

No. 855,731.

PATENTED JUNE 4, 1907.

F. H. RICHARDS.
TYPOGRAPHIC MACHINE.

APPLICATION FILED JAN. 9, 1901. RENEWED APR. 28, 1902.

7 SHEETS—SHEET 1.

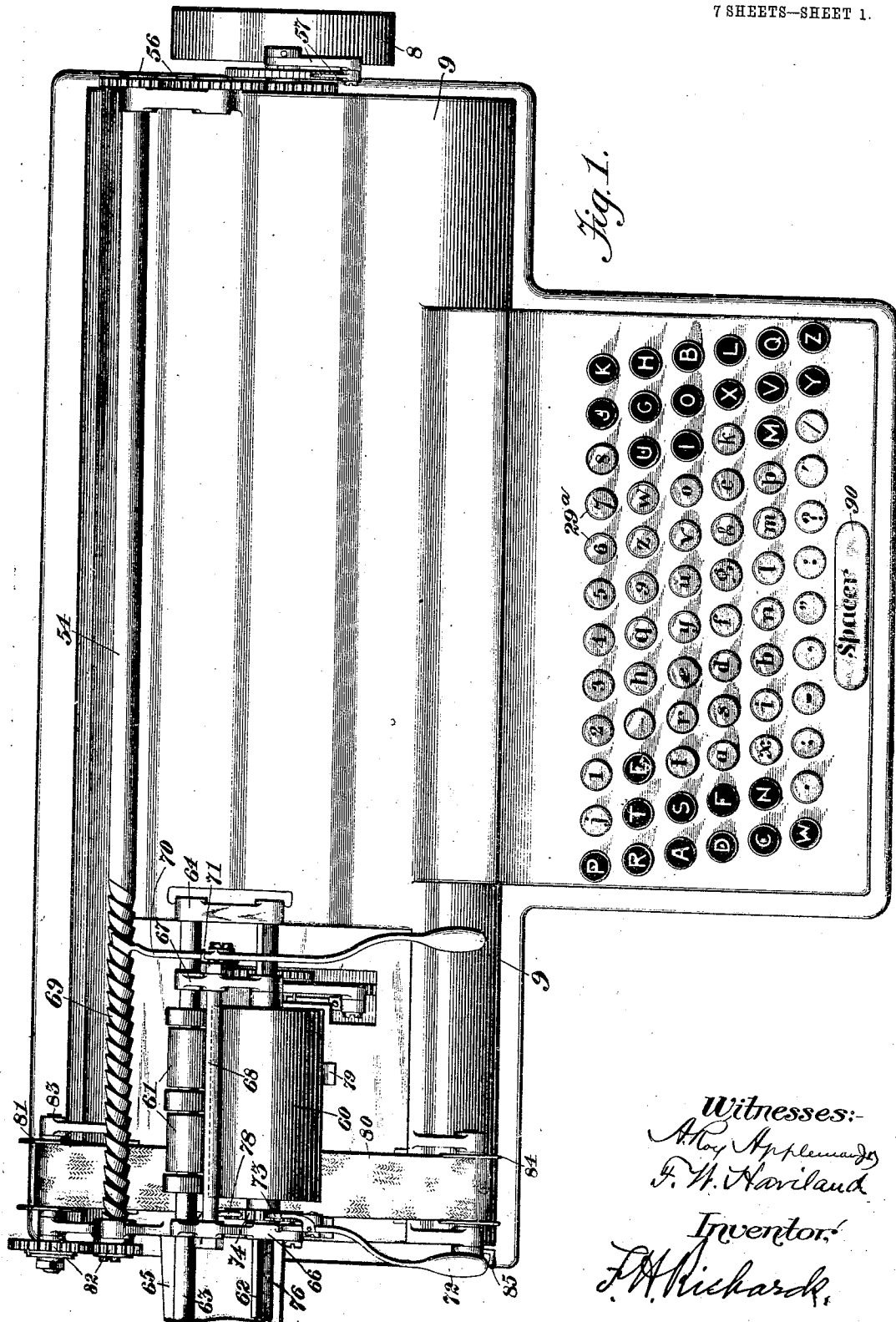


Fig. 1.

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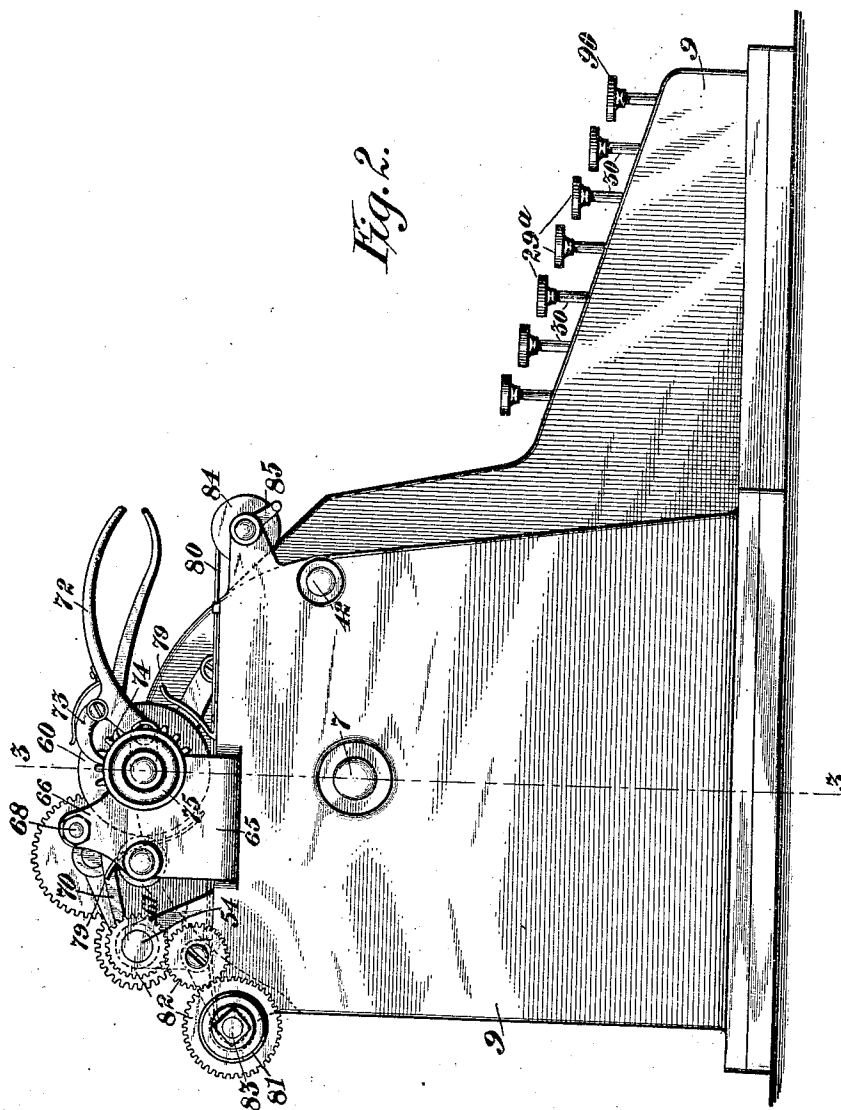
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7 SHEETS—SHEET 2.



