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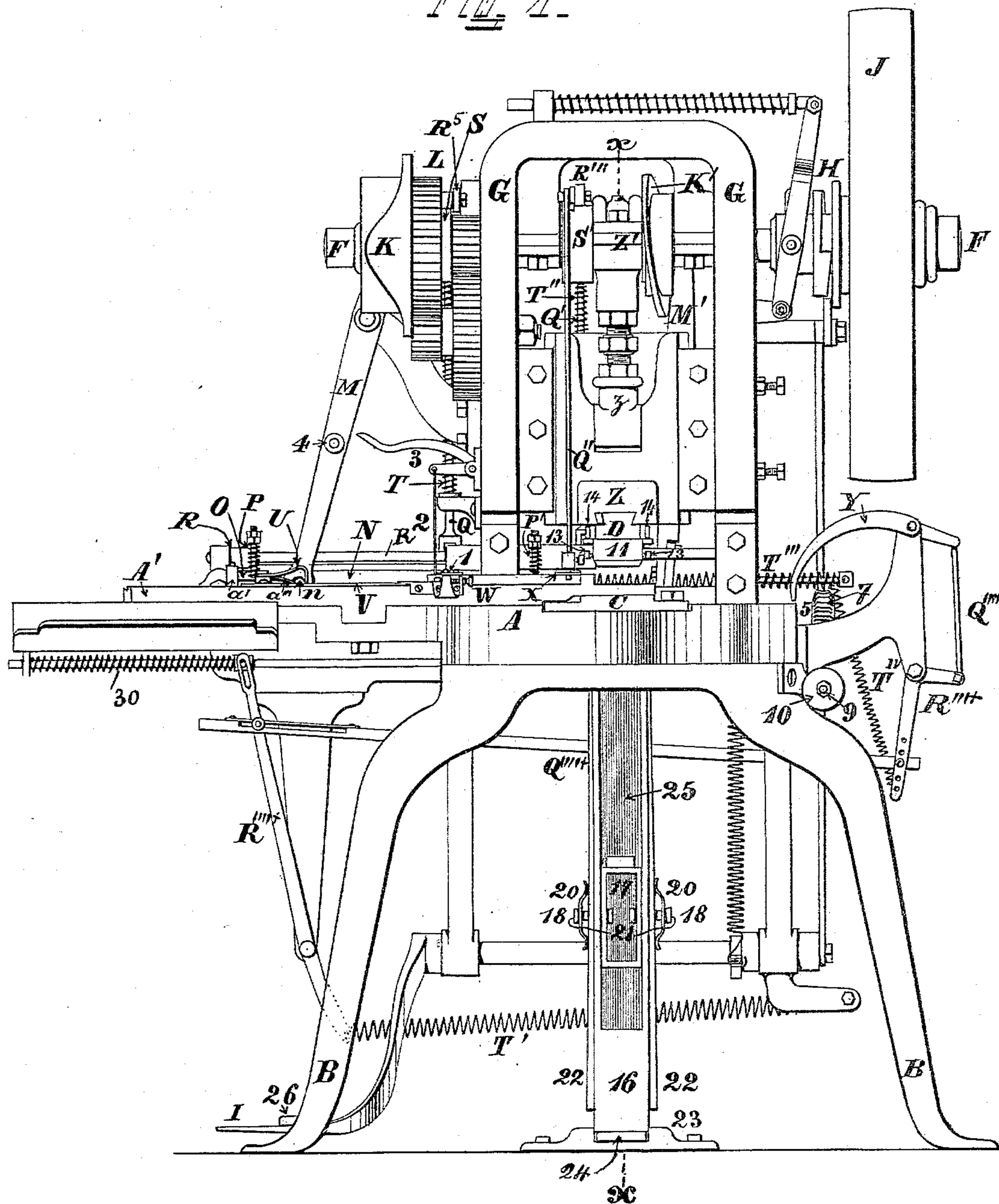
5 Sheets—Sheet 1.

S. J. MURRAY.
MACHINE FOR PUNCHING CARDS.

No. 381,716.

Patented Apr. 24, 1888.

Fig. 1.



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Gods wheellock.

Inventor.
Samuel J. Murray
by Knight Bros. Attys.

(No Model.)

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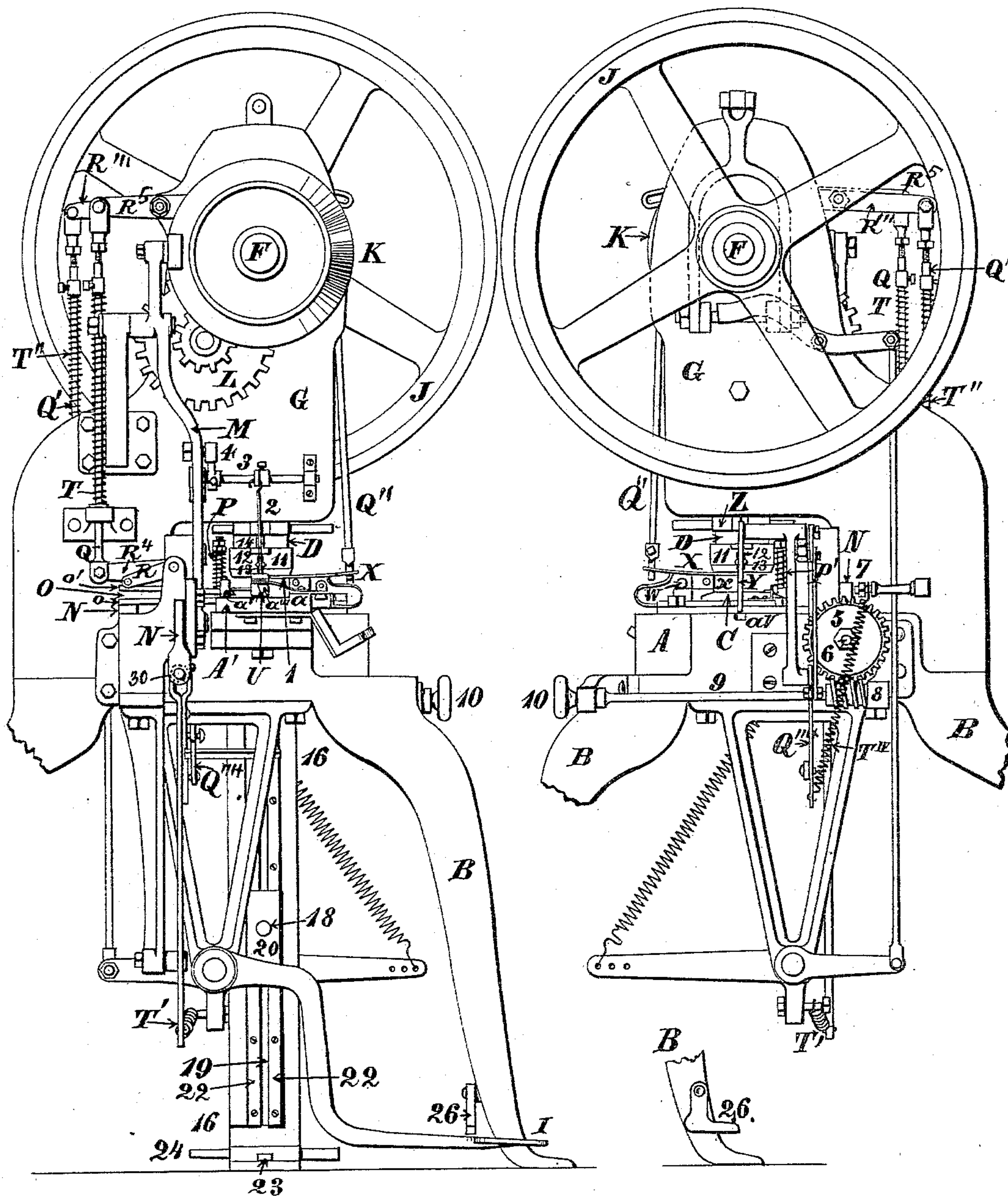
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Fig. 2.

Fig. 3.



