F. H. RICHARDS.

TYPOGRAPHIC MACHINE.

APPLICATION FILED DEC. 28, 1900. RENEWED FEB. 27, 1909.

916,782.

Patented Mar. 30, 1909.

5 SHEETS—SHEET 1.

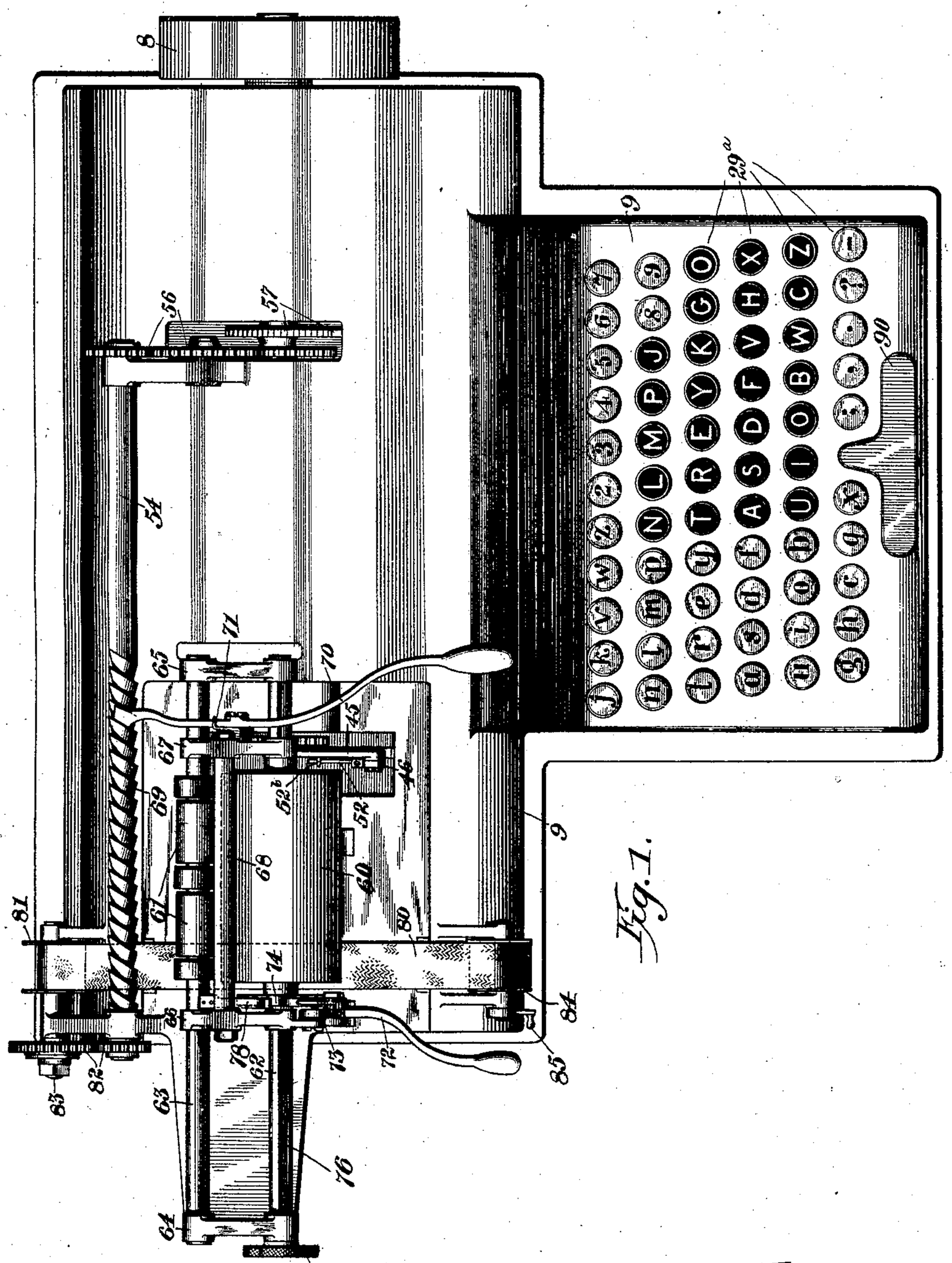

Fig. 1.

Witnesses:-
A. Roy Appleman
F. W. Naviland

Inventor.
F. H. Richards.

F. H. RICHARDS.

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5 SHEETS—SHEET 2.

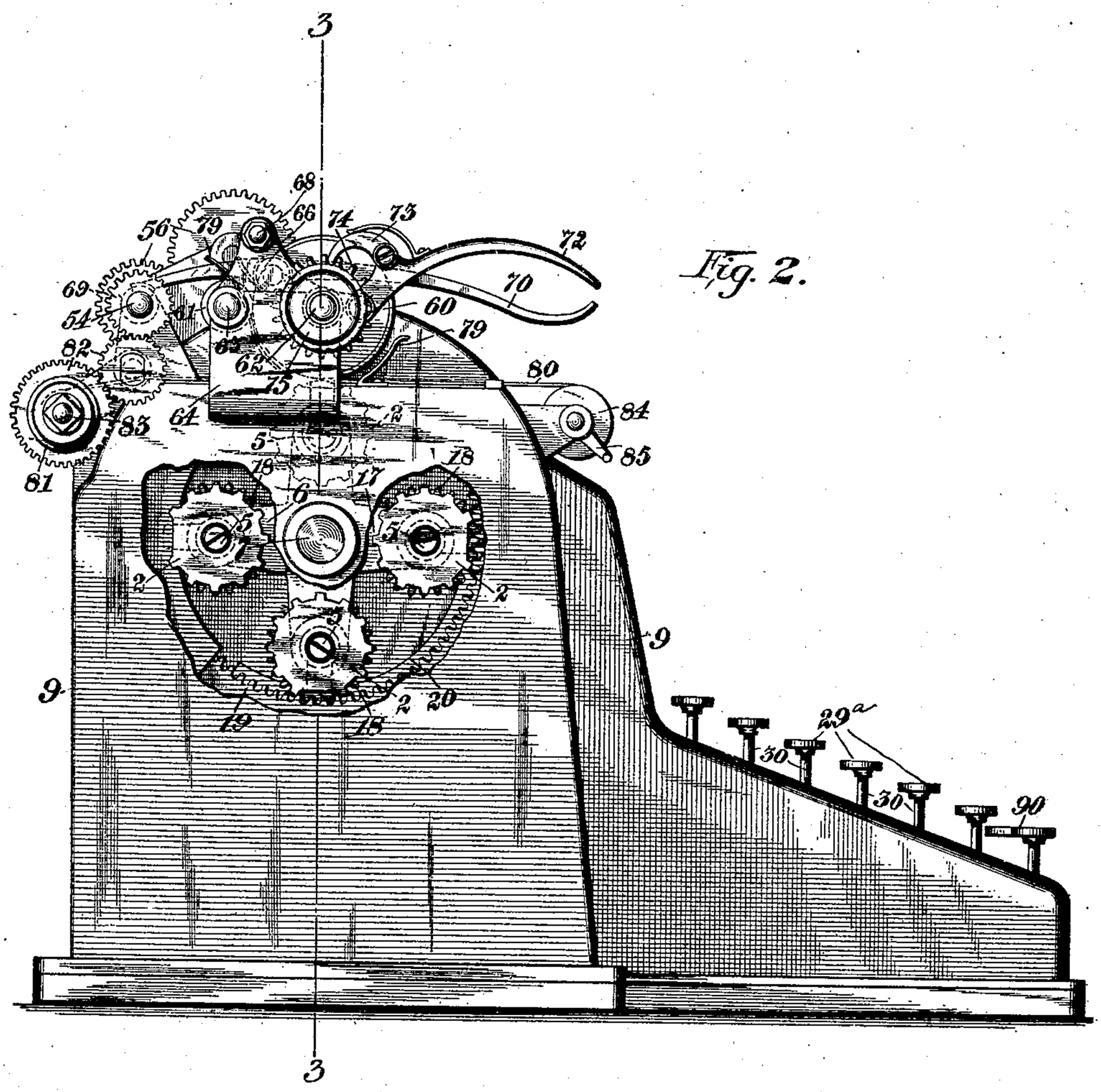

Fig. 2.

