. This hub member has integrally formed therewith near its lower extremity an annular plate 8 having cut-out portions 9 therein for the purpose of decreasing its weight, said plate constituting a carrier for the die members. An annular series of openings 10 are formed near the outer edge of the plate 8 and over each opening is supported a die member 11. The novel construction of the die members will be fully described at a later point in the specification. The hub member 7 also has formed integrally therewith an annular disc 12. The disc 12 constitutes a support for an attached punch carrier, said punch carrier being in the form of a spider having a ring 13 that is secured to the disc 12 in any suitable manner, the means employed in the embodiment illustrated comprising dowel pins 14 and bolts 15. The spider further includes ribs 16 that support at their outer extremity the punch holder that is in the form of a ring 17, said ring being U-shaped in cross section so as to embrace the shanks of the punch elements.

The punch elements comprise shanks 18, said shanks extending through openings in

the upper and lower wall of the ring 17 and carrying flanges 19 against which an expansion coil spring 20 abuts at one end, said spring 20 at the opposite end bearing against the upper face of the lower wall of the ring 17. Each of the shanks 18 is provided near its upper extremity with a channel 21 and carries the punch element at the lower end.

The punch elements include an upper plate 22 having upturned arms 23 that extend through openings in the ring 13, and a plate 24 on which the punching characters 25 are formed, said plate 24 being removably secured to the plate 22 in any suitable manner, as by removable screws 24^a (Fig. 2). This is an important feature as it permits removal and replacement of the punch characters without disturbing the supporting stems, etc., therefor.

In order to reinforce the hub member there is provided above the disc 12 reinforcing flanges 26. A housing casting 27 is fitted to the base casting and extends over the punch and die mechanism. This housing is connected to the base member by bolts 28 passing through lugs 29 on a lower face of the housing and lugs 30 extending outwardly from the upper edge of the base casting. The hub member extends through the central portion of the housing, an opening 31 being formed in the housing in such a way as to constitute a bearing for the upper portion of the hub member. A hand wheel 32 is suitably secured to the hub member above the housing and constitutes means for revolving the hub member and thereby bringing the punch and die elements into selected stencil cutting positions.

In order to properly lubricate the operating mechanism for positioning the punch and die elements a well casting 33 is secured to the spindle above the upper end of the hub element, said well casting having an opening 34 therein through the bottom wall adjacent to the spindle, and the hub member is formed with a groove 35. Lubricant placed in the well 33 thus has access through the openings 34 and the channel or groove 35 to the bearing portions of the hub and spindle and the journals for the hub member when the hub member is revolved and the upper end of the channel 35 is brought into communication with the passage 34.

A dial plate 36 is secured to the upper face of the casting 33 thus being held in stationary adjustment, and a pointer element 37 is mounted on the hand wheel rim. Thus, by revolving the hand wheel 32 selected punch and die elements are brought to the stencil cutting point.

The mechanism for operating the punch elements includes a shaft 38 journaled in lugs 39 and 40, said lugs being formed on the upper face of brackets 41 and 42 respectively, and said brackets in turn being supported on the upper wall of the housing 27. The shaft has secured to one end an operating handle 43, the handle being so positioned and adjusted that it is normally in the raised position shown in full lines in Fig. 2. A coil spring 44 embracing the shaft 38 between the lug 39 and the hub of the handle constitutes the means for actuating the shaft to normal position, it being understood that one end of the coil spring is secured to the lug 39 and the opposite end to the hub of the handle 43.

The means for depressing the punch member includes an actuator 45, said actuator extending through an opening in the housing 27 above the cutting point. This actuator includes an upper U-shaped member 46 having flanges 47 on its side face, said flanges operating in channels in the inner faces of the lugs 39 and 40 and in the edge of the opening in the housing. A roller 48 is supported between the arms of the U-shaped sections of the actuator, said roller operating in a cam slot 49 formed in a cam plate 50, said cam plate 50 having a hub 51 for attaching it to the shaft 38.