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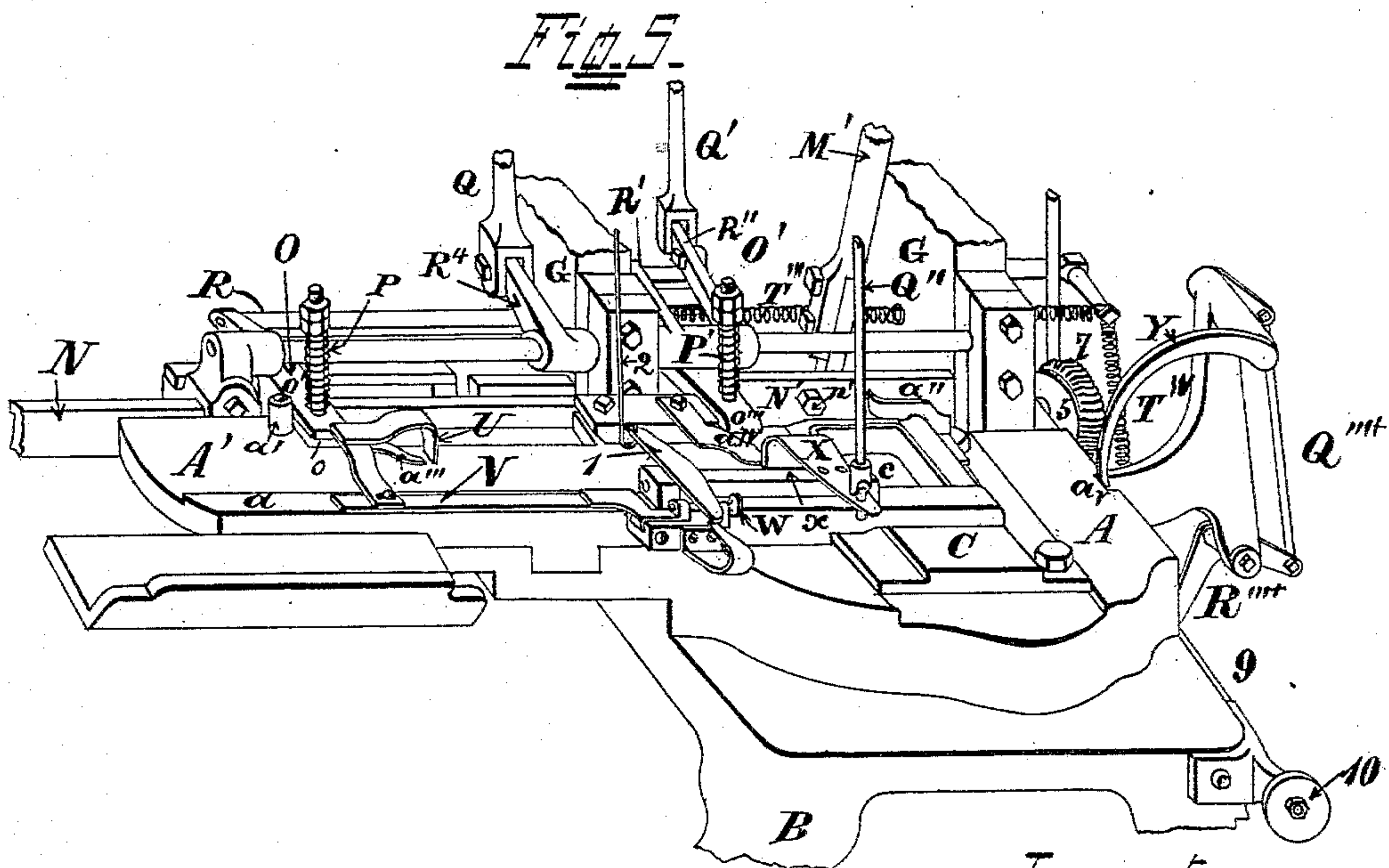
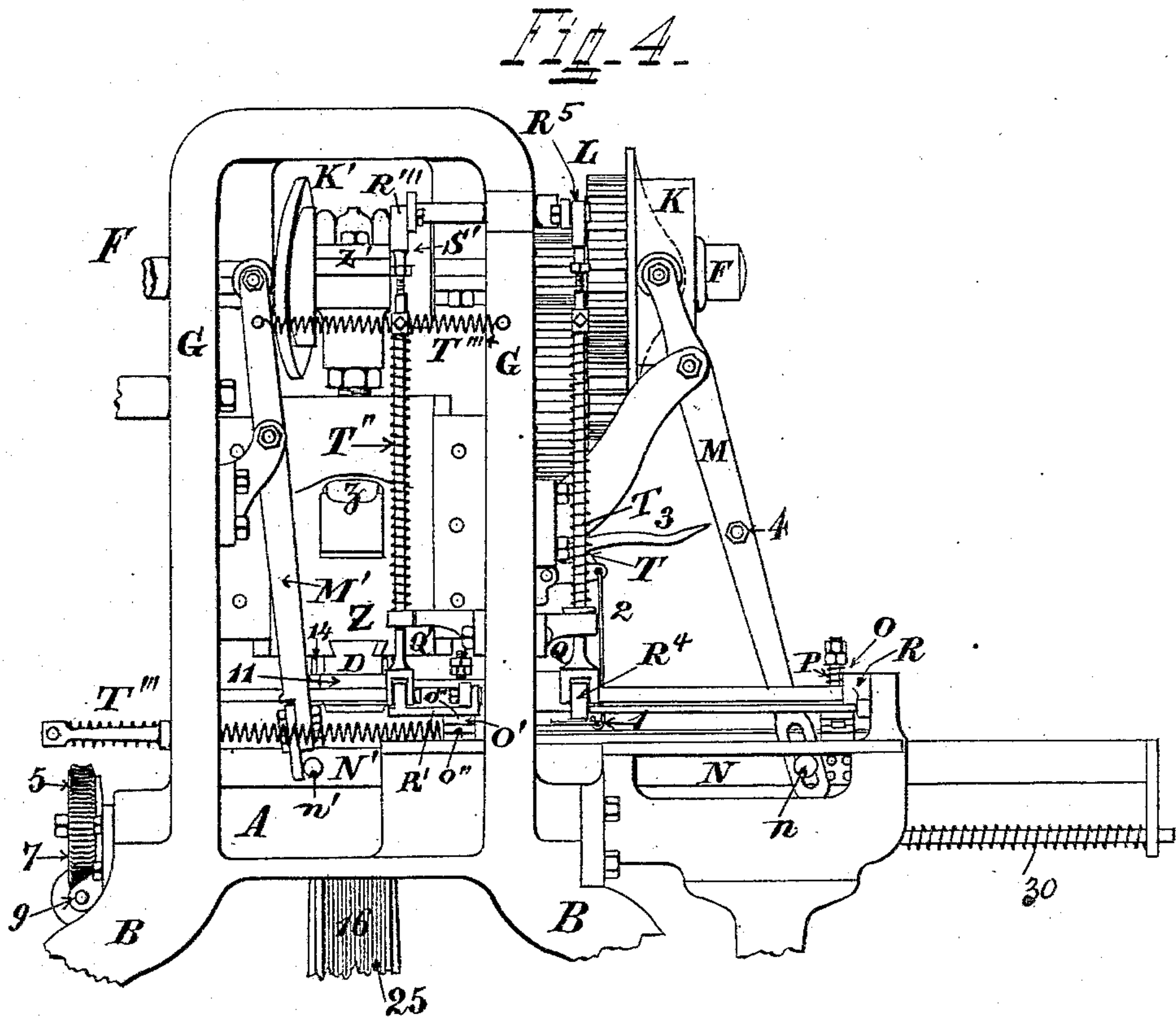