Witnesses:-
A. Roy Applemann
F. H. Haviland

Inventor:
F. H. Richards.

F. H. RICHARDS.

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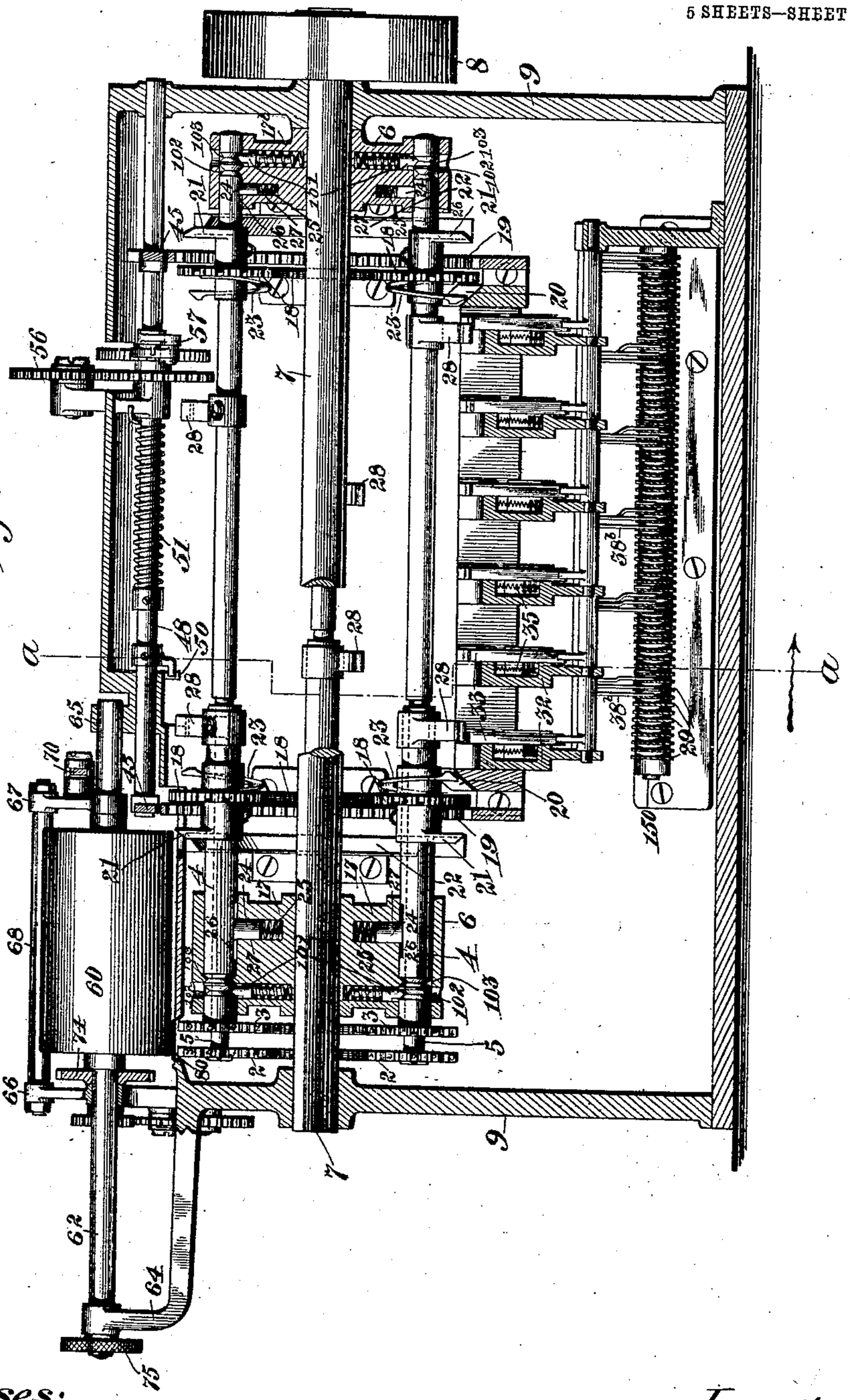
5 SHEETS—SHEET 3.

Fig. 3.



Witnesses:-
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F. W. Haviland

Inventor:
F. H. Richards.

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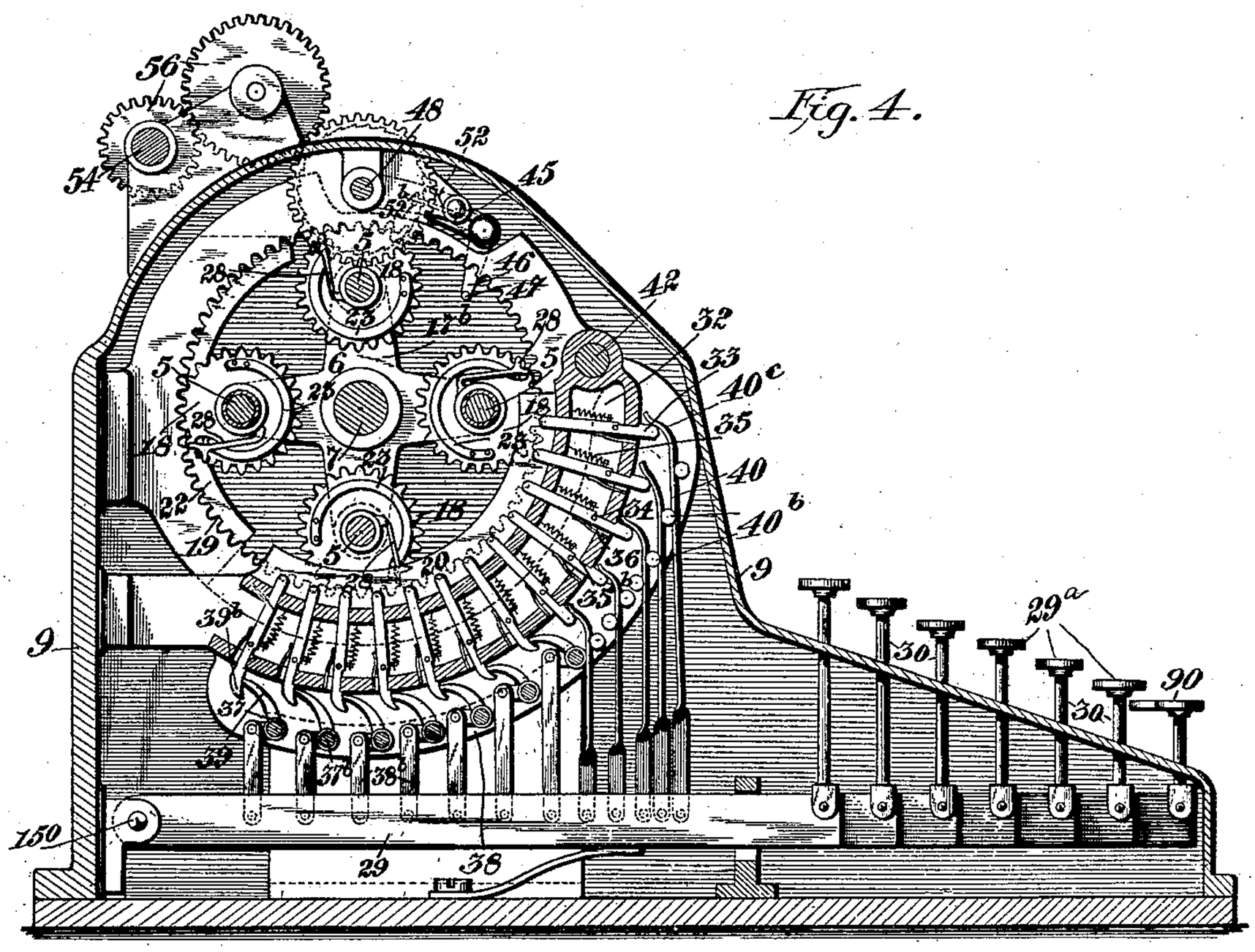
5 SHEETS—SHEET 4.