The actuator is provided with a depending L-shaped tail piece 52, the lower horizontal arm of said piece 52 being arranged to operate in the channels 21 formed in the shanks of the punch members. Obviously, as the operating shaft is rocked by depression of the handle to the position shown in dotted lines in Fig. 2, the actuator is moved downwardly by the roller 48 riding in the cam slot 49, thereby causing the lower end of the actuator to engage the upper end of the particular punch member positioned at the stencil cutting point, and thereby depress the punch member to cut the work. The movement is in an exact horizontal plane, thereby assuring direct vertical downward movement of the punch for the cutting operation.

It will be noted that the width of the channels 21 is in excess of the thickness of the horizontal arms of the tail piece 52, so that there will be an initial downward movement of the actuator prior to the actual depression of the punch member. This lost motion is allowed in order that the locking mechanism for locking the punch and die elements at the cutting point shall operate prior to the actual operation of the cutting mechanism, as will be understood more fully from the detailed description of the locking mechanism hereinafter.

The locking mechanism includes a lever 53 having a bifurcated extremity 54 between the arms of which is supported a roller 55. The lever 53 is pivoted at one end to a pin 56 having an extension 57 that passes through an opening in the upper wall of the housing 27, the nut 58 serving to hold the

pin in place. The extension 57 is offset from the axis of the pin 56 so that an eccentric pivot for the lever 53 is provided whereby the exact adjustment of the roller 55 may be effected to a point exactly intermediate of a pair of punch shanks, as shown in detail in Fig. 7.

The actuator for the lever 53 comprises a lever 59 pivoted on a pin 60, said pin 60 being supported in lugs 61 formed on the brackets 41 and 42. The lever 59 carries at its upper end a roller 62 and at its lower end a roller 63, said roller 63 extending through a cam slot 64 in the lever 53. The lever 53 is normally held in retracted position by a retractile spring 65 secured at one end to a pin 66 passing through the wall of the housing 27 and at the other end to the lever 53. The upper end of the lever 59 is swung inwardly by a cam plate 67, thereby swinging the lower end of the lever 59 outwardly causing the roller 55 to move into the space between a pair of punch shanks. The cam plate 67 is mounted upon the same operating shaft that operates the punch mechanism. The initial movement of the operating shaft positions the locking device so that before the punch actuator begins to move the punch member downwardly, the punch and die carrier will be locked from rotation assuring an exact positioning of the stencil material for receiving the stencil cut.

The cross feed mechanism for the stencil sheet comprises an upper pair of feed rollers 68 and 69, said rollers being revolubly supported on pins 70 and 71, respectively, screwed into the front of the housing 27. The rollers 68 and 69 are above the table 4 and are provided with serrated edges for gripping the stencil sheet. In the table 4 and immediately below the rollers 68 and 69 are slots 72 and 73. Tension rollers 74 and 75 are arranged below the face of the table and means are provided for moving said tension rollers into and out of contact with the feed rollers 68 and 69. The rollers 74 and 75 are revolubly mounted on pins extending inwardly from the inner face of a plate 76. The plate 76 has ears 77 at each end, said ears extending over pins 78 depending from the lower face of the wall of the table 4. Coil springs 79 normally tend to actuate the plate upwardly and thereby force the rollers 74 and 75 into resilient contact with the rollers 68 and 69. In order to release the rollers 74 and 75, the plate 76 is moved downwardly by a cam shaft 80, the cam element of which extends into an opening 81 in the plate. The shaft 80 is actuated by a handle 82 secured thereto at the outer end of the shaft and lying at the front face of the table 4.

The stencil sheet is advanced transversely of the machine by the actuating mechanism comprising a sliding plate 83 having a slot 84 therein, said plate being mounted for vertical movement on pins 85 that extend through the slot 84 and into the side wall of the housing 86. The plate 83 has an extension 87 formed at right angles thereto, said extension constituting a support for a pivoted pawl 88, said pawl cooperating with a ratchet 89 formed on the face of the roller 69. The tail of the pawl 88 is pulled upwardly by a contraction spring 90, one end of which is secured to the pawl and the other end of which is secured to a lug 91 formed on the housing 86. The plate 83 has a rack 92 formed on one of its faces, said rack cooperating with a rack segment 93, the rack segment being supported by the main operating shaft 38. Thus on each depression of the handle the rack plate 83 is moved downwardly causing the free end of the pawl 88 to ride idly over a ratchet tooth on the ratchet 89. When the handle is released and restored to normal position the rack plate 83 moves upwardly and thereby, through its connections with the feed roller 69, the stencil sheet is advanced.