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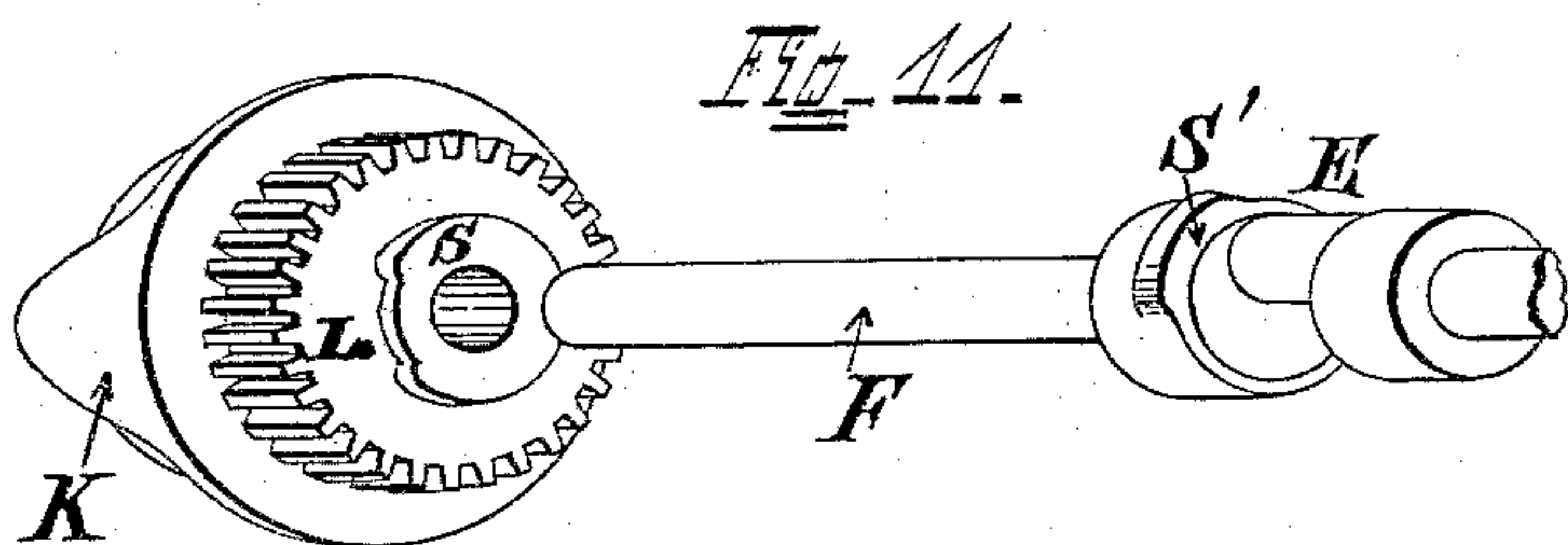
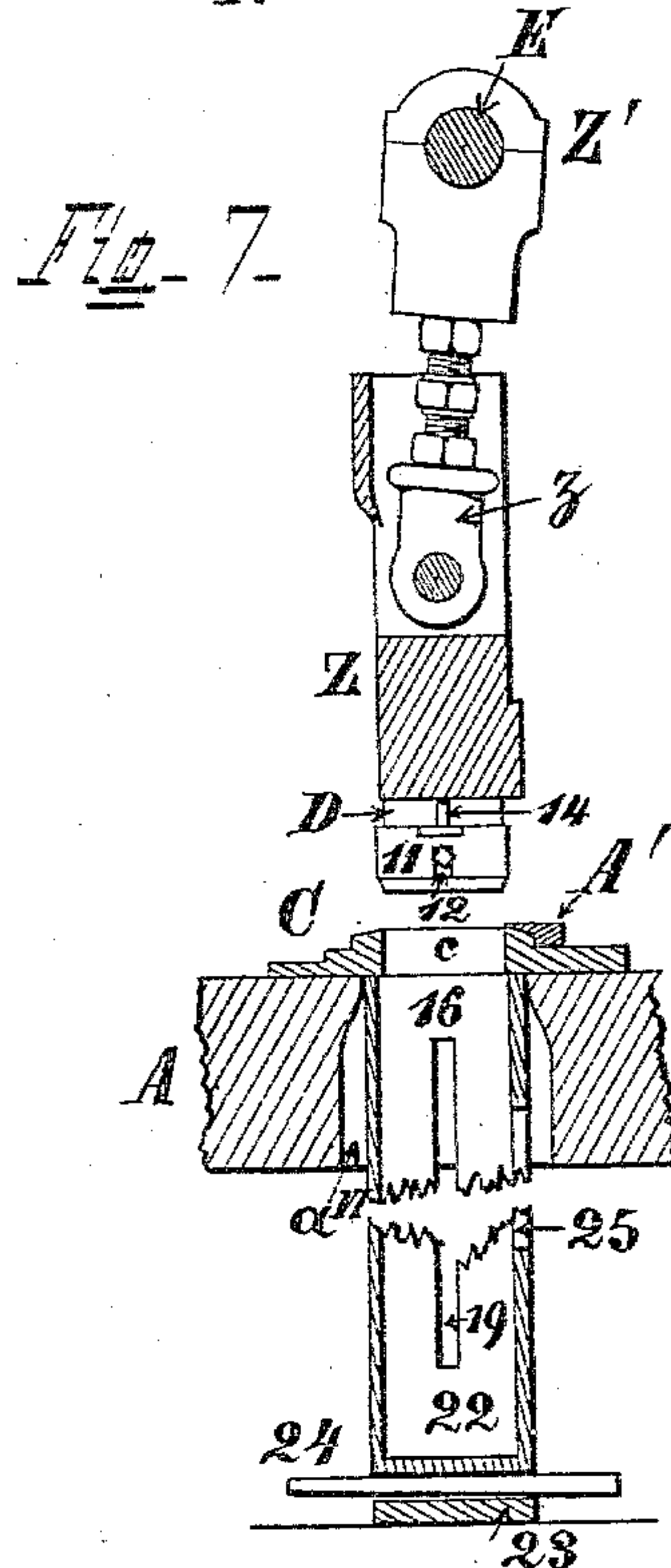