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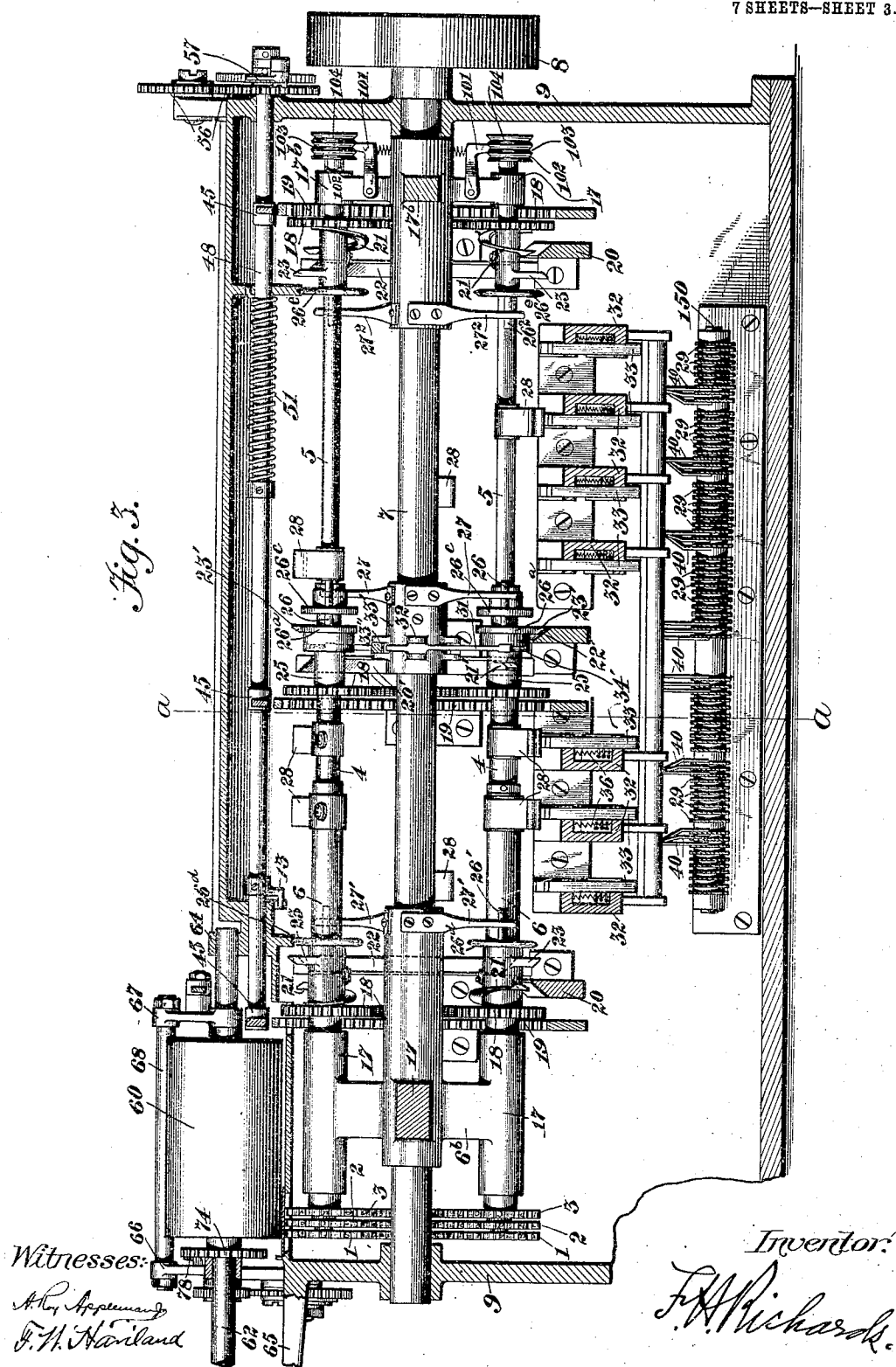
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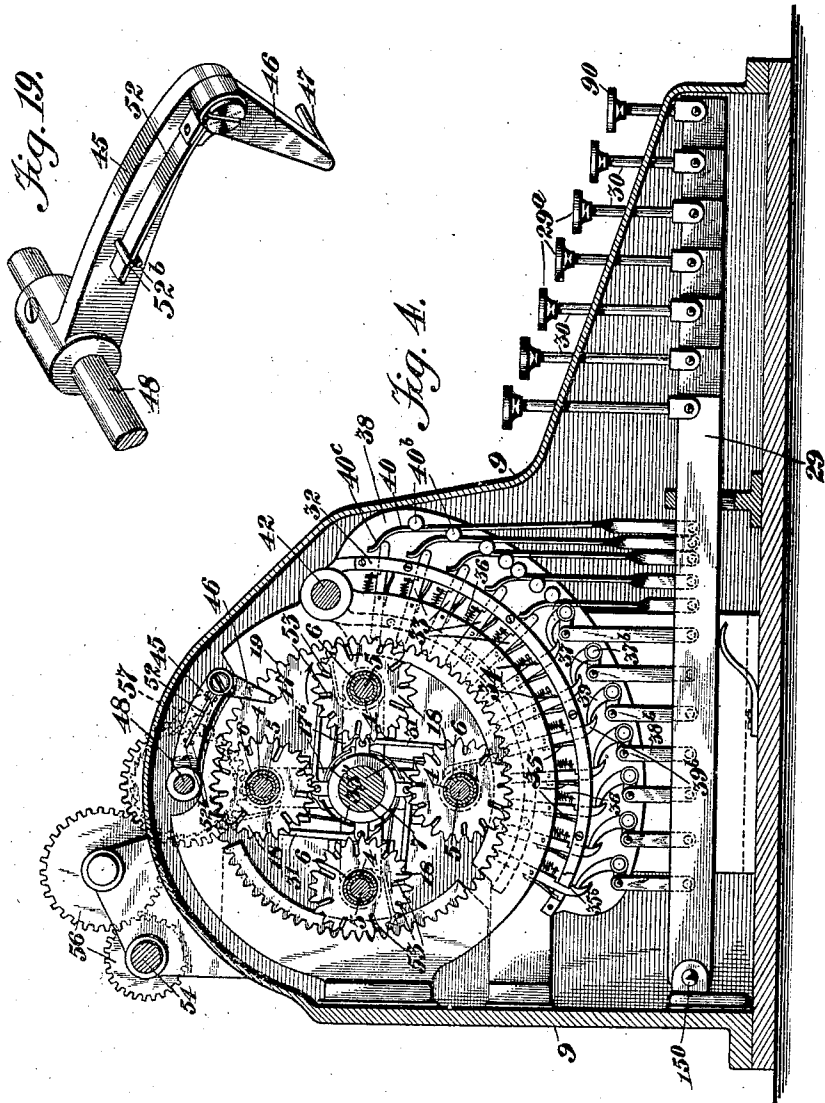
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7 SHEETS—SHEET 4.