Fig. 4.



Witnesses:-

A. Roy Appleman

F. H. Haviland

Inventor;

F. H. Richards.

F. H. RICHARDS.

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5 SHEETS—SHEET 5

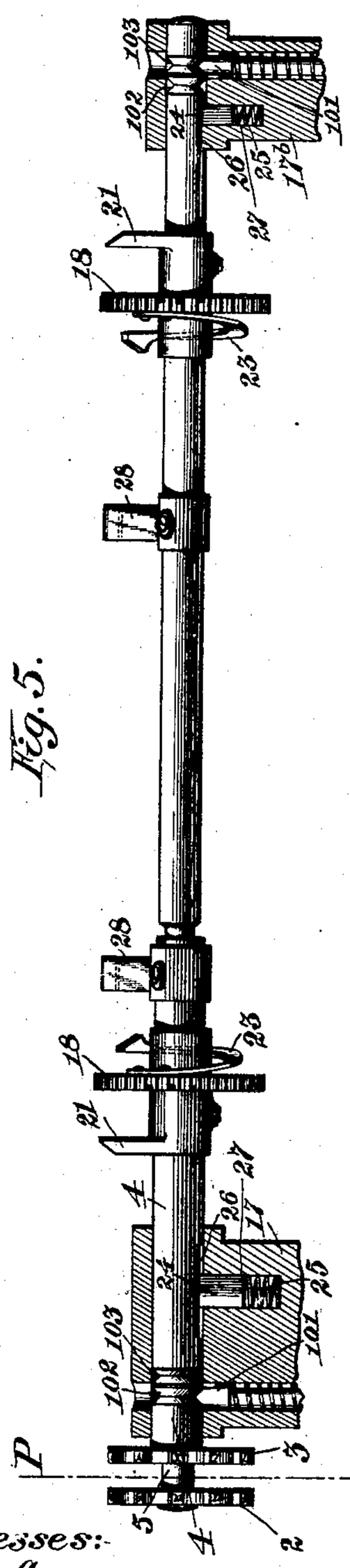

Fig. 5.

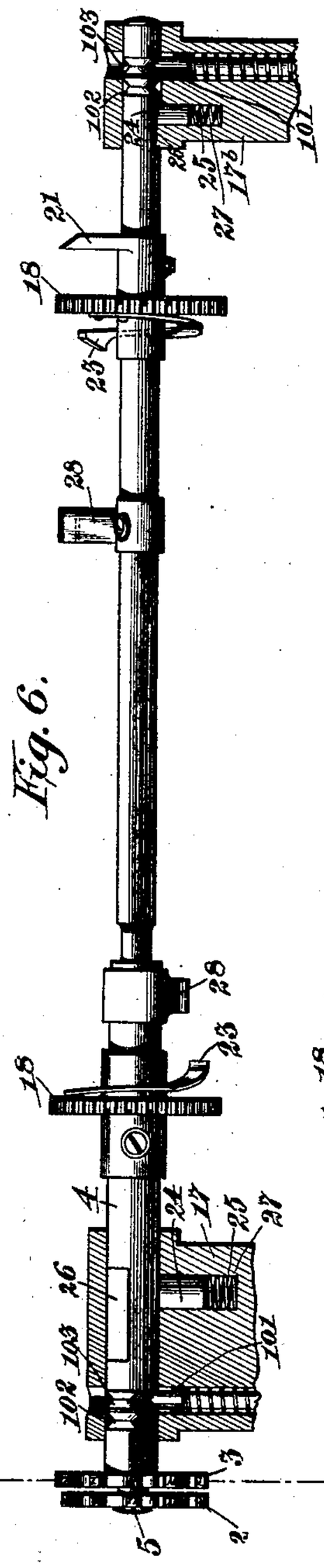

Fig. 6.

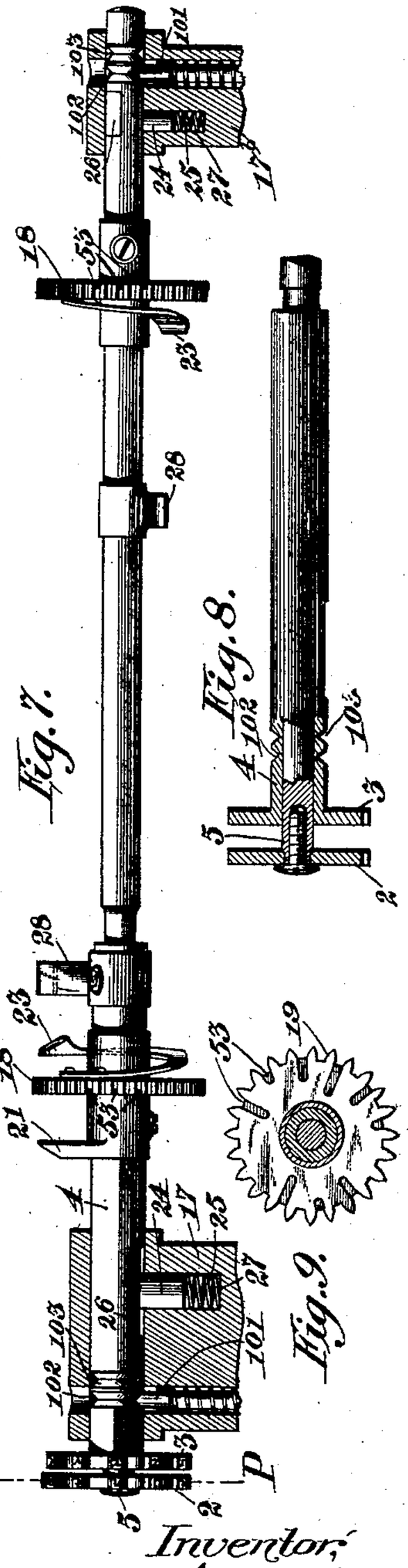

Fig. 7.

Fig. 8.

Fig. 9.

Witnesses:
A. Roy Appleman
F. H. Maitland

Inventor:
F. H. Richards.

UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO AMERICAN TYPOGRAPHIC CORPORATION, A CORPORATION OF NEW JERSEY.

TYPOGRAPHIC MACHINE.

No. 916,782. Specification of Letters Patent. Patented March 30, 1909.

Application filed December 28, 1900, Serial No. 41,347. Renewed February 27, 1909. Serial No. 480,468.

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Typographic Machines, of which the following is a specification.

This invention relates to typographic-machines of that class in which the impression devices consist of wheels or rolling-impressors capable of a double circuital movement, one in an orbital or closed circuit path and the other a movement of rotation about the several axes of the impressors.

An object of the present invention is to furnish a machine of this class which may be provided with a large number of types or dies and is adapted for making a large number of impressions while keeping the size and mass of the impression mechanism relatively small and capable of operation at a high velocity.