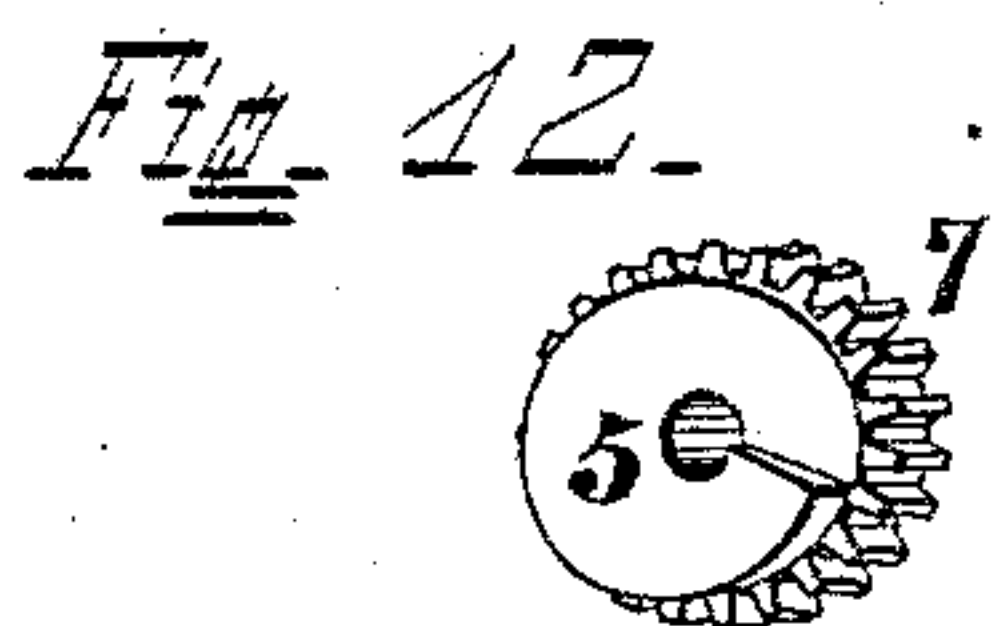
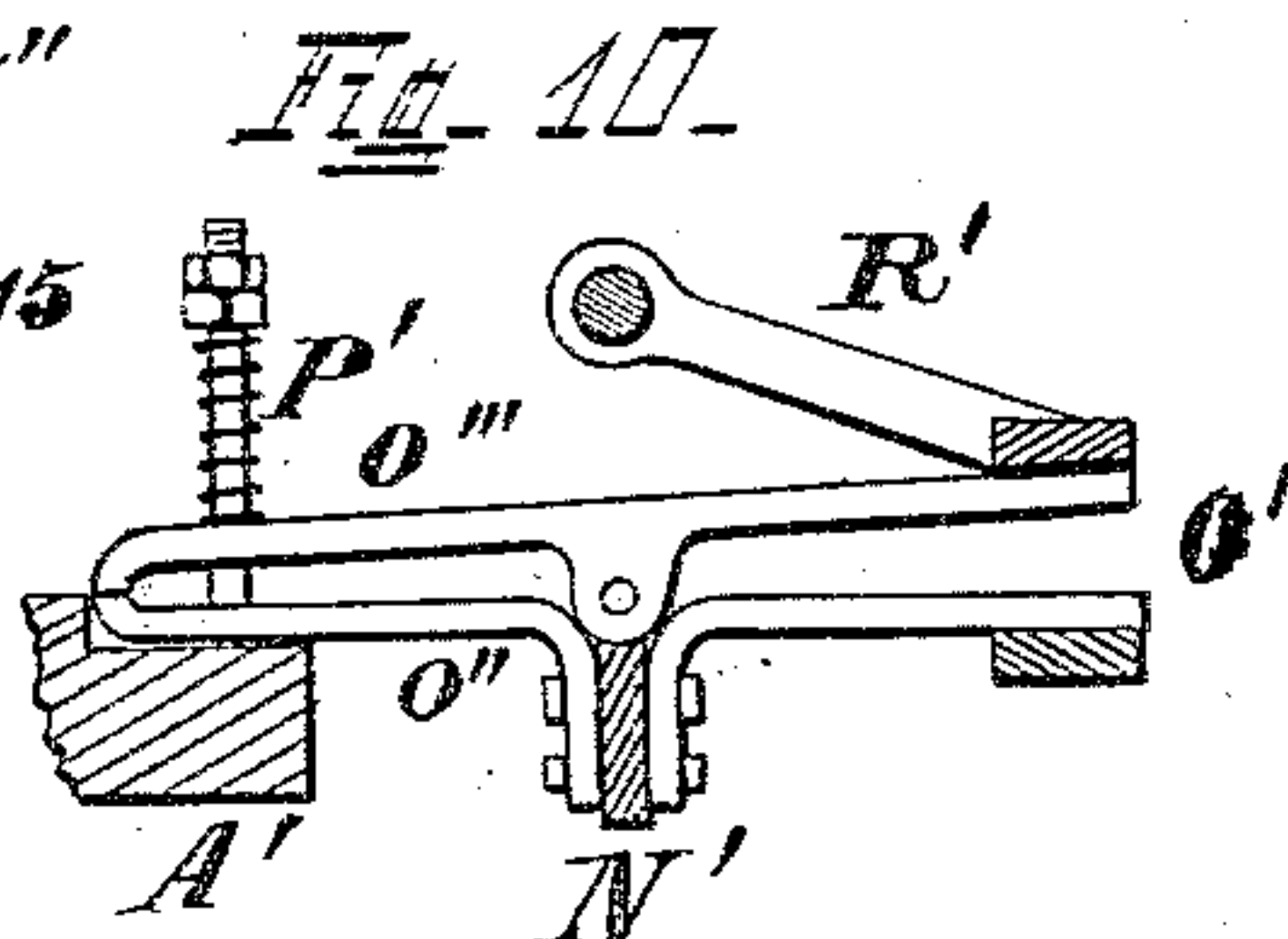
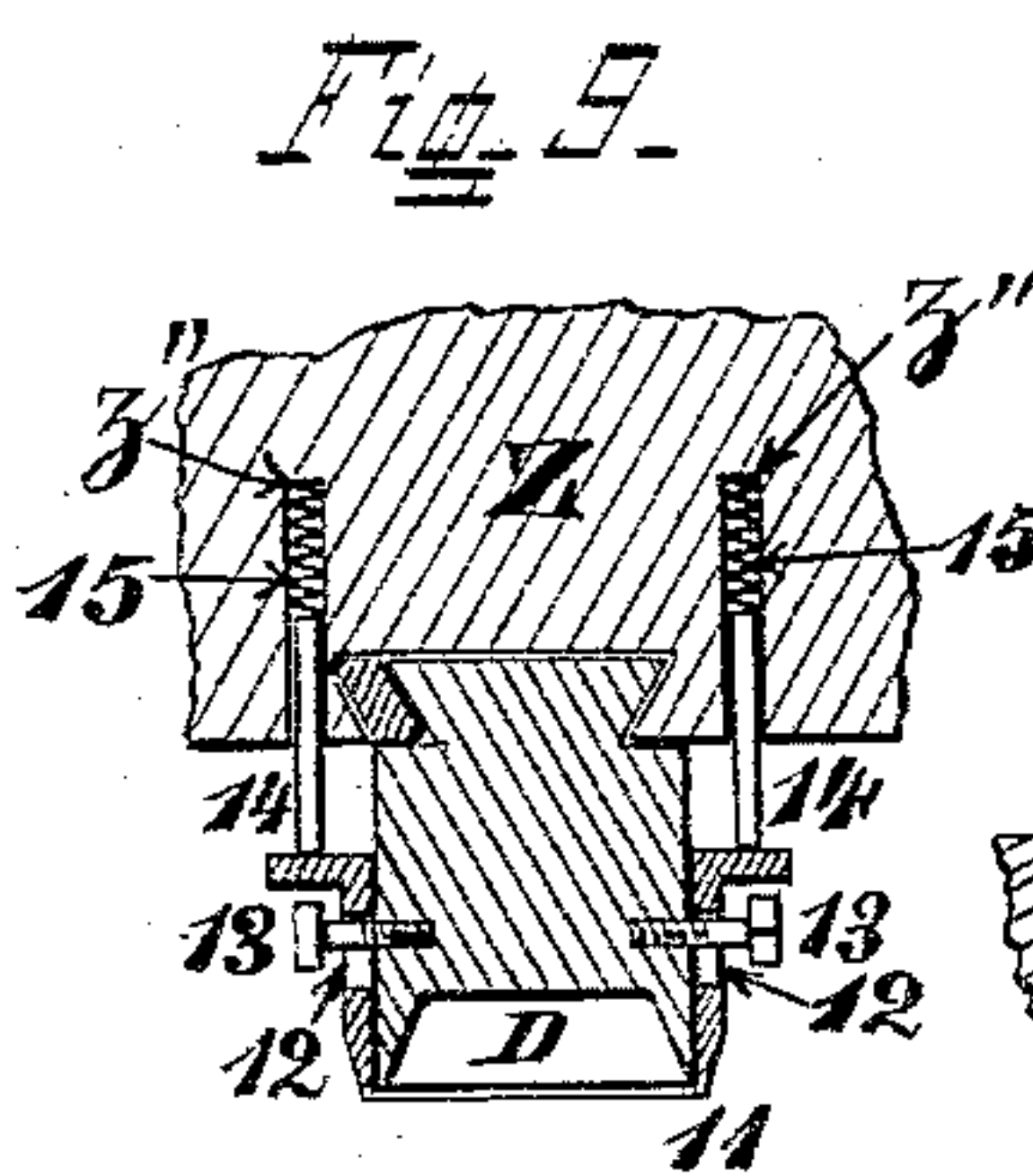
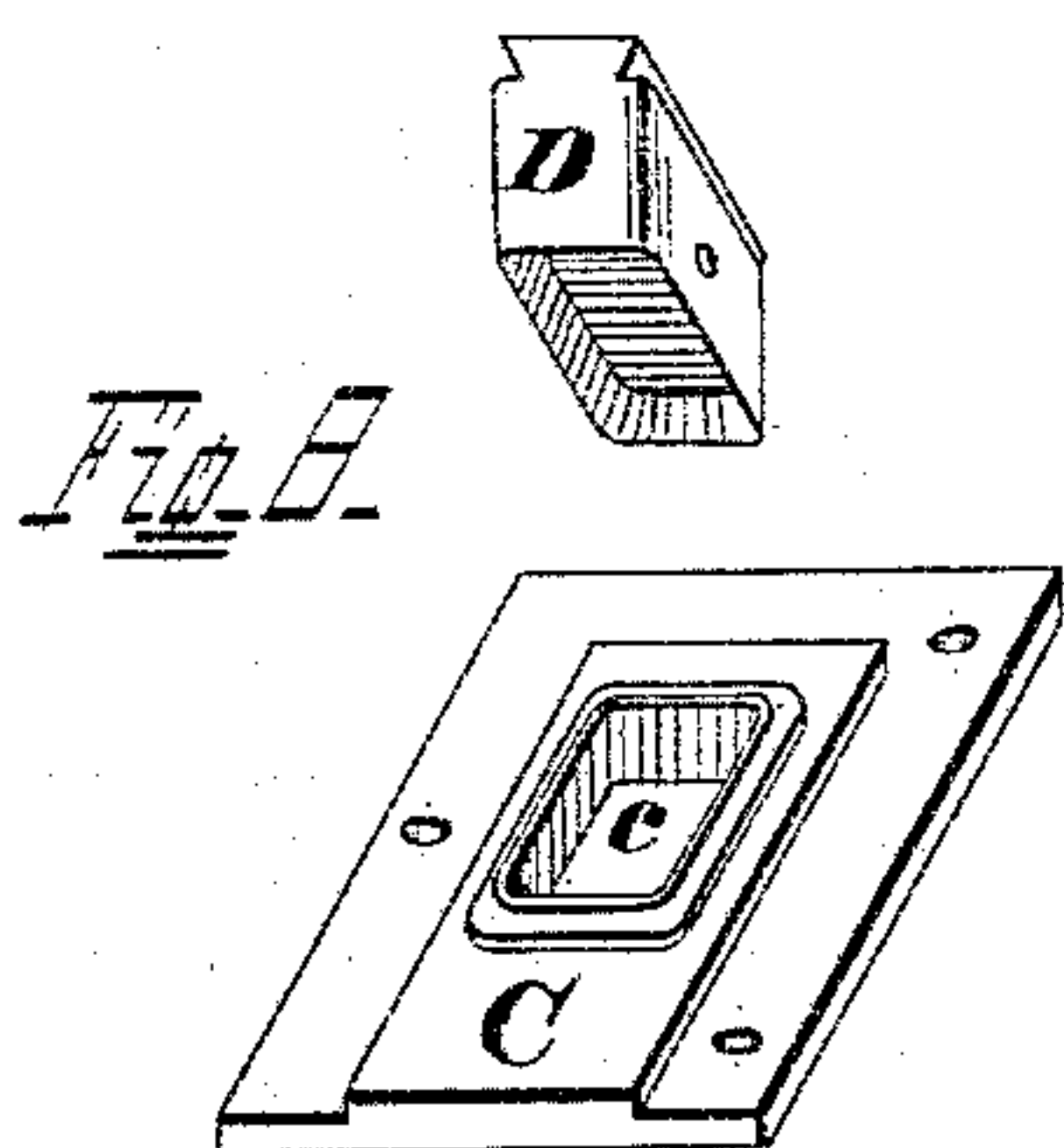