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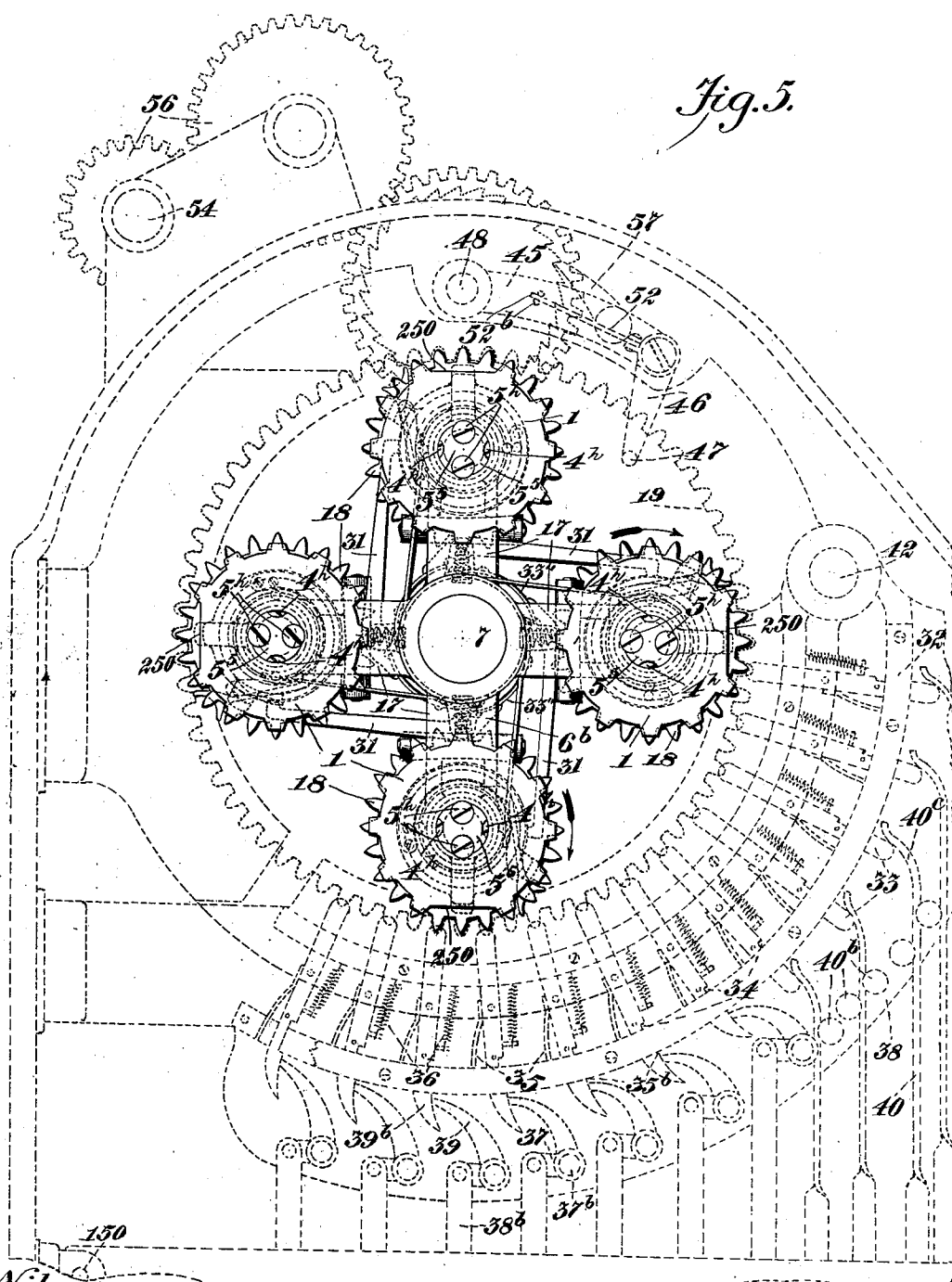
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7 SHEETS—SHEET 5.



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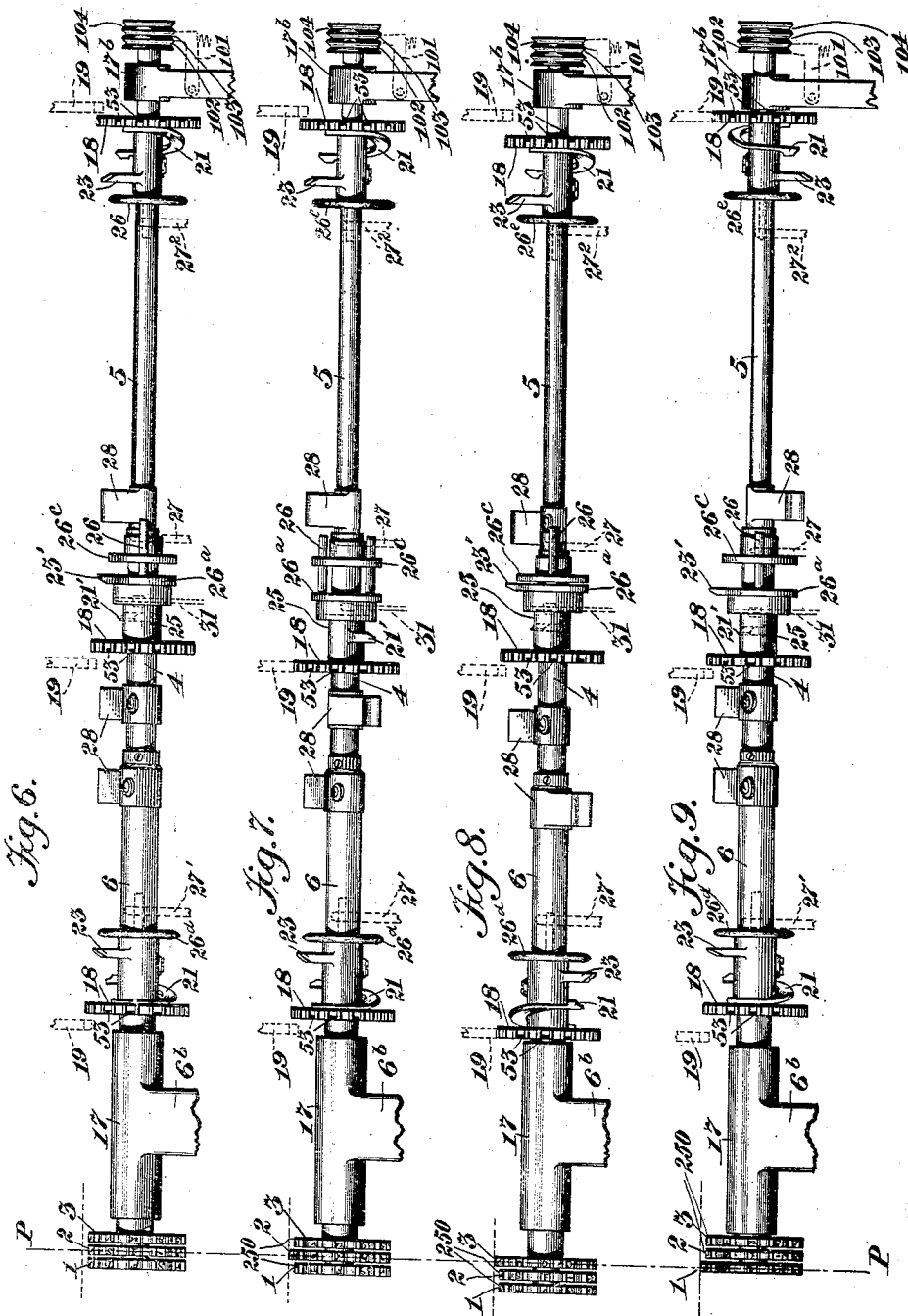
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7 SHEETS—SHEET 6.