In carrying out my invention a plurality of impression devices or rolling-impressors are employed capable of independent axial movement toward and away from a fixed plane. To permit of this movement and other motions of which they are capable the impressors are conveniently carried upon shafts which are according to the present invention located one within the other. When the wheel or impressor carried upon any particular shaft is to be operated this shaft, when it is started rotating, (or at some other time before an impression is made,) is shifted lengthwise or axially to its proper, operative, axial position, and after the impression has been made the shaft is returned to its original or inoperative axial position. A similar operation takes place when another of the impressors carried by an associated shaft is to be used; to use this latter device therefore its actuating shaft is given a longitudinal or endwise movement so as to bring the impressor carried by it into the plane or operative axial position previously occupied during its own period of operation by the first-mentioned impressor. For permitting this mode of operation a space is provided between the planes in which the orbital paths of such associated impressors are described when in idle or inoperative positions, into which space an impressor is shifted when it is desired that an impression shall be made.

The invention embodies also, in combination with the foregoing, a set of selective devices whereby a particular type or die upon any impressor may be caused to perform its function to the exclusion of all others, the operation of any type or die being, therefore, under control.

A machine embodying the various features of this invention will be described in the following specification with the aid of the accompanying drawings, in which—

Figure 1 is a plan view of such a machine. Fig. 2 is a side elevation thereof, parts being broken away the better to show parts lying beyond. Fig. 3 is a longitudinal section on the plane of the line 3—3, in Fig. 2, looking from the front toward the rear of the machine. Fig. 4 is a cross-section upon the planes of the broken line *a*—*a*, in Fig. 3, looking in the direction of the arrow. Fig. 5 is a side view upon a somewhat larger scale than the foregoing views of a set of associated shafts showing the impressors carried thereby in an idle or inoperative axial position. Fig. 6 is a similar view showing one of the impressors as lying in the operative plane. Fig. 7 is a view similar to Figs. 5 and 6, showing the impressor, which in Fig. 6 is represented as lying in the operative plane, as having been shifted therefrom, while the other impressor of the set is represented as having been brought into that plane. Fig. 8 is a side elevation partly in section showing the relative disposition of a set of associated shafts with their impressors; and Fig. 9 is a side or radial face view of a certain feed wheel or disk.

Similar characters of reference designate corresponding parts in all the figures.

An organization is shown adapting the features of the invention to use in a typewriting-machine, but the invention is not limited, it will be understood, to such particular embodiment, it being applicable, in whole or in part, as respects its various features, to typographic-machines in general, or machines in which an impression device is designed to operate upon or affect a certain surface.

The impression devices of this machine are rotary or rolling impressors consisting of one or more parts provided with one or more impression types or dies. These parts (which, with their types or dies, will hereinafter gen-

erally be referred to as impressors) are disposed on opposite sides of a fixed plane, (hereinafter referred to as the operative plane.) Two such impressors forming a set are shown in Figs. 5 to 8, inclusive, and designated by the numbers 2 and 3. Normally, or in an inoperative axial position, the two impressors as here shown of a set are separated a space at least sufficient to permit either impressor to be shifted lengthwise of its axis of rotation toward the other into the same position relative to the operative plane, (see lines P—P, in Figs. 5, 6, and 7). For this purpose they may be affixed to shafts 4 and 5, respectively, which are disposed on one side mainly of the operative plane and are fitted the one shaft to rotate and move axially within the other.

The impressors, as before stated, are adapted to have both a motion in a closed circuit or orbital path and at times a rotary motion about their own axes. In the particular instance illustrated this closed circuit or orbital motion is that of revolution about an axis exterior to the impressors and for the purpose of conveniently enabling this double motion to be attained the shafts 4 and 5 carrying the impressors 2 and 3, respectively, are shown mounted in a turret or rotary carrier 6, which may be rotated by a shaft 7 through the medium of a pulley or band-wheel 8 from a convenient source of power. The bearings of this shaft 7 are supported by a suitable fixture or fixtures, which, in the present instance, are constituted by the protecting casing 9 inclosing the mechanism. Such a number of sets of impressors as are desired within the capacity of the turret are mounted thereupon, bearing types or dies and affixed to appropriate associated shafts. The exterior or tubular shaft 4 of each set may be journaled in an arm 17, extending from and secured to the shaft 7 while the inner shaft 5 of each set is journaled in its associated exterior shaft and in an arm 17^b. These several arms 17 and 17^b may be considered in this instance as constituting the turret 6.

As before mentioned, each set of associated shafts 5 and 4 is adapted to have a rotary motion imparted independently to its component shafts in addition to the orbital motion they may have by virtue of the rotation of the turret 6, and for this purpose to each shaft there may be secured a gear or toothed wheel 18, engaging at times with a driver, in this case an internal driving-gear 19, one for the series of several inner or solid shafts 4, and another for the series of several or exterior shafts 5. These internal gears 19 and 19 are shown as being secured to the casing 9, and they afford a convenient and positive means when a gear-wheel 18 is in engagement with one of them for effecting a rotation of each gear-wheel.

The endwise or axial movement of each shaft 4 and each shaft 5 for bringing the corresponding impressor into and withdrawing it from the operative plane is utilized for engaging the gear 18 on the shaft with and disengaging it from the corresponding driver 19 for that series. To effect this endwise movement in one direction there may be combined as shown in the present instance with each series of shafts 4 and 5 an actuating member or cam 22 with which coöperates a coacting or cam arm 21 on each shaft of the corresponding series for shifting each shaft of that series toward and bringing the corresponding impressor into the operative plane. It will be manifest that since the two series of shafts move in opposite directions to approach the operative plane, the cam 20 and cam-arms 21 for the two series will face in opposite directions. For returning the shafts there may be an actuating member or cam 20 for each series, with which coöperates a coacting or cam arm 23 projecting from each shaft of its respective series which accomplishes the shifting of the several shafts backward and the withdrawal of the corresponding impressor from said plane. These coacting cams and cam-arms for the two series of shafts also, it will be understood, are oppositely facing. Each arm in one of these two series of cam-arms 21 and 23, here shown to be cam-arms 23, is shown to have its operative surface located at the end of a flexible or spring-like strip, which method of supporting the operative portion will tend to suppress the violence of the shock when the parts come in contact. The cams 20 and 22 for each series of shafts may be attached to the casing 9 and are located in the proper positions to coöperate with their respective coacting arms, while the distance each causes a shaft to move axially is not sufficient to carry the other arm of that shaft which coacts with the other cam beyond the point where contact of this arm would take place with its cam when the shaft has been swung around to render the arm operative. The two cams 20 and 22 of each series are situated on substantially diametrically-opposite sides of the circle in which the operative ends of their cam-arms move, and each cam is of a length to insure the contact of an arm with it as a shaft rotates about its own axis and revolves about the axis of the turret, producing as a result a movement of a shaft to and fro for each rotation of the turret 6.

Each of the shafts 4 and 5 will be provided with some form of device for resisting to a considerable degree an axial movement thereof for the purpose of holding the shaft normally in place. For instance, a spring-pressed detent 101 may be urged into either one of two grooves 102, 103, corresponding to the axial positions of the shaft. If the sides of these grooves are made slanting and

the detent corresponds in form the pressure inward of the detent will cause a degree of end thrust in the shaft tending to complete the operations of the shifting cams 20 and 22. Some forms of a precision-brake for stopping the rotation of a shaft 4 or 5 in a determined angular position when its gear-wheel 18 has been thrown out of engagement with the driving-gear 19 will also be provided. The device shown in the present instance comprises a plunger 24, pressed outward by a spring 25 against a facet 26 upon the shaft. The plunger works in a cylinder 27 formed in a fitting extending from the shaft 7. In the present instance the arms 17 and 17^b constitute these fittings for the two series of shafts.

For initiating the rotary movement of the separate shafts in a set, each shaft is provided with a starting-arm 28 operating substantially in the manner set forth in Patents Nos. 401,371 and 573,620, granted to me on April 16, 1889 and December 22, 1896, respectively, which may be consulted for a detailed description of its construction and mode of operation. The starting-arm 28 on each shaft may be arranged in a different plane to that of the starting-arm on any other shaft for a purpose that will be explained later.