The extent of rocking of the main operating shaft is controlled by a set screw 94 screwed into a boss 95 on the housing 27 and locked in position by a lock nut 96. A stripper plate 97 is interposed between the punch and die elements to release the stencil sheet when the punch element moves upwardly.

The die elements in the present machine are of novel construction and comprise matched plates. The cutting die 11 has an opening the same size as the punch element 25. The opening below the cutting die 11 is slightly in excess of the punch element. The two pieces are electrically welded together and are held in place in the die carrier by screws passing through the die carriers at the side of the openings and into the plates. Dies of this character provide sharp cutting edges with a sufficient relief portion below the cutting die so that the punched out portion of the stencil sheet, after being severed from the sheet, will be discharged through the openings in the die carrier.

From the foregoing it will be understood that the operation of the machine briefly described comprises the placing of a stencil sheet on the table 4, the table 4 being ruled by ruled lines 98 to indicate the position to which the sheet shall be inserted for the respective lines to be formed in the sheet, the tension rollers 74 and 75 being released by operation of the shaft 80 for that purpose. The tension rollers are then adjusted so as to impinge against the sheet and firmly hold the sheet between the feed rollers 68 and 69 and said tension rollers 74 and 75. By operation of the hand wheel selected punch and die elements are brought to the cutting point. The operating handle

is then depressed, the initial movement thereof setting the locking device to prevent rotation of the punch and die carriers and holding the selected punch and die element firmly at and centered upon the cutting point. The further operation of the handle carries the punch element downwardly to the cutting position and also sets the feeding mechanism for stepping the work transversely of the machine. Thereupon the handle is released and the parts restored by spring action to normal position, that is to say the locking device moves out of locked position, and the punch element is elevated and the sheet is stepped across the machine one step. As the punch element moves upwardly the sheet is stripped from the punch by the stripper plate 97 and the machine is in position for cutting additional characters.

From the foregoing it will be understood that the mechanism fully accomplishes the objects of the invention, that the machine is simple in construction and effective, and accurate in operation. It will also be understood that the invention may be varied or modified in certain particulars without departure from the spirit and scope thereof, and we do not limit ourselves to the exact construction shown and described, but what we claim and desire to secure by Letters Patent is:—

1. In a stencil cutting machine, a stationary frame, a rotary carrier in said frame, an annular series of dies in the lower part of said carrier, an annular series of punches in the upper part of said carrier, an operating shaft supported by said frame, a cam rigid on said shaft and having an elongated cam slot, an actuator for said punches, a roller on said actuator in said cam slot wholly supporting said actuator by said cam, a pivoted locking device supported by said frame, a spring normally holding said locking device out of engagement with said punches, a lever for moving said locking device into engagement with said punches, and a cam supported by said shaft for operating said lever to move said locking device into engagement with said punches.

2. In a stencil cutting machine, a stationary frame, a rotary carrier in said frame, an annular series of dies in the lower part of said carrier, an annular series of punches in the upper part of said carrier, an operating shaft supported by said frame, a cam rigid on said shaft and having an elongated cam slot, an actuator for said punches, a roller on said actuator in said cam slot wholly supporting said actuator by said cam, a pivoted locking device supported by said frame, a spring normally holding said locking device out of engagement with said punches, a lever for moving said locking device into engagement with said punches, a cam supported by said shaft for operating said lever to move said locking device into engagement with said punches prior to the impact of the punches with the stencil material, and a feeding device operated by said shaft to feed the stencil material between said dies and said punches.