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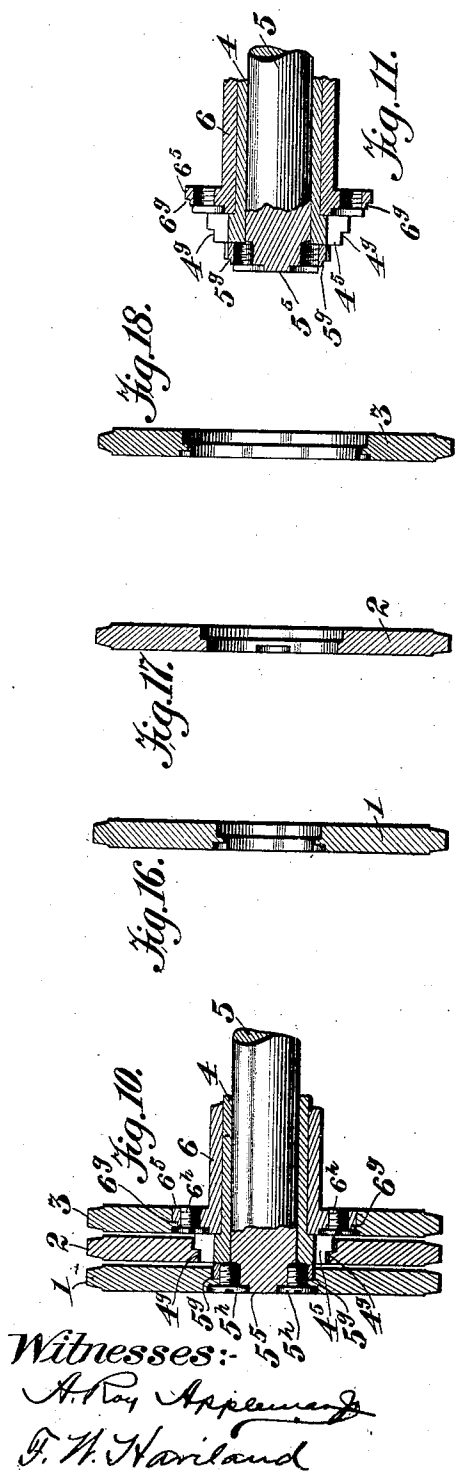
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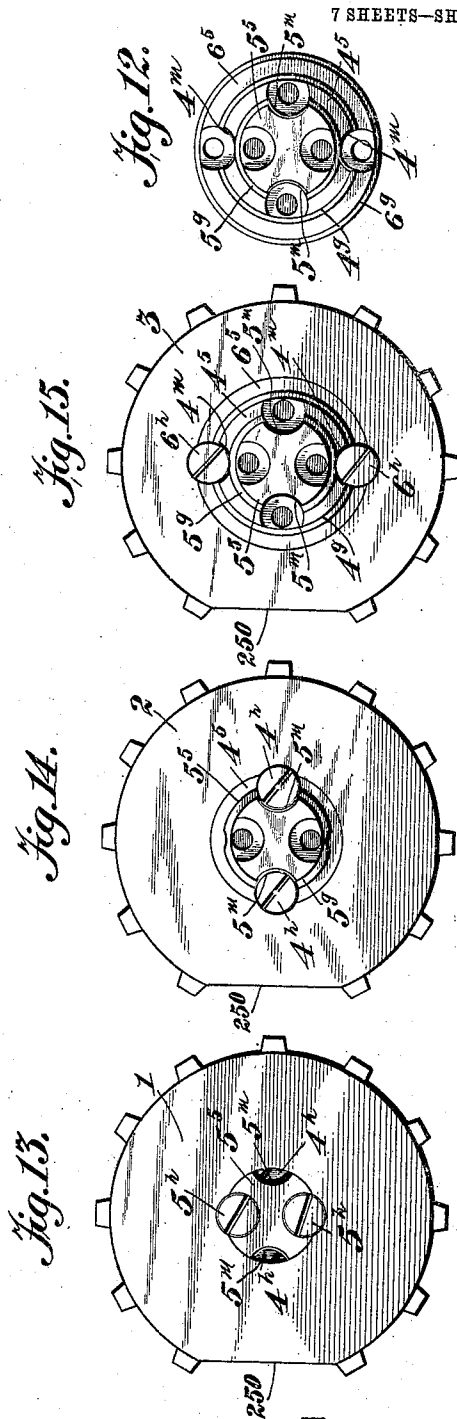
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7 SHEETS—SHEET 7.



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Inventor:

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UNITED STATES PATENT OFFICE.

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TYPOGRAPHIC MACHINE.

No. 855,731.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed January 9, 1901. Renewed April 28, 1902. Serial No. 104,917.

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 are assembled in one or more sets, the several sets being selectively shiftable and this shifting, in conjunction with the shifting of the entire assemblage of impression devices in which the shifted set is included, serving to bring the selected device to the working point of the machine.

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 disposed in one or more sets are employed capable of axial or sidewise movement toward and away from a fixed plane. To permit of this movement and other motions of which they are capable, the impressors are mounted as a whole upon one or more sectional carriers each comprising a number of separate and independently movable sections, one for each of the aforesaid sets of impression devices. In the particular embodiment set forth in the drawings hereto attached, the several sections of a sectional carrier are affixed to respective shafts which are concentrically disposed with respect to each other. When the impression device 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 with other shafts in that set lengthwise or axially to its proper operative axial position, and after the impression has been made the shafts are returned to their original axial positions. A similar operation takes place when another of the impressors carried by a shaft in that set is to be used.

The invention embodies, also, in combination, with the foregoing, a selective mechanism, whereby a particular type or die upon any impression device carrier 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. Fig. 3 is a longitudinal section on the plane of the line 3—3, Fig. 2, looking from the front toward the rear of the machine. Fig. 4 is a cross-section on the plane of the line *a—*a**, Fig. 3, looking from the left hand toward the right in that figure. Fig. 5 is a view similar to Fig. 4, the section, however, being taken adjacent to the left-hand end of the machine and certain parts being represented in dotted outline, while the scale adopted is somewhat larger than that used in Fig. 4. Figs. 6, 7, 8, and 9 are detail views of a set of shafts with certain of their associated parts, and shows the attached impressors in the different positions which they occupy when in the act of operating. Fig. 10 is an enlarged sectional view of a portion of the set of shafts shown in Figs. 6, 7, 8, and 9, with their attached impressors. Fig. 11 is a view similar to Fig. 10, but shows the shafts with the impressors removed. Fig. 12 is an end view of the shafts represented in Fig. 11. Fig. 13 is an end view of the impressors, etc., represented in Fig. 10. Fig. 14 is an end view of the parts as shown in Fig. 10, with the outer impressor, however, removed. Fig. 15 is an end view of the parts as shown in Fig. 10, with the outer two impressors, however, of the set removed. Fig. 16 is a cross-section of the impressor shown in Fig. 13, the same being removed. Fig. 17 is a similar view of the impressor shown in Fig. 14, the same being detached. Fig. 18 is a similar view of the impressor shown in Fig. 15, the same being also detached. Fig. 19 is a perspective view of a certain feed-arm embodied in the machine.