Referring now to certain selective devices whereby any shaft 4 or 5 may be set in rotation and the amount of such rotation that shall occur up to a fixed point where an impression device is to operate be under control, these results are herein attained by the employment of a series of latch mechanisms, the tripping of any one of which will cause a reciprocating latch or bolt to protrude into the path of the revolving starting-arm which engages therewith and turns the shaft in its bearing on the turret 6, itself resetting the latch in the manner set forth in the aforesaid patents. Any suitable mechanism of this character may be employed or that particular organization thereof to be described.

Each latch mechanism herein shown is operated by means of a spring-elevated rock-lever 29, actuated by pressure upon a key 29^a adjacent to its outer end. A number of these rock-levers 29 are shown corresponding in number to the types or dies upon the impressors. They may all be fulcrumed at the rear of the casing 9—for instance, by the rod 150—and may each have a push-rod 30 extending upward through an opening at the front of the casing and supplied at its top with a fingerpiece or key 29^a. There will be as many latches or bolts in the latch mechanisms designed to actuate any single shaft 4 or 5 mounted in the turret 6 as there are types or dies upon the impressor affixed to that particular shaft. Furthermore these latches are arranged at different distances from the point at which the types or dies operate, or impression is made, for the purpose of initiating the rotary movement of the shaft at different distances from the said fixed point. The latch mechanisms for initiating the movements of any single shaft will all be located in the same plane in which the starting-arm 28 thereon swings, while this latter is made of a width sufficient to preclude the passing to one side free of the latch mechanism despite the axial shifting of the shaft to which the arm is attached. In Fig. 4 there are shown twelve separate latches substantially in the same plane, but of course this number may be increased or diminished according to the number of types or dies it is desired that each impressor shall have. Each series of latches for operating any one shaft is conveniently located in a latch frame 32, so formed and located as to permit the inner ends of the latches or bolts therein to be arranged circularly or concentrically with reference to the axis of the turret 6. Each latch mechanism comprises a bolt or latch 33 fitted to slide through suitable openings in the latch frame toward and away from the turret axis, and each latch, in the present instance, is held in its inoperative or retracted position by a notch 34 thereof, which fits over the edge of an opening in the latch frame and prevents the latch from being thrown inward under the tension of spring 35 by reason of the contact of the side of this notch with a shoulder 35^b in the latch frame opening. A spring 36 normally holds this notch 34 pressed against the shoulder 35^b of the opening in the frame, but the opening is wide enough to permit a sufficient lateral movement of the latch when the notch is pressed away from the shoulder for the latch to clear the latter.

Suitable intermediate devices are inserted between each rock-lever 29 and its corresponding latch or bolt 33. As shown in Fig. 3, some of these intermediate devices comprise each an angle-lever 37 pivoted to a stud 37^b extending from a flange 38 of the latch frame 32, one of the arms of the angle-lever being connected to its corresponding rock-lever 29 by a link 38^b, while the other arm of said angle-lever is made in the form of a finger 39, which passes over a projecting toe 39^b on the latch. The downward movement of a finger 39 presses the notch 34 away from the shoulder 35^b and permits the corresponding latch to be thrown inward. Others of the latch mechanisms are shown as constructed to be each tripped by means of a finger 40, pivoted or otherwise connected to a rock-lever 29, the finger being guided by pins 40^b on opposite sides thereof and having its angularly-extending upper end 40^c lying above the extremity of the latch. The various rock-levers 29, angle-levers 37, links 38^b, and fingers 40 concerned in the actuation of any one starting arm are made of such

forms and dimensions as will permit the motions of the several rock-levers when lying side by side as shown, to be transmitted and serve to operate the latches or bolts arranged in the plane of the starting arm. The several latch frames 32 for supporting the several sets of latch mechanisms may be conveniently held in place upon a rod 42, extending from end to end of the machine.

A step-by-step motion or a motion of any other character to properly feed the material whose surface is to be impressed or acted upon may be imparted to such material by any suitable means, or that herein shown which is designed to accomplish a step-by-step or intermittent movement.

Supported at the end of a swinging lever 45 is a floating arm 46, provided with a laterally-extending pin or projection 47, which contacts with and is moved by a shoulder upon a feed-wheel or disk for the purpose of accomplishing such feeding movement. Normally (assuming that the turret 6 is rotating but that no impressor has been shifted into the operative plane to effect an impression) there is no contact of this pin 47 with the shoulder upon the feed-wheel or disk, but when an impressor has been shifted into the operative plane, contact will be made sometime during the orbital and rotary movement of the impressor between a shoulder upon a corresponding feed-wheel or disk and the pin or projection 47. There is a swinging lever 45 and a floating arm 46 supplied with a pin 47 for each of the series of impressors upon opposite sides of the operative plane, or in other words, each series of inner and each series of outer shafts. The swinging levers 45 are affixed to a rock-shaft 48 mounted in suitable bearings which may be supported from the casing 9. The rotation of the rock-shaft 48 in one direction past a predetermined point is prevented by a stop 50, while a spring 51 constantly urges the shaft to this fixed position. Normally, or while the rock-shaft 48 is in its fixed position, and is not being turned in its bearings, the direction taken by a floating arm 46 may be, if a feed before impression is desired, as shown in Fig. 4, where it is seen pointing toward that side of the turret axis which is moving toward it when the turret is rotating. The floating arm 46, however, may not only be moved upward in the manner pointed out below to turn the rock-shaft 48, but may also be deflected upon its normal position relative to the lever 45, being designed to return to such normal position when free to do so. To bring about this return it may be provided with an elastic finger 52 confined between stops 52^b, 52^b. The feed disks or wheels mentioned as coöperating with the pins 47, 47, may be formed upon separate and independent disks attached to the several shafts 4 and 5 of the two series of shafts or the gear-wheel 18 upon each shaft may perform the function of such feed disk as herein illustrated. The shoulder stated as co-acting with a pin 47 may be formed as shown by notching the radial face of each gear-wheel as indicated by 53, or such shoulder may be formed by the bottom of the gear-wheel tooth, which, for the purpose, may be regarded as a notch.

Each floating arm 46 is arranged adjacent to that set of feed-wheels or as here shown gear-wheels 18 with which it is designed to coöperate, and upon that side of the gear-wheels toward which they are shifted to engage with a driver 19, and it is therefore during this longitudinal or axial movement that contact of the pin 47 takes place with a shoulder on the feed or gear wheel. The lateral flexibility of the pin 47 permits it to readily seat itself in the bottom of a notch 53, whereupon further orbital and rotary movement of the gear-wheel 18 causes the elevation of the floating arm 46 from which the pin 47 extends and the consequent partial rotation of the rock-shaft 48 with which it communicates. Finally, as the wheel continues its double circular movement the pin 47 is rolled out of its notch, the floating arm 46 simultaneously deflecting with reference to the swinging lever 45 and the spring 51 and finger 52 return the parts to their original positions. A movement of a floating arm 46 may take place if so desired each time the engagement of a gear-wheel 18 with its driver 19 occurs, and hence a feeding movement results for each movement of an impressor into the operative plane. A variation in the amount or degree of this feeding movement may be desired; for instance, where a number of types or dies of varying width are used. This may be secured by altering the radial depth of the notches upon the feed-wheel, or gear-wheel, 19, resulting thereby in the turning of the rock-shaft 48 through different arcs. It will be understood therefore that the entrance of a pin 47 into a particular notch 53 corresponds to the appearance of a particular type or die at the fixed or impression point.

Intermittent motion may be imparted to a feed-shaft 54 here shown as being arranged at the top of the casing 9 from the rock-shaft 48 by means of a system of gears 56 extending through an opening in the casing, and embodying a pawl-and-ratchet mechanism 57.