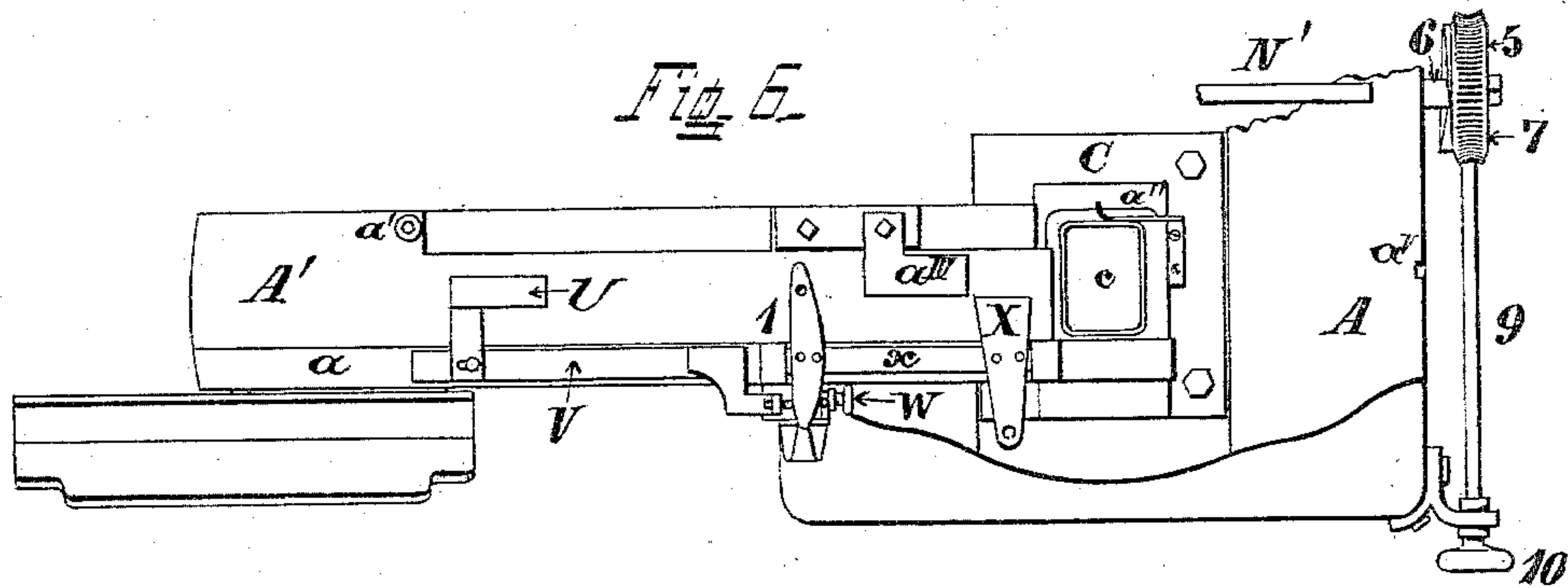
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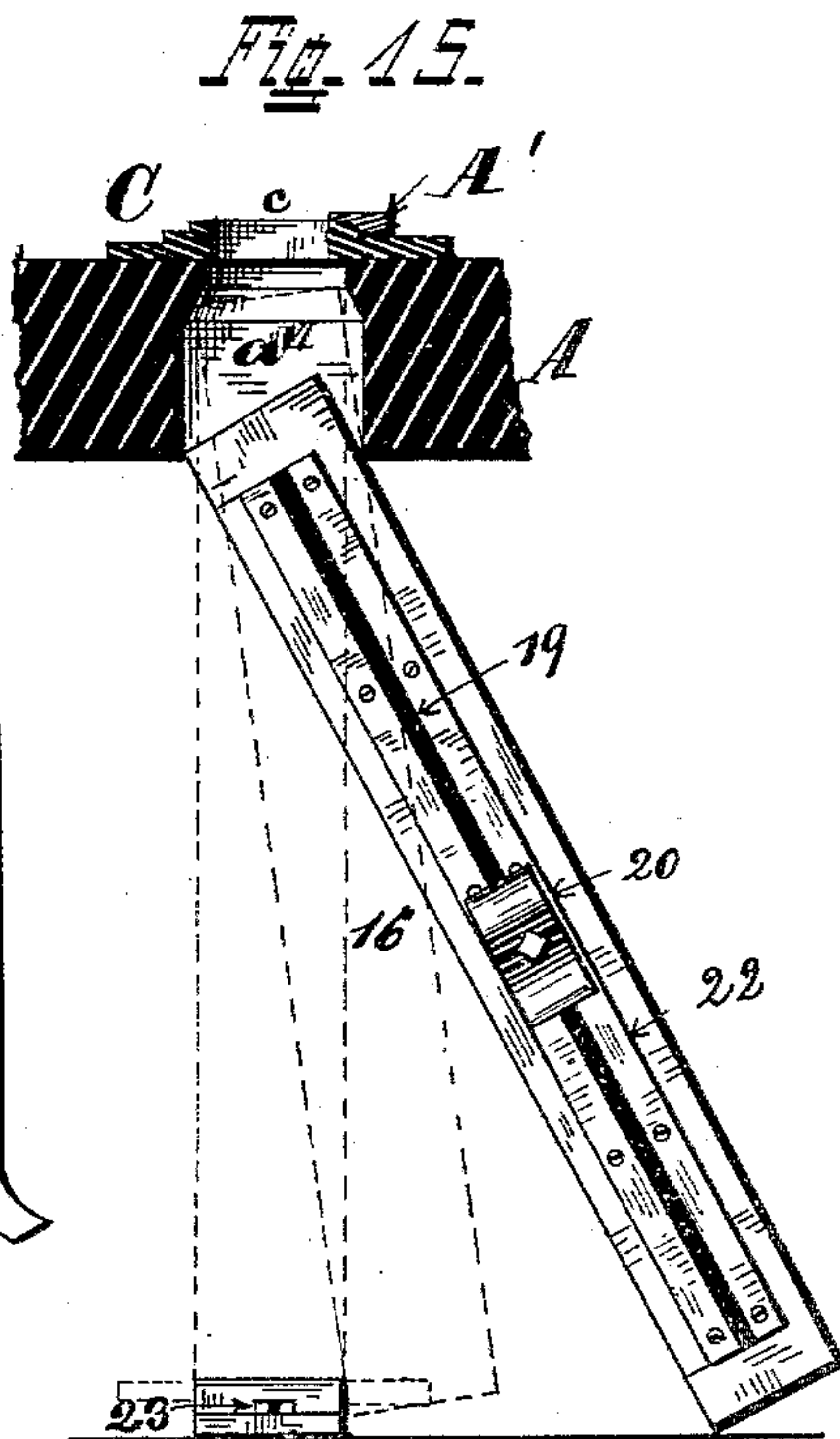