3. In a stencil cutting machine, the combination with a main frame, of a rotary element including spaced punch and die carriers, an annular series of die mounted in the lower carrier, an annular series of spring supported punches mounted in the upper carrier, an operating shaft, an actuator for depressing the punch elements, a plate having a cam slot therein mounted on the shaft and connected with said actuator, a locking device, an actuator for said locking device, and a cam plate carried by the shaft and arranged to cooperate with said actuator for moving said locking device, said locking device being operable to lock the punch and die carrier in position to receive the punch impression prior to the impact of the punch with the stencil cutting material.

4. In a stencil cutting machine, the combination with a main frame, of a rotary element including spaced punch and die carriers, an annular series of dies mounted in the lower carrier, an annular series of spring supported punches mounted in the upper carrier, an operating shaft, a cam on said shaft, a bifurcated actuator embracing and engaging said cam, for depressing and raising the punch elements, a locking device, an actuator for said locking device controlled by said shaft to lock the punch and die carrier in position to receive the punch impression prior to the impact of the punch with the stencil cutting material, feeding mechanism for advancing the stencil sheet transversely across the machine, and operating connections between said shaft and said feeding mechanism whereby said stencil sheet will be advanced with each operation of said shaft.

5. In a stencil cutting machine, the combination with a main frame, of a rotary element including spaced punch and die carriers, an annular series of dies mounted in the lower carrier, an annular series of spring supported punches mounted in the upper carrier, an operating shaft, a cam on said shaft, a bifurcated actuator embracing and engaging said cam, for depressing and raising the punch elements, a locking device, an actuator for said locking device controlled by said shaft to lock the punch and die carrier in position to receive the punch impression prior to the impact of the punch with the stencil cutting material; feeding mechanism comprising a pair of upper rollers for engaging the sheet, a pair of tension rollers cooperating with

said first-named rollers, said last-named rollers being independently adjustable toward and away from the stencil sheet; and operating mechanism whereby one of said upper rollers is actuated on each operation of the shaft for moving the stencil sheet one step across the machine.

6. A machine of the class described comprising a revoluble element having punch and die carriers connected therewith, an annular series of punch elements in one of said carriers, an annular series of depressible punch elements in the other of said carriers, an operating shaft, a bifurcated actuator for said punch elements arranged to engage the punch element set at the cutting point, a roller between the arms of said actuator, a cam plate between the arms of said actuator and having a cam slot to which said roller extends, a shaft for operating the cam plate, and a handle whereby said shaft is operated.

7. In a stencil cutting machine, a revoluble punch and die carrier, means for selectively adjusting said punch and die carrier, a locking device comprising a pivoted lever equipped with a roller adapted to engage between a pair of the punch elements, an actuator for said lever, said actuator including a pivoted lever having a roller thereon at one end, said roller engaging within a cam slot formed in said locking lever, a roller on the opposite end of said actuator, a rock shaft, and a cam plate on said rock shaft adapted to engage with the roller on said actuator whereby said locking lever is operated when said rock shaft is moved.

8. In a stencil cutting machine, a revoluble punch and die carrier, means for selectively adjusting said punch and die carrier, a locking device comprising a pivoted lever equipped with a roller adapted to engage between a pair of the punch elements, an actuator for said lever, said actuator including a pivoted lever having a roller thereon at one end, said roller engaging within a cam slot formed in said locking lever, a roller on the opposite end of said actuator, a rock shaft, a cam plate on said rock shaft adapted to engage with the roller on said actuator whereby said locking lever is operated when said rock shaft is moved, and a spring connected with said locking lever to restore the same to unlocked position when the rock shaft is released.

9. In a stencil cutting machine, the combination with a main frame and a housing connected therewith, of a revoluble element journaled in the frame and housing, and including spaced punch and die carriers, an annular series of die elements in the lower one of said carriers, an annular series of punch elements each including a punch plate and a shank mounted in the upper one of said carriers for vertical movement, a spring for supporting each of said punch elements in upper position, means for adjusting said revoluble element to bring selected ones of said punch and die elements to the cutting point, a rock shaft, a plate carried by the rock shaft provided with a cam slot, a block mounted to move vertically through the housing of the machine for actuating the punch elements in cutting operations, an arm connected with said block and arranged to engage and operate the punch element at the cutting point, a lock device movable into and out of engagement with said shanks to hold the revoluble element against rotation after it has been positioned, means operated by said rock shaft for moving said lock device into locking engagement with said shanks to lock said revoluble element prior to depression of the punch element and means for disengaging said lock device from said shanks.