The present embodiment of the invention being shown as a typewriting-machine, the printing platen may be in the form of a rotary cylinder 60, guided to move with any desired number of companion pressure rolls 61 endwise along guide-bars 62 and 63, entering stationary brackets 64 and 65, extending from the casing 9. For the purpose of permitting an endwise feeding movement of the rotary platen 60 and the pressure rolls 61,

they may lie between side frames 66 and 67, secured together by a stretcher-rod 68. The feed-shaft 54 may be of any appropriate construction to effect the endwise intermittent feeding movement of the rotary platen 60. As shown it is formed with a ratchet thread 69, with which engages an arm 70, extending from the frame 67. This arm 70 will preferably be pivoted to the frame and be pressed downward into engagement with the ratchet thread 69, by a spring 71 for instance, which will permit a disengagement from the thread by the exertion of a pressure upon the outer end of the arm 70. The platen 60 may have the usual return spring, (not shown) while the inclined surface of the ratchet screw 69 allows the arm 70 to slide endwise of the feed-shaft when the platen is pushed backward along its guides.

A ratchet mechanism may be provided for imparting a step-by-step rotation to the platen 60 and comprise a pawl-operating handle 72 carrying a spring-pressed pawl 73 engaging with a ratchet-wheel 74 affixed to the platen or an extension thereof, while a more or less continuous rotary movement may be given to the platen manually by means of a thumb wheel 75 secured to the guide-bar 62, which is for this purpose mounted to turn in the end brackets 64 and 65, and provided with a longitudinal groove 76, into which extends a pin projecting from the platen 60.

A retaining device is designated by 78 for holding the platen in a desired rotary position.

A paper guide is designated by 79.

The usual inking ribbon is designated by 80, the take-up roller 81 of the mechanism being driven in any suitable manner, for instance, as herein shown through a system of gears 82 from the feed-shaft 54. Preferably the take-up roller 81 has a frictional connection with its driving-shaft 83 to permit of a reverse movement of the roller around its moving driving-shaft when the ribbon 80 is wound back upon its supply roller 84 by means of a crank 85. The supply roller 84 is prevented by suitable means (not shown) from turning too freely. These requirements are usually fulfilled by the ordinary inking ribbon device and need not be here more fully described.

It has been stated that the types or dies upon each impressor is different from the types or dies upon any other. If this is the case it may happen that upon tripping the latch mechanism to prevent its latch 33 to intrude into the path of the corresponding starting arm 28, that that particular arm has just passed the point at which it would be actuated and set in motion. It will not therefore enter upon a rotary motion until it has again reached the projected latch, making thus very nearly a complete revolution about the axis of the turret 6. It may, however, be advisable to reduce this possible maximum period elapsing from the time of the manipulation of the latch until the impression shall be made, and for this purpose any impressor in the series formed by the impressors attached to the inner shafts 4 or in the series formed by the impressors attached to the tubular shafts 5 may have one or more duplicates in that series. Such is the idea involved in the construction set forth at the left-hand portion of Fig. 4, in which each pair of diametrically-opposite tubular shafts are respectively provided with duplicate impressors. The starting-arms 28 upon the shafts carrying duplicate impressors will then need to be in the same plane transverse to the axis of rotation of the turret in order to be conveyed into a position where they may be actuated by the same set or row of latch mechanisms. Disposed in this manner, should a latch 33 have been thrown inward after a starting-arm 28 has passed, the arm of another duplicate impressor will be actuated and thus the necessity of the starting-arm which has just left the actuated latch mechansim making a complete revolution before the desired impression can be made, will be avoided.

The customary space-key is shown at 90, which operates through an intervening rock-lever 29, latch mechanism and starting-arm 28 similar to those that have been described to initiate the rotation of a shaft 4 or 5 for the purpose of shifting the same toward the operative plane. Although a feeding movement will thereby take place in the manner already described, the relation between the types or dies and the spaces upon the particular impressor 2 or 3 and the amount that such impressor is caused to rotate by the manipulation of the spacing key is such as to bring a blank space, (see 250,) instead of a type or die in juxtaposition to the plate.

The operation of a machine constructed as illustrated may be briefly described as follows: Assuming that a key has been depressed, thereby actuating the rock-lever 29 to which it is attached, the corresponding latch 33 is permitted to be thrown inward by the attached spring 35 and the first starting-arm 28 in the plane of that latch to reach it will engage with its end. The continued rotation of the turret 6 causes the engaged starting-arm to swing around as also its shaft until by the contact of the cam-arm 21 with the inclined surface of cam 22, the gear-wheel 18, its shaft and attached impressor 2 or 3 are moved endwise and the impressor shifted into the operative plane, whereupon the gear-wheel 18 meshes with the driver 19; the detent 101 has in the meantime sprung into the groove 102′ and maintains the parts in this axial position. Rotation of the said shaft now takes place, the continued swing-

ing of the starting-arm 28 having in the meantime reset the latch 33, until that type or die of the actuated impressor to which the particular key operated is referable, has reached the platen 60 or fixed point where it is designed that the type or die shall operate, whereupon the latter rolls around upon the surface of the object there placed and the impression is made. Just before reaching this point, however, the pin 47 has entered a predetermined notch 53 in a feed-wheel whose function is performed, as already explained, by the gear-wheel 18, and the rock-shaft 48 is turned to cause a feed in the manner already described. As soon as the pin 47 is free from the particular notch into which it enters to effect the feed, the shaft 48, &c., are returned to their normal positions by the spring 51 and elastic finger 52. Soon after this, by reason of the continued rotation and revolution, the cam-arm 23 contacts with the cam 22, and the impressor shaft being free to move endwise is shifted back to its original position, the retaining detent 101 springing back into the groove 103. Gear-wheel 18 is withdrawn from the driver 19 simultaneously with this return movement, and the shaft brought to rest in its normal position by the brake-plunger 24, sliding onto the facet 26, assisted to some degree by the action of the detent 101, as aforesaid. Simultaneously the impressor has been withdrawn from the operative plane leaving a space for the entrance of the impressor of the other series if one in this series should be the next to respond to the tripping of a latch 33 for the purpose of causing the operation of the second type or die.

Having described my invention, I claim—

1. The combination, with a carrier adapted to move in a closed circuit or orbital path, and parts mounted thereon which are adapted to move toward a fixed plane, the one in one direction and another in the opposite direction and away from the plane in reverse directions, of means located upon one side of said plane for causing the movements of said parts toward and away from the plane.

2. The combination, with a carrier adapted to move in a closed circuit or orbital path, and parts mounted thereon which are adapted to move toward and away from a fixed plane extending between them, of means located upon one side of said plane for causing the movements of said parts toward and away from the plane.

3. The combination, with a rotary carrier or turret and parts mounted thereon which are adapted to move toward a fixed plane, the one in one direction and another in the opposite direction and away from the plane in reverse directions, of means located upon one side of said plane for causing the movements of said parts toward and away from the plane.

4. The combination, with a rotary carrier or turret, and parts mounted thereon which are adapted to move toward and away from a fixed plane extending between them, of means located upon one side of said plane for causing the movements of said parts toward and away from the plane.

5. The combination, with a carrier adapted to move in a closed circuit or orbital path and parts disposed in a set mounted thereon which are adapted to move toward a fixed plane, the one in one direction and another in the opposite direction and away from the plane in reverse directions, of means located upon one side of said plane for causing the movements of said parts toward and away from the plane.

6. The combination, with a carrier adapted to move in a closed circuit or orbital path and parts disposed in a set mounted thereon which are adapted to move toward and away from a fixed plane extending between them, of means located upon one side of said plane for causing the movements of said parts toward and away from the plane.