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 main parts or carriers each comprising a plurality of sections upon which are mounted one or more impression types or dies. These parts are disposed, according to the present invention, when in their normal or inoperative positions, in such relation to a fixed plane (hereinafter referred to as the operative plane) as to be shiftable axially thereto, and if a main carrier embodying a set comprising three carrier sections is employed, as shown in the drawings attached to this specification, a carrier-section may be located on each side of said plane while a third is normally in that plane. While three carrier-sections are shown as forming a set, it is evident that this number may be increased or diminished without departing from the spirit of the invention. All the carrier-sections in a set are shifted axially to bring any particular one of such sections normally at the side into the fixed or operative plane, (see lines P—P, in Figs. 6, 7, 8, and 9). For this purpose they may be conveniently affixed to shafts which extend on one side of the operative plane and are fitted the one shaft to rotate within the other.

Each main carrier is adapted to have both a movement in a closed circuit or orbital path, and, at times, a rotary motion about its own axis. In the particular instance illustrated, this closed circuit or orbital motion is that of revolution about an axis exterior to the carrier, and for the purpose of conveniently enabling this double motion to be attained the shafts 4, 5, and 6 carrying the sections 1, 2, and 3, respectively, of a set are shown mounted in a turret or rotary carrier 6^b, which may be rotated by the 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 carrier-sections as are desired, within the capacity of the turret, are disposed thereon, being affixed to suitable sets of shafts. The exterior shaft 6 in each set may be journaled in an arm 17 extending from and secured to the shaft 7, and the inmost shaft 5 at one end in an arm 17^b also extending from and secured to the shaft 7. If, now, the intermediate shaft 4 of the set is journaled on the inmost shaft 5 and extended toward the operative plane in the space between the outer and inmost shafts, the

shafts afford mutual support for each other. The several arms 17 and 17^b extending from and secured to the shaft 7 in conjunction with the latter may be regarded as forming the turret 6^b.

Each set of associated shafts 4, 5, and 6 is adapted to have an independent rotary motion imparted to each of its component shafts in addition to the orbital motion which the set may have by virtue of the rotation of the turret 6^b, 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 gear-wheel 19. There is a gear-wheel 19 for the series of inmost shafts 5, another for the series of intermediate shafts 4, and another for the series of outer or exterior shafts 6. Each internal gear 19 is shown as being secured to the casing 9, and it affords a positive means when a gear-wheel 18 is engaged with it for effecting a rotation of the gear-wheel.

The endwise or axial movement of each shaft 4 and 6 in each set for bringing the corresponding carrier-sections into and withdrawing it from the operative plane is utilized for engaging the gear-wheel 18 on the shaft with and disengaging it from the corresponding driver 19. To effect this endwise movement in one direction there may be combined, as shown in the present instance, with each series of exterior shafts 6 and each series of inmost shafts 5 an actuating member or cam 20, with which there is adapted to co-operate a coacting member or cam-arm 21 on each shaft in the corresponding series for shifting the shaft toward and bringing the corresponding carrier-section into the operative plane. It will be manifest that since the carrier-sections supported by one of the mentioned series of these shafts, in the illustrated and described organization, lie when in their normal positions upon one side of the operative plane and the carrier-sections supported by the other series of shafts lie upon the other side of the operative plane, that the two series of shafts move in opposite directions in approaching the operative plane. Hence the cams 20 for the two series will face in opposite directions. For returning the shafts in the two series there may be an actuating member or cam 22, one for each series, with which is adapted to co-operate a coacting member or cam-arm 23, projecting from each shaft which accomplishes the shifting of a shaft backward and the withdrawal of the corresponding carrier-section from said plane. These cams 22 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 21, may have its operative surface arranged at the end of a flexible or spring-like strip, which method of supporting the operative portion will tend to suppress the vio-

lence of the shock when the parts come in contact.

When the carrier-sections on any set of associated shafts are in their normal or operative positions the intermediate carrier-section attached to the intermediate shaft 4 lies in the operative plane, as here organized and as shown in Figs. 3 and 6. Hence it is not necessary to shift the intermediate carrier-section of a set axially when it is desired to set it in rotation, and in fact such a shifting, it is evident, would prevent its operation at the designed point in the operative plane. To effect the rotation of any intermediate shaft 4 and thereby its attached section 2, the gear-wheel 18, for this purpose, is shown mounted upon a sleeve 25 movable along the intermediate shaft but fixed thereto so far as any relative rotary movement is possible by means of one or more pins 26 extending axially from a flange 26^a of the sleeve and fitted to slide backward and forward in openings in a flange 26^b projecting radially from the intermediate shaft.

The several sleeves 25 may be shifted lengthwise by means similar to those already described for effecting a like movement of a series of shafts. If such be the case there may be combined with the series of sleeves an actuating member or cam 20', with which is adapted to co-operate a coacting member or cam-arm 21' extending from each sleeve and similar to the cam and cam-arms 20 and 21 already described, although the operative portions of the cam-arms 21' are not herein shown as being supported upon flexible or spring-like strips. For moving the several sleeves in the opposite direction there may be an actuating member or cam 22' with which is adapted to co-operate a coacting member or cam-arm 23' on each sleeve similar to the cam and cam-arm 22 and 23 already described.

For holding each sleeve 25 in a position to which it may be adjusted axially, and to prevent its axial movement when either the exterior shaft 6 or the inmost shaft 5 of the corresponding set is shifted to bring its attached carrier-section into the operative plane, there is shown a lever 31 pivoted at 32 to a boss 33 upon the shaft 7 and pressed downward by a spring 33 against a raised portion or rib 34 on the sleeve. This lever 31 and rib 34 are preferably formed to engage with each other that their coaction will be such as to resist the displacement of the lever from the side to the top of the rib, and vice versa, but not preventing it when sufficient force is exerted through the operation of the shifting cams 20 and 22 to effect the transfer.

The cams 20 and 22 for each series of exterior and inmost shafts and the cams 20' and 22' for the series of sleeves 25 may be attached to the casing 9, and are located in

the proper positions to co-operate with their respective arms, while the distance each causes a shaft or sleeve to move axially is not sufficient to carry the other arm of that shaft or sleeve which coacts with the other cam beyond the point where contact of this arm will take place with its cam when the shaft or sleeve has been swung around to render the arm operative.

The two cams 20 and 22 for each series of shafts and the cams 20' and 22' for the series of sleeves 25 are arranged substantially on diametrically opposite sides of the circle in which the operative ends of their cam-arms move, while each cam is of a length sufficient to insure the contact of the coacting arm with it as a shaft or sleeve rotates about its own axis and revolves about the axis of the turret. As a result a movement of the shaft or sleeve to and fro for each rotation of the turret 6^b is produced.