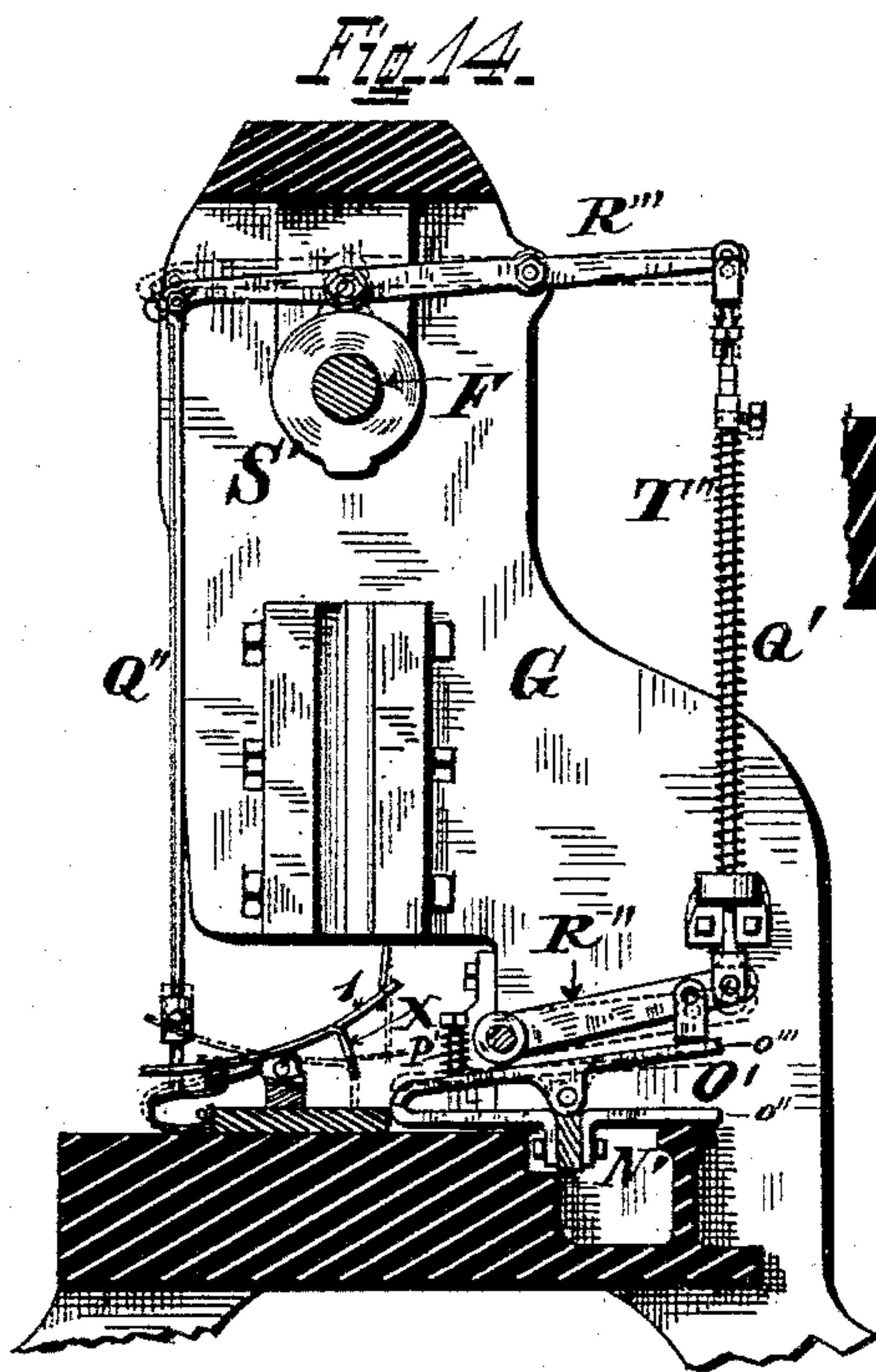
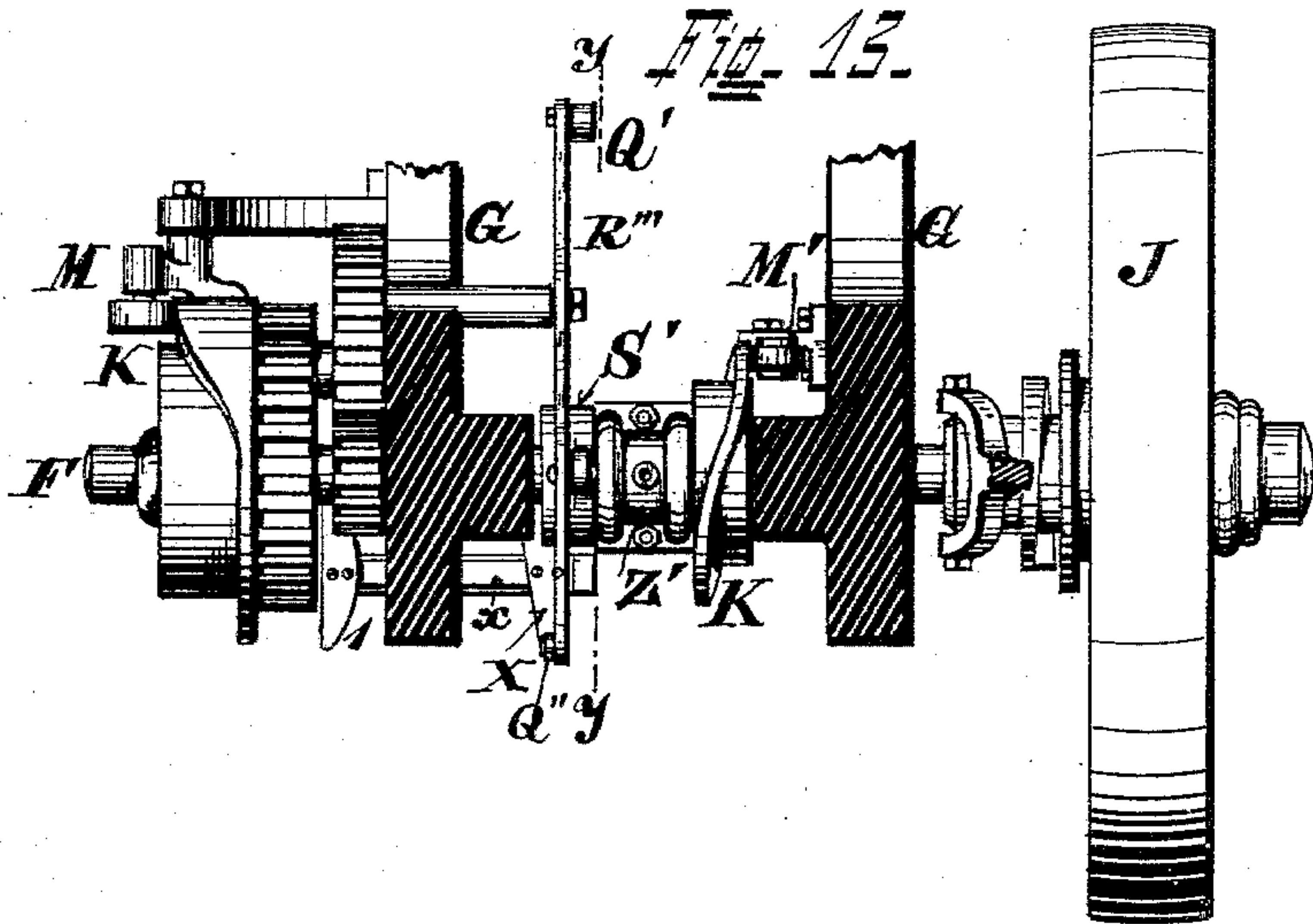
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5 Sheets—Sheet 5.