7. The combination, with a rotary carrier or turret and parts disposed in a set mounted thereon which are adapted to move toward a fixed plane, the one in one direction and another in the opposite direction and away from the plane in reverse directions, of means located upon one side of said plane for causing the movements of said parts toward and away from the plane.

8. The combination, with a rotary carrier or turret, and parts disposed in a set mounted thereon which are adapted to move toward and away from a fixed plane extending between them, of means located upon one side of said plane for causing the movements of the parts toward and away from the plane.

9. The combination, with a carrier adapted to move in a closed circuit or orbital path and impressors mounted thereon which are adapted to move toward a fixed plane, the one in one direction and another in the opposite direction and away from the plane in reverse directions, of means located upon one side of said plane for causing the movements of said impressors toward and away from the plane.

10. The combination, with a carrier adapted to move in a closed circuit or orbital path, and impressors mounted thereon which are adapted to move toward and away from a fixed plane extending between them, of means located upon one side of said plane for causing the movements of said impressors toward and away from the plane.

11. The combination, with a rotary carrier or turret and impressors mounted thereon which are adapted to move toward a fixed plane, the one in one direction and another in the opposite direction and away

from the plane in reverse directions, of means located upon one side of said plane for causing the movements of said impressors toward and away from the plane.

12. The combination, with a rotary carrier or turret, and impressors mounted thereon which are adapted to move toward and away from a fixed plane extending between them, of means located upon one side of said plane for causing the movements of said impressors toward and away from the plane.

13. The combination, with a carrier adapted to move in a closed circuit or orbital path and impressors disposed in a set mounted thereon which are adapted to move toward a fixed plane, the one in one direction and another in the opposite direction and away from the plane in reverse directions, of means located upon one side of said plane for causing the movements of said impressors toward and away from the plane.

14. The combination, with a carrier adapted to move in a closed circuit or orbital path and impressors disposed in a set mounted thereon which are adapted to move toward and away from a fixed plane extending between them, of means located upon one side of said plane for causing the movements of said impressors toward and away from the plane.

15. The combination, with a rotary carrier or turret and impressors disposed in a set mounted thereon which are adapted to move toward a fixed plane, the one in one direction and another in the opposite direction and away from the plane in reverse directions, of means located upon one side of said plane for causing the movements of said impressors toward and away from the plane.

16. The combination, with a rotary carrier or turret, and impressors disposed in a set mounted thereon which are adapted to move toward and away from a fixed plane extending between them, of means located upon one side of said plane for causing the movements of the impressors toward and away from the plane.

17. The combination, with a rotary carrier or turret, and a tubular or exterior shaft having an inner shaft and which is mounted upon said carrier or turret and adapted to move independently of said inner shaft toward and away from a fixed plane, and an impressor attached to said exterior shaft, of means for causing the axial movement of the said exterior shaft toward and away from the plane.

18. The combination, with a rotary carrier or turret, and a tubular or exterior shaft having an inner shaft and which is mounted upon said carrier or turret and adapted to move independently of said inner shaft toward and away from a fixed plane, and an impressor attached to said exterior shaft, of means for causing the axial and rotary movements of the said exterior shaft.

19. The combination, with a rotary carrier or turret, and a tubular or exterior shaft having an inner shaft and which is mounted upon said carrier or turret and adapted to move independently of said inner shaft toward and away from a fixed plane, and impressors attached to said shafts, of means for independently causing the axial movements of said shafts toward and away from the plane; and means for rotating said shafts when shifted toward the said plane.

20. The combination, with a rotary carrier or turret, and a tubular or exterior shaft having an inner shaft and which is mounted upon said carrier or turret and adapted to move independently of said inner shaft toward and away from a fixed plane, of a gear secured to each of said shafts, and a driver with which each of said gears is adapted to engage when the shaft is in one of its axial positions.

21. The combination, with a rotary carrier or turret, and a tubular or exterior shaft having an inner shaft and which is mounted upon said carrier or turret and adapted to move independently of said inner shaft toward and away from a fixed plane, and impressors attached to said shafts, of a gear attached to each of said shafts; a driver with which each of said gears is adapted to engage in an axial position of its corresponding shaft; and a starting arm secured to each shaft.

22. The combination, with a rotary carrier or turret, and a tubular or exterior shaft having an inner shaft and which is mounted upon said carrier or turret and adapted to move independently of said inner shaft toward and away from a fixed plane, and impressors attached to said shafts, of a gear attached to each of said shafts; a driver with which each of said gears is adapted to engage in an axial position of its corresponding shaft; a starting-arm secured to each shaft; and selective devices for engaging with said starting-arm and causing the rotation of an impressor and for causing any particular type or die thereon to appear at a fixed point.

23. The combination, with a rotary carrier or turret, and a tubular or exterior shaft having an inner shaft and which is mounted upon said carrier or turret and adapted to move independently of said inner shaft toward and away from a fixed plane, and impressors attached to said shafts, of a gear attached to each of said shafts; a driver with which each of said gears is adapted to engage in an axial position of its corresponding shaft; a starting-arm secured to each shaft; and comprising latch mechanisms for engaging with said starting-arm and causing the

rotation of an impressor and for causing any particular type or die thereon to appear at a fixed point.

24. The combination, with a rotary carrier or turret, of a set of shafts mounted thereon comprising an inner and an exterior shaft adapted to rotate and move axially independently of each other; an impressor secured to each shaft and adapted to move in opposite directions toward a fixed plane extending between them; a gear affixed to each shaft; a driver for each gear with which the latter is adapted to engage in an axial position of a shaft to rotate the same; a starting-arm secured to each shaft; an actuating and a coacting member for shifting each shaft in one direction; means for shifting it in an opposite direction; and selective devices for engaging with the starting-arm on each shaft to effect a turning of the same and the coaction of the said members for the purpose of shifting the shaft in one direction.

25. The combination, with a rotary carrier or turret, and a tubular or exterior shaft having an inner shaft and which is mounted upon the carrier or turret, the said shafts being adapted to move independently of each other toward and away from a fixed plane, of impressors attached to said shafts; feed-wheels mounted on the shafts; and feed mechanism adapted to be actuated by a feed-wheel when the shaft to which it is attached is shifted axially.

26. The combination, with a rotary carrier or turret, and a tubular or exterior shaft having an inner shaft and which is mounted upon the carrier or turret, the said shafts being adapted to move independently of each other toward and away from a fixed plane, of impressors attached to said shafts; feed-wheels mounted on the shafts; feed mechanism comprising a swinging lever and a pin or projection adapted to engage with a notch upon the feed-wheel and adapted to be actuated by a feed-wheel when the shaft to which it is attached is shifted axially.

27. The combination, with a rotary carrier or turret, and a tubular or exterior shaft having an inner shaft and which is mounted upon the carrier or turret, the said shafts being adapted to move independently of each other toward and away from a fixed plane, of impressors attached to said shafts; feed-wheels having notches upon their faces of different radial depths mounted on the shafts; feed mechanism comprising a swinging lever; and a pin or projection adapted to engage with a notch upon the feed-wheel and adapted to be actuated by a feed-wheel when the shaft to which it is attached is shifted axially.

28. The combination with an exterior tubular shaft of an interior shaft assembled therewith, a carrier upon which the shafts are mounted, and mechanism for selectively axially shifting the shafts with respect to the carrier.

29. The combination with an exterior tubular shaft and an interior shaft assembled therewith; of means for selectively rotating and axially shifting said shafts.

30. The combination with an exterior tubular shaft and an interior shaft assembled therewith; of means for selectively rotating and shifting said shafts axially, one in one direction and the other in the opposite direction.

31. The combination with a tubular shaft of a shaft assembled therewith, a carrier upon which the shafts are mounted, and mechanism for selectively shifting each shaft with relation to the other.