10. In a stencil cutting machine, a stencil cutting mechanism, a work table for supporting the stencil sheet, an upper pair of serrated feeding rollers mounted to revolve above the work table, a plate mounted below the table and having a hole therethrough, a pair of rollers supported by said plate, springs normally actuating said plate to raise said lower rollers toward said upper rollers, a shaft extending through said hole in said plate, a cam on said shaft in said hole for depressing said plate against the tendency of the springs, an operating shaft, a sliding plate, operating connections between the shaft and said plate, a pawl carried by said plate, and a ratchet on one of the upper rollers operable effectively to move the roller on each operating stroke of the shaft to advance the stencil sheet one step.

11. In a stencil cutting machine including a stencil cutting mechanism and a work table for supporting the stencil sheet, feeding mechanism for stepping the stencil sheet transversely of the machine comprising an upper pair of serrated rollers mounted to revolve above the work table, a carrier mounted below the table, a pair of cooperating rollers supported in the carrier, springs normally actuating the carrier to raise said lower rollers toward said upper rollers, an adjusting device for depressing said carrier against the tendency of the springs, an operating shaft, a sliding plate, a rack segment on said shaft, a rack on said plate meshing with said rack segment, a pawl carried by said plate, and a ratchet on one of the upper rollers operable effectively to move the roller on each operating stroke of the shaft to advance the stencil sheet one step.

12. In a stencil cutting machine including

stencil cutting mechanism and a work table for supporting the stencil sheet, feeding mechanism for stepping the stencil sheet transversely of the machine comprising an upper pair of serrated rollers mounted to revolve above the work table, a carrier mounted below the table, a pair of cooperating rollers supported in the carrier, springs normally actuating the carrier to raise said lower rollers toward said upper rollers, an adjusting device for depressing said carrier against the tendency of the springs comprising a shaft supported below the work table and having an extension beyond the forward end thereof, a cam carried by said shaft operating in a slot formed in said carrier, an operating shaft, a sliding plate, operating connections between the shaft and said plate, a pawl carried by said plate, and a ratchet on one of the upper rollers operable effectively to move the roller on each operating stroke of the shaft to advance the stencil sheet one step.

13. In a stencil cutting machine including stencil cutting mechanism and a work table for supporting the stencil sheet, feeding mechanism for stepping the stencil sheet transversely of the machine comprising an upper pair of serrated rollers mounted to revolve above the work table, a carrier mounted below the table, a pair of cooperating rollers supported in the carrier, springs normally actuating the carrier to raise said lower rollers toward said upper rollers, an adjusting device for depressing said carrier against the tendency of the springs comprising a shaft supported below the work table and having an extension beyond the forward end thereof, a cam carried by said shaft operating in a slot formed in said carrier, an operating shaft, a sliding plate, a rack segment on said shaft, a rack on said plate meshing with said rack segment, a pawl carried by said plate, and a ratchet on one of the upper rollers operable effectively to move the roller on each operating stroke of the shaft to advance the stencil sheet one step.

14. In a stencil cutting machine, the combination of a main frame and a housing connected therewith, a spindle having a longitudinal slot therein supported by the frame, a hub element revolubly mounted on said spindle, punch and die carriers connected with said hub element, a hand wheel for revolving said hub element and thereby effecting adjustment of the punch and die elements, a rigid casting supported by the upper end of the spindle having an oil well therein with an outlet opening arranged to register with the slot in the spindle as the hub element is revolved, and a dial plate constituting a cover for said well.

15. In a machine of the class described, a die element arranged to be supported in the die carrier comprising two plates welded together, the upper plate having an opening therein corresponding to the punch character of the punch element and the lower plate having an excess dimension over the opening of the upper plate.

GUSTAVE F. FUCHS.
WALT C. MARSH.