For each series of shafts 4, 5, and 6 there will be provided some form of device for resisting, to a considerable degree, an axial movement of the set for the purpose of holding the set of shafts in an axial position to which they may be shifted. For instance, a spring-pressed detent 101 may be urged into either one of three grooves 102, 103, 104, corresponding to the axial positions of the shafts and formed in a disk 105 attached to one of the shafts of a set. 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 operation of the shifting cams 20 and 22. A collar affixed to each intermediate shaft 4 is shown for preventing the axial movement of the exterior shaft 6 along the intermediate shaft while the corresponding movement of the latter shaft with respect to its inmost shaft 5 may be prevented by similar means.

Some form of a precision-brake for stopping the rotation of a shaft in a determinate angular position when its gear-wheel 18 has been thrown out of engagement with its driving-gear 19 will also be provided. The device shown in the present instance comprises for each intermediate shaft an elastic finger 27 secured to the boss 33 and extending across the path and tending to retard the revolution of the pins 26 before mentioned. A similar device is employed for the other shafts, and consists of a similar elastic finger 27' for each exterior shaft 6 projecting from the shaft 7 and extending into and tending to retard the revolution of pins 26' extending from a flange 26^a projecting radially from shaft 7 and a similar elastic finger 27² similarly related to pins 26² projecting radially from a flange 26^b upon each inmost shaft 5.

For initiating the rotary movement of the individual shafts 4, 5, and 6 and sleeve 25 for the purpose of turning the arm 21 or 21' into a

position in which it may coact with its proper cam each shaft is provided with a starting-arm 28 operating substantially in the manner set forth in Patents Nos. 431,371 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. A starting-arm 28 on each shaft or sleeve may be arranged in a different transverse plane to that of the starting-arm on any other for a purpose that will be explained later.

Referring now to certain selective devices whereby a particular shaft 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 may be 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 a revolving starting-arm which engages therewith and turns the shaft in its bearing, 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 as herein shown is operated by means of a spring-returned rock-lever 29, actuated by pressure upon a key 29^a at its outer end. A number of these rock-levers 29 is 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 a rod 150, and may each have a push-rod 30 extending upward through an opening at the front of the casing and provided at its top with a finger-piece or key 29^a.

There will be as many latches or bolts in the latch mechanisms designed to actuate any single shaft supported on the turret 6^b 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 said fixed point.

The latch mechanisms for initiating the rotary 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 its passing to one side free of the latch mechanism despite the axial shifting of the shaft to which the arm is attached by the action of the cam 20, or 20'.

In Fig. 3 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^b. 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. Each latch, in the present instance, is held in its inoperative or retracted position by a notch 34 thereon which fits over the edge of an opening in the latch frame and prevents the latch from being thrown inward under the tension of a spring 35, by reason of the contact of the side of this notch with the 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 a latch when the notch is pressed away from the shoulder for a 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. 4, 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 with 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. A 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, while it is properly guided by means of pins 40^b—40^b on opposite sides thereof, and has 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 that 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 lengthwise 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 is adapted to contact with and be moved by a shoulder upon a feed wheel or disk for the purpose of accomplishing this feed movement. Normally, (assuming that the turret 6^b is rotating but that no carrier-section has been shifted into the operative plane to effect an impression, and that the gear-wheel 18 on each sleeve 25 is out of its engaging position as shown in Fig. 3) there is no contact of this pin 47 with a shoulder upon a feed wheel or disk, but when a carrier-section has been shifted into the operative plane or the gear-wheel on a sleeve into engagement contact will be made sometime during the orbital and rotary movement of the carrier-section between a shoulder upon a corresponding feed wheel or disk and a pin or projection 47.

There is a swinging lever 45 and a floating-arm 46 supplied with a pin or projection 47 for each of the series of carrier-sections, or, in other words, each series of inmost, intermediate and exterior shafts. These swinging levers 45 are affixed to a rock-shaft 48 mounted in suitable bearings, which may be supported by the casing 9. The rotation of the rock-shaft 48 in one direction past a predetermined point is prevented by a stop 13, while a spring 51 constantly urges the shaft to this particular position. Normally, or while the rock-shaft 48 is in this predetermined position and is not being turned in its bearing, 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 on 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 forward in the manner pointed out below to turn the rock-shaft 48, but may also be deflected from 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 co-operating with the pins 47 may each consist of a separate and independent disk attached to each shaft in the series of exterior and inmost shafts and the sleeves 25 on the intermediate shafts 4, or the gear-wheel 18 upon each shaft and sleeve may perform the function of such feed-disk as herein illustrated. The shoulder stated as coacting with a pin 47 may be formed as shown by notching the radial face of each gear-wheel indicated generally by 53, or such shoulder may be formed by the bottom of the gear-wheel tooth which for this purpose may be regarded as forming a notch.

Each floating-arm 46 is arranged adjacent to that set of feed-wheels, or, as herein shown, gear-wheels 18, with which it is designed to

co-operate, and upon that side of the gear wheels toward which they are shifted to engage with a driving-gear 19, for it is 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 freedom of movement of each 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 the 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 result for each movement of a carrier-section 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 18, resulting therefore in the turning of the rock-shaft 48 through different arcs. It will be understood, therefore, from the foregoing 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 rotary 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 at the side of the casing, which may include 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 its companion pressure-rolls 61, 61, or any other desired number, endwise along the guide-bars 62 and 63 entering stationary brackets 64 and 65 extending from the casing.

For the purpose of permitting an endwise movement of the rotary platen 60 and the pressure-rolls 61, 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 preferred 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 pressed downward into engage-

ment 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.

5 The platen 60 may have the usual return spring (not shown) while the inclined surface of the ratchet thread 69 allows the arm 70 to slide endwise on the feed-shaft when the platen is pushed backward along its guides.

10 A ratchet mechanism may be provided for imparting a step-by-step rotation to the platen 60, and it may comprise a pawl-operating handle 72 carrying a spring-pressed pawl 73 engaging with a ratchet-wheel 74

15 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 for the purpose is

20 mounted to turn in the end brackets 64 and 65, and is provided with a longitudinal groove 76 into which extends a pin (not shown) projecting from the platen 60. A retaining device designated by 78 is shown

25 for holding the platen 60 in a desired rotary position. A paper guide, designated by 79, may also be used for retaining the paper in the proper position on the platen.

The usual ink ribbon, designated by 80, may have the take-up roller 81 of the mechanism 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

35 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 by means of a crank 85. The supply roller 84 is prevented by suitable means (not shown) from

40 operating too freely. These requirements are usually fulfilled by the ordinary inking ribbon device and the mechanism need not therefore be here more fully described.

45 It has been stated that the type or dies upon each carrier-section is different from the types or dies upon any other. If this is the case it may happen upon the tripping of a latch mechanism to permit its latch 33 to

50 protrude into the path of the corresponding starting-arm 28, that this particular arm has just passed the point at which it would be actuated and set in motion. It will not, therefore, enter upon its rotary motion until

55 it has again reached the projected latch, making thus very nearly a complete revolution about the axis of the turret 6^b. It may, however, be advisable to reduce this possible maximum period elapsing from the time of the manipulation of a latch mechanism until impression shall be made, and for this purpose any impressor mounted upon the series

60 of carrier-sections formed by the sections attached to one or more of the series of shafts 65 may have one or more duplicates in that

series. In the present instance the carrier-sections upon the intermediate shafts 4 are provided with impressors which are all duplicates of each other, while the impressors upon the carrier-sections of the exterior

70 shafts 6 are arranged in pairs, those on the diametrically-opposite shafts being duplicates. All the impressors on the carrier-sections to the inmost shafts 5 are, however, dissimilar to each other in the present illustration.