32. The combination with a tubular shaft, of a shaft assembled therewith, a carrier upon which the shafts are mounted, and mechanism for selectively shifting each shaft toward the other, one at a time.

33. The combination with mechanically separable and rotatable parts, of mechanism operative in conjunction with said parts for selectively moving said parts with relation to each other.

34. The combination with mechanically separable and rotatable parts, of mechanism operative in conjunction with said parts for selectively moving said parts with relation to each other, one at a time.

35. The combination with mechanically separable and rotatable parts, of a carrier upon which said parts are movably mounted and mechanism located at one side of said parts for selectively shifting the same one toward the other.

36. The combination with mechanically separable and rotatable parts, of means for carrying said parts, and mechanism located at one side of said parts for selectively shifting the same one toward the other.

37. The combination with mechanically separable parts, which are also rotatable, of means for selectively rotating and actuating each toward the other.

38. The combination of separable mechanically rotatable parts, of a main carrier upon which said parts are mounted, mechanism located at one side of said parts for selectively rotating and shifting the same one toward the other, one at a time, and means for holding said parts in a predetermined position as respects their distances from each other.

39. The combination with mechanically separable, rotatable parts, of mechanism located at one side of said parts for selectively rotating and for shifting the same toward each other one at a time, detents for holding said parts in predetermined positions as respects their distance from each other, and

detents for also holding said parts in predetermined angular positions.

40. The combination with mechanically separable, rotatable parts, of a new main carrier upon which such parts are mounted, mechanism located at one side of said parts for selectively rotating and for shifting the same toward each other one at a time, detents for holding said parts in predetermined positions as respects their distance from each other, and detents for also holding said parts in predetermined angular positions.

41. The combination with mechanically separable, rotatable parts, of mechanism located at one side of said parts for selectively rotating said parts through various predetermined angles and for shifting the parts, one at a time, toward each other.

42. The combination with mechanically separable, rotatable parts, of a main carrier upon which such parts are mounted, and mechanism located at one side of said parts for selectively rotating the same through various predetermined angles and for shifting said parts, one at a time, toward each other.

43. The combination with mechanically separable, rotatable parts, of mechanism located at one side of said parts for selectively rotating the same through various predetermined angles and for shifting said parts, one at a time, toward each other, and detents for holding said parts in predetermined positions as respects their distance from each other.

44. The combination with mechanically separable, rotatable parts, of a main carrier upon which such parts are mounted, mechanism located at one side of said parts for selectively rotating the same through various predetermined angles and for shifting said parts, one at a time, toward each other, detents for holding said parts in predetermined positions as respects their distance from each other, and detents for also holding said parts in predetermined angular positions.

45. The combination with mechanically separable, rotatable parts, of means located at one side of said parts for selectively initiating the rotation of said parts, means brought into action by the initiation of the rotation of a part for continuing its rotary movement, a device for throwing the latter mentioned means out of action upon the completion of a predetermined angle of rotary movement, and means for selectively shifting said parts, one at a time, toward each other.

46. The combination with normally separated, rotatable parts, of mechanism located at one side of said parts for selectively rotating and for shifting the same one toward the other one at a time, detents for holding said parts in predetermined positions as respects their distance from each other, and detents for also holding said parts in predetermined angular positions.

47. The combination with normally separated, rotatable parts, of a main carrier upon which such parts are mounted, mechanism located at one side of said parts for selectively rotating and for shifting the same one toward the other one at a time, detents for holding said parts in predetermined positions as respects their distance from each other, and detents for also holding said parts in predetermined angular positions.

48. The combination with normally separated rotatable parts, of mechanism located at one side of said parts for selectively rotating said parts through various predetermined angles and for shifting the parts, one at a time, toward each other.

49. The combination with normally separated, rotatable parts, of a main carrier upon which such parts are mounted, and mechanism located at one side of said parts for selectively rotating the same through various predetermined angles and for shifting said parts, one at a time, toward each other.

50. The combination with normally separated, rotatable parts, of mechanism located at one side of said parts for selectively rotating the same through various predetermined angles and for shifting said parts, one at a time, toward each other, and detents for holding said parts in predetermined positions as respects their distance from each other.

51. The combination with normally separated, rotatable parts, of a main carrier upon which such parts are mounted, mechanism located at one side of said parts for selectively rotating the same through various predetermined angles and for shifting said parts, one at a time, toward each other, detents for holding said parts in predetermined positions as respects their distance from each other, and detents for also holding said parts in predetermined angular positions.

52. The combination with normally separated, rotatable parts, of means located at one side of said parts for selectively initiating the rotation of said parts, means brought into action by the initiation of the rotation of a part for continuing its rotary movement, a device for throwing the latter mentioned means out of action upon the completion of a predetermined angle of rotary movement, and means for selectively shifting said parts, one at a time, toward each other.

53. The combination with mechanically separable parts of mechanism located at one side of said parts for selectively operating, and for shifting the same toward each other, one at a time, means for holding said parts in predetermined positions as respects their

distance from each other, and means for holding said parts in predetermined angular positions.

54. The combination with separable rotatable parts of a main carrier upon which such parts are mounted, mechanism located at one side of said parts for selectively rotating and for shifting the same toward each other one at a time, mechanism for holding said parts in predetermined positions as respects their distance from each other, and detents for also holding said parts in predetermined angular positions.

55. The combination with a carrier movable in a prescribed path, and parts mounted thereon for movement toward a fixed plane one in one direction, and the other in another direction, and means suitably located for causing relative movements of said parts.

56. The combination with a rotary carrier or turret, of an inner shaft, a tubular or exterior shaft affording a bearing for the inner shaft and mounted upon said carrier or turret to move axially independently thereof and of said inner shaft toward and away from a fixed plane, an impressor attached to said exterior shaft, and means for causing the axial movement of the said exterior shaft toward and away from said plane.

57. The combination with a rotary carrier or turret, of an inner shaft, a rotary tubular or exterior shaft having a bearing for the inner shaft and mounted upon said carrier or turret for axial movement and movable independently of said inner shaft toward and away from a fixed plane, an impressor attached to said exterior shaft, and means for causing axial and rotary movements of the said exterior shaft.

58. The combination with a rotary carrier or turret, of an inner shaft, a rotary tubular or exterior shaft having a bearing for the inner shaft and mounted upon said carrier or turret for axial movement independently of said inner shaft toward and away from a fixed plane, impressors attached to said shafts, means for independently causing the axial movements of said shafts toward and away from the said plane, and means for rotating said shafts when shifted toward the said plane.

59. The combination with a rotary carrier or turret having a tubular or exterior shaft and an inner shaft independently movable toward and away from a fixed plane, impressors attached to said shafts, a gear attached to each of said shafts, and a driver for engagement with each of said gears in a certain axial position of its particular shaft.

60. The combination with a rotary carrier or turret having a tubular or exterior shaft and an inner shaft independently movable toward and away from a fixed plane, heads attached to said shafts, a gear attached to said shafts, a driver for engagement with each of said gears upon the axial shifting of its corresponding shaft, a starting-arm secured to each shaft, and comprising latch mechanisms for engaging with said starting-arm and causing the rotation of a head and for causing any particular type or die thereon to appear at the working point.

61. The combination with a rotary carrier or turret, of an inner and a tubular or exterior shaft mounted upon said carrier or turret and the outer shaft being movable independently of said inner shaft toward and away from a fixed plane, impressors attached to said shafts, a gear attached to each of said shafts, a driver with which each of said gears is engageable in an axial position of its corresponding shaft, a starting-arm secured to each shaft, and comprising latch mechanism for engaging with said starting-arm and causing the rotation of an impressor and for causing any particular type or die thereon to appear at a fixed point.

FRANCIS H. RICHARDS.

Witnesses:
FRED. J. DOLE,
C. E. VOSS.