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UNITED STATES PATENT OFFICE.

SAMUEL J. MURRAY, OF CINCINNATI, OHIO, ASSIGNOR TO THE RUSSELL & MORGAN PRINTING COMPANY, OF SAME PLACE.

MACHINE FOR PUNCHING CARDS.

SPECIFICATION forming part of Letters Patent No. 381,716, dated April 24, 1888.

Application filed September 1, 1883. Serial No. 105,303. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL J. MURRAY, of Cincinnati, Hamilton county, Ohio, have invented a new and useful Improvement in Machines for Punching Cards from Printed Sheets, of which the following is a specification.

My invention relates to improvements in the class of machines which are employed for severing from one another a set of printed panels or designs imprinted collectively upon a sheet of pasteboard to constitute a pack or set of playing or other cards.

My improvements have for their object the enabling such work to be performed by comparatively unskilled persons with greater accuracy, with greater economy of time, labor, and material, and with much greater safety to the operators.

My improved machine is so constructed that the attendant has merely to place the successive blanks in register with a gage upon a suitable table, when the machine automatically grasps and feeds them to the proper place for the punching of the first card on each blank, which blank is then automatically seized by the second feed and alternately fed and punched until severance of all the prints on that sheet.

During the act of punching, the sheet is held fast upon the die by an automatically-operating clamp. At each retraction of the punch an encircling "stripper" holds the surrounding portions of the pasteboard firmly down upon the die. After the punching of the last card in the sheet and automatic release of the clamp, the remnant or "skeleton" is ejected by an automatically-operated finger. At the instant of the automatic insertion of a new sheet the clamp is automatically held open by action derived from the "long feed" independently of the action, which releases said clamp in the intervals of the punching action, during which the "short feed" takes place.

The machine comprises means conveniently accessible to the attendant both for adjustment of the gage which determines the sheet's place of departure for the long feed and for adjustment of the short feed to correspond with consecutive distance of card-prints.

In machines of this class previously employed it has been necessary to bring the ma-

chine to a dead standstill while the attendant introduced and carefully adjusted each new sheet or strip successively under the punch, she holding the sheet in position with her hand while starting the machine by pressure of her foot upon the treadle.

In the present improvement the attendant leisurely places each successive sheet under an adjustable gage at safe and convenient distance from the punching action, the action on the preceding sheet affording sufficient time to do this without stopping the machine.

In the accompanying drawings, Figure 1 is a front elevation of a card-punching machine embodying my invention, the parts being shown in their several positions at the instant of starting. Figs. 2 and 3 are elevations of the machine on its feed and delivery sides, respectively. Fig. 4 is a rear elevation of the upper portions of the machine. Fig. 5 is a perspective view, and Fig. 6 is a plan, of the table and accessory parts. Fig. 7 is a vertical section on line *xx*, Fig. 1. Fig. 8 shows the punch and die detached. Fig. 9 is a vertical section through the punch and stripper. Fig. 10 is a side view of the short-feed gripper. Fig. 11 is a perspective view of the main shaft and associated cams. Fig. 12 is a perspective view of the short-feed stop. Fig. 13 is a top view of the upper portions of the machine at that stage of its movements in which normal "closure" of the clamp employed to hold the work immovable for action of the punch is momentarily held in abeyance while the long feed is placing the new blank in position for the first punching. Fig. 14 is a section on line *yy*, Fig. 13. Fig. 15 is a side view of the receiver in the act of removal from the machine.

A represents a plate or table, which is supported at a convenient level upon legs B. Bolted upon this table is a plate, A', for reception of the printed sheets to be operated upon. A shoulder, *a*, upon said plate coacts with roller *a'*, elastic lips *a''*, *a'''*, and *a''''*, and with the long and short feeds and long-feed gage, to be presently described, to conduct the work to its proper place for punching action.

C is a die, having an orifice, *c*, for the passage of the severed cards.

D is the punch attached to the under side of a

cross-head, Z, which is coupled by means of a pitman, z, to yoke Z', that engages around crank E on main shaft F, which is journaled in standards G of the frame.

J represents the driving-pulley, which runs loosely upon the shaft F, but which drives the said shaft through the instrumentality of a clutch, H, so long as the attendant keeps her foot on the treadle I.

The above parts, being old and well known, require no specific description other than to say that the table A, with its plate A', and main shaft F, are made to extend farther to the left than is common in machines for this purpose, in order to accommodate the long-feed mechanism to be now explained. That portion of the main shaft F which protrudes to the left of the standards carries a loose cam, K, which, through the medium of gearing L, which derives its motion from said main shaft, makes one revolution to as many of said main shaft F as there are cards in the printed slip or sheet. This cam K operates the long feed by its impact on a lever, M, that impinges against a stud, n, (clearly shown in Fig. 4,) on carriage N, projecting from which is a gripper, O, whose upper jaw, o', is, during the advance stroke of said carriage, held by spring P in contact with the lower jaw, o, and which, during the retraction of said feed, is held open or gaping by means of hinged frame R, whose arm R⁴ is depressed with the frame on the rear end of the upper jaw by means of a rock-bar, R⁵, fulcrumed to a standard, its rear end being connected by a vertical rod, Q, to said arm R⁴, and its forward end engaging with cam S, which projects from the rear part of and revolves with cam K.

Contact of the rock-bar R⁵ with cam S is maintained by spring T between a projection on the standard and a projection on the rod Q. The retraction of the long-feed carriage and the pressure of the feed-arm M against the cam K are insured by spring 30. (Seen in profile in Figs. 1 and 4, and whose endwise position is indicated by dotted circle in Fig. 2.)

To enable the attendant to place the work on the plate or table A' in proper position for the gripping action of the long feed, I provide an adjustable gage consisting of finger U, that, projecting from a bar, V, is adjustable to the right or to the left by means of the screw W. The said gage is preferably so adjusted as (when the printed sheet is properly placed for the long-feed grip) to bring the gage-finger precisely over the center of the space between the two middle prints, in order that any slight inaccuracy in the short feed may be equally divided between the two sides of the group or row of card-prints. This automatic feed into the machine is designated by me the "long-feed" in contradistinction to the shorter feed, which my device possesses in common with all instrumentalities of its class, said short feed being that which in the intervals of consecutive punching moves the sheet only the distance from center to center of the consecutive panel-

prints on the sheet-face. This short feed being essentially like that heretofore employed, a brief description of it will suffice.