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The starting-arms 28 upon the shafts of the sections having duplicate impressors will then need to be in the same plane transverse to the axis of rotation of the turret 6^b in

80 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, then

85 the arm of the shaft whose section is provided with the duplicate impressor will be actuated and thus the necessity is avoided for the starting-arm which has just left the actuated latch mechanism to make a complete revolution

90 before the desired impression can be made.

The customary space-key is shown at 90 which operates through an intervening rock-lever 29, latch mechanism, and starting-arm

95 28 similar to those that have been described to initiate the rotation of a shaft for the purpose of shifting the same toward the operative plane.

Although a feeding movement will thereby

100 take place in the manner already described, the relation between the types or dies and the blank spaces on the particular carrier-section actuated, and the amount that such carrier-section is caused to rotate by the manipulation of the space-key, is such as to bring

105 a blank space (see 250) instead of a type or die in juxtaposition to the platen. In the normal position of each carrier-section the blank space 250 thereon is adapted to come

110 into juxtaposition to the impression surface so that as the turret rotates with the impressors inoperative no impression is made.

A construction is set forth in Figs. 10 to 18, inclusive, for securing the carrier-sections 1,

115 2, and 3 to their respective shafts, whereby the ready detachment of section from its shaft is permitted for the purpose, for instance, of attaching another in its place and without the necessity of changing the relation

120 of the shafts and subsequently reassembling them. Each such section is secured to its shaft by attaching the same to a radial flange upon the shaft, and these flanges are of such relative diameters as not to interfere

125 with the removal of any section when the outer ones have been taken off. The flange 6^c of the shaft 6 is preferably provided with an annular groove or channel 6^d forming a shoulder over which the section 3 fits and

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against which it is forced and held in place by the fastening screws 6^h, 6^h entering threaded openings in the flange 6^s and having their heads overlapping the section. Similarly the intermediate shaft 4 is provided with a radial flange 4^s whose outside diameter is not greater than the diameter of the bore of the section 3. This flange 4^s likewise has an annular groove 4^s forming a shoulder against which the section 2 is clamped by fastening screws 4^h, 4^h entering threaded openings in the flange and overlapping the section. It will be noticed that the unbroken flange 4^s is of such diameter as to cause it to extend over the fastening screws 6^h, 6^h, and hence it may be recessed as shown at 4^m, 4^m to expose these screws. Similarly the inmost shaft 5 is provided with a radial flange 5^s, whose outside diameter is not greater than the diameter of the bore of the section 2. This flange 5^s likewise has an annular groove 5^s forming a shoulder against which the section 1 is clamped by fastening screws 5^h, 5^h entering threaded openings in the flange and overlapping the impressor. Portions of this flange 5^s may be also removed, as shown at 5^m, 5^m, to expose the fastening screws 4^h, 4^h. Preferably the various fastening screws will be let into countersunk recesses to enable the sections of a set to be closely assembled. It is evident that the flanges of the different shafts perform a further function than constituting means for the attachment of the sections, as they act as stops to limit the relative lengthwise movement of the shafts.

The operation of a machine constructed as illustrated may be 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^b causes the engaged starting-arm to swing around, as also its shaft, (assuming that either the series of inmost or the series of exterior shafts is actuated,) until by the contact of the cam-arm 21 with the inclined surface of cam 20 the gear-wheel 18, its shaft, and attached impression device carrier-section are moved endwise, carrying the other shafts in the set bodily or as a unit with it, and the section on the shaft whose arm is actuated is shifted into the operative plane, while the gear-wheel 18 simultaneously meshes with the driver 19. The corresponding detent 101 has in the meantime sprung into the groove 102, maintaining the parts in this axial position. Rotation of the said shaft now takes place, the continuous swinging of the starting-arm having in the meantime reset the latch 33, until that type or die

of the actuated carrier-section to which the particular key operated is referable has reached the platen 60 or other 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 the 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, etc., 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 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 angular position by the elastic finger 27', assisted to some degree by the action of the detent 101, as aforesaid. Coincidentally with the disengagement of the gear-wheel 18 the carrier-section has been shifted from the operative plane leaving the intermediate carrier-section therein. If, however, a carrier-section on an intermediate shaft 4 is the one that will respond to the depression of the key this shaft is not shifted axially, since the carrier-section attached thereto lies normally in the operative plane. The only result of the engagement of the cams 20' and cam-arm 21' due to the swinging of the starting-arm 28 of the sleeve will be to shift the latter axially along the intermediate shaft and carry the gear-wheel 18 attached to the sleeve into engagement with the driver 19. A rotation is then imparted from this gear-wheel 18 to the shaft by means of the pins 26, and an impression followed by a return movement ensues in the manner already described. A feeding movement prior to the making of an impression occurs as pointed out before.

Having described my invention, I claim—

1. The combination, with a carrier adapted to move in a closed circuit or orbital path, of a set of shafts mounted one within the other and which are capable of independent rotation, and means located upon one side of a fixed plane for moving the set of shafts as a unit in opposite directions with respect to said plane.

2. The combination, with a carrier adapted to move in a closed circuit or orbital path, of a set of shafts mounted one within the other and which are capable of independent rotation; impressors attached to said shafts;

and means located upon one side of a fixed plane for moving the set of shafts as a unit in opposite directions with respect to said plane.

3. The combination, with a carrier adapted to move in a closed circuit or orbital path, of a set of shafts mounted one within the other and which are capable of independent rotation; impressors attached to said shafts; and means located upon one side of a fixed plane for moving the set of shafts as a unit axially in opposite directions with respect to said plane and for rotating a particular shaft in the set.

4. The combination, with a rotary carrier or turret, of a set of shafts mounted one within the other and which are capable of independent rotation, and means located upon one side of a fixed plane for moving the set of shafts as a unit in opposite directions with respect to said plane.

5. The combination, with a rotary carrier or turret, of a set of shafts mounted one within the other and which are capable of independent rotation; impressors attached to said shafts; and means located upon one side of a fixed plane for moving the set of shafts as a unit in opposite directions with respect to said plane.

6. The combination, with a rotary carrier or turret, of a set of shafts mounted one within the other and which are capable of independent rotation; impressors attached to said shafts; means located upon one side of a fixed plane for moving the set of shafts as a unit axially in opposite directions with respect to said plane and for rotating a particular shaft in the set.

7. The combination, with a rotary carrier or turret, of a set of shafts mounted one within the other and which are capable of being shifted axially as a unit; impressors attached to said shafts; gear-wheels for rotating each shaft independently of the others; and means located upon one side of a fixed plane for moving a gear-wheel axially for the purpose of rotating a shaft.

8. The combination, with a rotary carrier, of a set of shafts mounted one within the other and which are capable of being shifted axially as a unit; impressors attached to said shafts; gear-wheels for rotating each shaft independently of the others; a starting-arm moving in unison with each gear-wheel for initiating the rotary movement thereof; and an actuating member and coacting member for shifting a gear-wheel axially to effect its continued rotation.