O' is a gripper (similar to gripper O) that projects from a carriage, N'. The movable jaw o''' of this gripper, whenever at liberty to do so, is closed upon the jaw o'' by stress of spring P'. A cam, S', on the main shaft F operates by means of a hinged frame, R', having arm R'', depressed by vertical rod Q', secured to the inner end of rock-bar R''', extending thereover and supporting a clamp-rod, Q'', to simultaneously release jaw o''' and bring into action an elastic clamp or dog, X, that holds the work immovable for the action of the punch. As the frame R' and rod Q', with front end of lever or rock-bar R''', become released from action of the cam S', a spring, T'', causes the front end of the upper lever or rock-bar, R''', to sink and its rear end to rise, so as to simultaneously release the clamp X, and by removing pressure from rear end of jaw o''' to permit spring P' to resume its functions and to cause the said jaw to grip the work.

The parts are so arranged that immediately following the closure of the jaw o''' the short-feed carriage N' (of which it is a projection) is shifted in direction of the feed the distance between the centers of two consecutive prints or panels by action of a spring, T'''. The retrograde stroke of said carriage N' is caused by the action of cam K' (which is keyed to the main shaft F) upon lever M', which impinges against stud n' on said carriage. The upper end of the lever M' is held against the cam K' by means of a spring, T'''. The above movements are repeated until all the card-prints are punched out, leaving a remnant or skeleton upon the table, which skeleton is ejected from the machine by the finger Y, which is operated at the proper juncture by rod-and-lever connection Q'''' R'''' Q'''' R'''' with the long-feed movement. Engagement of finger Y in the meshes of the skeleton is facilitated by a notch, a'', in the table-edge. The finger Y, having fulfilled this mission, is retracted to its normal position by spring T'''. The addition of the automatic long-feed feature in the present machine renders necessary a correspondingly automatic provision for momentary arrest or suspension of action of the ordinary closure of clamp X, in order to insure unobstructed entrance of the new sheet into the machine and under the punch. With this object in view, an arm, 1, that is integrally connected with said clamp by means of a shaft, x, is connected by rod 2 with a lever, 3, which is momentarily deflected by impact with stud 4 upon the long feed lever M. This operates to hold the clamp, for the instant, aloof from the work, even after the normal clamp-operating mechanism previously described could have depressed it.

The place of commencement of the punching action upon the strip has been already explained to be regulated by adjustment of the

long-feed gage U, of which the means W is so located as to enable the attendant to regulate such commencement without stopping the machine or leaving her seat at the table. Regulation of amplitude of short-feed stroke is rendered equally easy and complete by the means following:

5 represents a cam which serves as the short-feed gage or stop, said cam being capable of rotation upon a stud, 6, and having peripheral notches 7 for engagement of worm 8, whose shaft 9 terminates in a knob, 10, which (like the handle W) is of convenient access to the attendant. The short-feed carriage N' is halted by impingement against the cam-surface of the stop 5. This halt occurs earlier or later, (so as to shorten or lengthen the short-feed stroke,) according to whether the more elevated or the less elevated parts of the cam 5 are presented, which presentation in turn depends on manipulation of the knob 10. Thus the proper action of the feed relatively to the punch-strokes to conform to the distances of the consecutive prints is placed under complete and accurate contact at every instant and while the machine is in full operation.

The described initial (long) feed and associated movements secure important saving of time, labor, and material with better results, and enable the machine to perform automatically work that has heretofore required skilled and expensive attendance, working at serious bodily risk.

In all machines of this class a means known as the "stripper" is employed to hold the work down during the ascent of the punch; but such strippers, being only on one, or at most two, sides of the punch, have not always operated satisfactorily, and attempts of operators to supplement such deficiencies of action have been a fruitful cause of accidents. I secure efficient stripping action by the means following:

11 is a short rectangular tube or sleeve which loosely encircles the punch. Vertical slots 12 in opposite sides of this sleeve receive bolts 13, which limit the descent of the sleeve relatively to the punch-point. (See Figs. 7 and 9.) Pins 14, which extend upward from said sleeve 11, impinge on helical springs 15 in sockets z'' in the substance of the cross-head Z. These springs coact with the weight of the sleeve to hold it firmly down upon the work until complete withdrawal of the punch therefrom. Each card in succession, as it is punched loose from the sheet, passes into the box or receiver 16, from whose sliding rest 17 project two bolts, 18, which, traversing slots 19 in the box-sides 22 and through springs 20, carry nuts 21, that bear upon said springs.

Each spring presses upon the sides 22, whose downward flare, coacting with the resilient force of said springs, (which force is regulable by the nuts 21,) operates to increase the resistance to the rest's descent in proportion to the increase of load upon said rest, due to the

gradual accession of newly-punched cards thereupon, so as to maintain a constantly uniform upstress against the punch-point. The upper end of the receiver 16 occupies a recess, a^{VI} , in the table A, so formed as to hold said receiver accurately in place and yet to permit it to be easily removed when desired. The lower end of said receiver is held (see Figs. 1 and 7) fast in step 23 by means of wedge 24, whose withdrawal enables removal of the receiver at any moment. (See Fig. 15.) Such removal is not, however, necessary to enable the attendant to empty the receiver, because such emptying can be effected at any time through the receiver's open front 25.

After being emptied the receiver can be instantly placed in condition for another charge of cards by simply pushing the rest 17 to its uppermost position.

26 represents a latch (which may operate either by spring force or by its own gravity, as represented) to hold the treadle automatically to its effective position. Said latch may be released by simple lateral pressure of the attendant's foot.

I claim herein as new and of my invention—

1. In a machine for punching cards from the printed sheet, the combination, with any suitable punch and short feed and with an adjustable gage, of the long-feed mechanism, constructed and operating substantially as set forth.

2. In a machine for punching cards from the printed sheet, the combination, with a punching mechanism and with a short-feed mechanism, of the auxiliary or long-feed mechanism, whose gripper O is operated from cams K S, which rotate once to as many rotations of the short-feed cams K' S' as the number of card-prints on the sheet, substantially as set forth.

3. In a machine for punching cards from the printed sheet, the provision on the short-feed clamp X of the arm 1, connected by rod 2 with lever 3 in the described combination with stud 4 on the long-feed lever M, as and for the purposes set forth.

4. In a machine for punching cards from the printed sheet, the auxiliary or long-feed mechanism, consisting of supplementary carriage N, having the gripper O, the feed-arm M, the spring T, the hinged frame R R', the rock-bar R⁵, and the duplex cam K S, which mechanism is so connected by gearing L with the short-feed cam-shaft F as to revolve once to as many rotations of said shaft F as the number of card-prints, substantially as and for the purpose set forth.

5. In a machine for punching cards from the printed sheet, the combination, with the described long-feed mechanism, of the adjusting mechanism consisting of the gage U V, having the adjusting-screw W, substantially as set forth.

6. In a machine for punching cards from the printed sheet, the combination, with the described short feed, of the cam-formed stop 5,

the shaft 9, having handle 10, and the worm-gear 7 8, connecting the said stop and shaft, as set forth.

7. In a machine for punching cards from the
5 printed sheet, the combination, with the described long and short feed mechanisms, of receiving-table A', having shoulder a , roller a' , and the elastic lips a'' , a''' , and a^{IV} , substantially as set forth.
- 10 8. In a machine for punching cards from the printed sheet, the combination of punch D, crank-shaft F, cam S', the short-feed gripper O', and the mechanism Q' Q'' R' R'' R''', which connects said cam with said gripper, and the
15 spring T' and clamp X, which operate alternately with said gripper, in the manner and for the purposes explained.

9. The remnant-discharging mechanism, consisting of finger Y, having rod-and-lever connection Q''' \times R''' \times with the long-feed movement, substantially as set forth. 20

10. The combination of a portable receiving-box, 16, step 23, recessed table and die, the box being supported between the step and die through the table, as set forth. 25

In testimony of which invention I hereunto set my hand.

SAMUEL J. MURRAY.

Attest:

GEO. H. KNIGHT,
S. S. CARPENTER.