9. The combination, with a rotary carrier or turret, of a set of shafts mounted one within the other and which are capable of being shifted axially as a unit; impressors attached to said shafts; gear-wheels for rotating each shaft independently of the others; means for driving said gear-wheels; a starting-arm moving in unison with each gear-wheel for

initiating the rotary movement thereof; and an actuating member and coacting member for shifting each gear-wheel axially into engagement with its driver to effect its continued rotation.

10. The combination, with a rotary carrier or turret, of a set of shafts mounted one within the other and which are capable of being shifted axially as a unit; impressors attached to said shafts; gear-wheels for rotating each shaft independently of the others; means for driving said gear-wheels; a starting-arm moving in unison with each gear-wheel for initiating the rotary movement thereof; selective devices for coacting with each arm; and an actuating member and coacting member for shifting a gear-wheel axially into engagement with its driver to effect its continued rotation.

11. The combination, with a rotary carrier or turret, of a set of shafts mounted one within the other and which are capable of being shifted axially as a unit; impressors attached to said shafts; gear-wheels for rotating each shaft independently of the others; means for driving said gear-wheels; a starting-arm moving in unison with each gear-wheel for initiating the rotary movement thereof; selective devices for coacting with each starting-arm; an actuating member and coacting member for shifting a gear-wheel axially into engagement with its driver to effect its continued rotation; and means for causing a feeding movement when a gear-wheel is shifted axially.

12. The combination, with a rotary carrier or turret, of a set of shafts mounted one within the other and which are capable of being shifted axially as a unit; impressors attached to said shafts; gear-wheels for rotating each shaft independently of the others; means for driving said gear-wheels; a starting-arm moving in unison with each gear-wheel for initiating the rotary movement thereof; selective devices for coacting with each starting-arm; an actuating member and coacting member for shifting a gear-wheel axially into engagement with its driver to effect its continued rotation; and means comprising a notched disk or wheel for causing a feeding movement when a gear-wheel is shifted axially.

13. The combination, with a rotary carrier or turret, of a set of shafts mounted one within the other and which are capable of being shifted axially as a unit; impressors attached to said shafts; gear-wheels for rotating each shaft independently of the others; means for driving said gear-wheels; a starting-arm moving in unison with each gear-wheel for initiating the rotary movement thereof; selective devices for coacting with each starting-arm; an actuating member and coacting member for shifting a gear-wheel axially into engagement with its driver to ef-

fect its continued rotation; means comprising a notched-disk or wheel; a rock-shaft; and a pin or projection adapted to engage with a notch in the disk and thereby actuate the rock-shaft for causing a feeding movement when a gear-wheel is shifted axially.

14. The combination, with a rotary carrier or turret, of a set of shafts mounted one within the other and which are capable of being shifted axially as a unit; impressors attached to said shafts; gear-wheels for rotating each shaft independently of the others; means for driving said gear-wheels; a starting-arm moving in unison with each gear-wheel for initiating the rotary movement thereof; selective devices for coacting with each starting-arm; an actuating member and coacting member for shifting a gear-wheel axially into engagement with its driver to effect its continued rotation; means comprising a series of notches on a gear-wheel; a rock-shaft; and a pin or projection adapted to engage with one of the notches for causing a feeding movement when a gear-wheel is shifted axially.

15. The combination, with a rotary carrier or turret, of a set of shafts mounted one within the other and which are capable of being shifted axially as a unit; impressors attached to said shafts; gear-wheels for rotating each shaft independently of the others; means for driving said gear-wheels; a starting-arm moving in unison with each gear-wheel for initiating the rotary movement thereof; selective devices for coacting with each starting-arm; an actuating member and coacting member for shifting a gear-wheel axially into engagement with its driver to effect its continued rotation; and means comprising a disk or wheel having notches of different radial depths for causing a feeding movement when a gear-wheel is shifted axially.

16. The combination, with a rotary carrier or turret, of a set of shafts mounted one within the other and which are capable of being shifted axially as a unit; impressors attached to said shafts; gear-wheels for rotating each shaft independently of the others; means for driving said gear-wheels; a starting-arm moving in unison with each gear-wheel for initiating the rotary movement thereof; selective devices for coacting with each starting-arm; an actuating member and coacting member for shifting a gear-wheel axially into engagement with its driver to effect its continued rotation; means comprising a disk or wheel having notches of different radial depths; a rock-shaft; and a pin or projection adapted to engage with a notch in the disk and thereby actuate the rock-shaft for causing a feeding movement when a gear-wheel is shifted axially.

17. The combination, with a rotary carrier or turret, of a set of shafts mounted one

within the other and which are capable of being shifted axially as a unit; impressors attached to said shafts; gear-wheels for rotating each shaft independently of the other; means for driving said gear-wheels; a starting-arm moving in unison with each gear-wheel for initiating the rotary movement thereof; selective devices for coacting with said starting-arm; an actuating member and coacting member for shifting a gear-wheel axially into engagement with its driver to effect its continued rotation; means for shifting the gear-wheel out of engagement with its driver; and means for causing a feeding movement when a gear-wheel is shifted axially in one direction.

18. The combination, with a rotary carrier or turret, of a set of shafts mounted one within the other and which are capable of independent rotation; impressors attached to said shafts and which lie normally to the side of the operative plane and also therein; gear-wheels for rotating said shafts and impressors; and means for shifting an impressor lying on one side of the operative plane thereinto when it is desired that an impression shall be made by said impressor.

19. The combination, with a rotary carrier or turret, of shafts mounted one within the other and which are capable of independent rotation; impressors attached to said shafts which lie normally to the side of the operative plane and also therein; means for shifting an impressor lying outside of said plane thereinto when it is desired that an impression shall be made; and means for causing a feeding movement when an impressor is rotated.

20. The combination, with a rotary carrier or turret, of a set of shafts mounted one within the other and which are capable of independent rotation; impressors attached to said shafts and which lie normally to the side of the operative plane and also therein; means for shifting an impressor lying outside of said plane thereinto when it is desired that an impression shall be made, and for also rotating said impressor when so shifted; and means for rotating an impressor lying normally in the operative plane when it is desired that an impression shall be made by this impressor.

21. A set of assembled shafts having flanges increasing in diameter from the flange of the inmost shaft to the flange of the outer shaft.

22. A set of assembled shafts, in combination with impressors having central openings increasing in diameter from the opening of the impressor attached to the inmost shaft to the opening of the impressor attached to the outer shaft.

23. A set of assembled shafts having grooved or channeled flanges, which flanges increase in diameter from the flange of the

inmost shaft to the flange of the outer shaft, in combination, with impressors secured to said flanges.

24. The combination, of an inmost shaft provided with a grooved flange; an intermediate shaft also provided with a grooved flange, said latter flange having a larger diameter than the flange of the inmost shaft; an outer shaft also provided with a grooved flange whose diameter is larger than the diameter of the flange of the inmost shaft; impressors adapted to fit said flanges; and fastening screws for securing them in place.

25. The combination with a plurality of orbitally movable selective devices assembled in a number of sets, of mechanism for shifting the said plurality of devices as a unit, and for shifting that set of said devices in which the selected device is comprised, to bring said selected device, to the exclusion of all others, to its working position.

26. The combination with a plurality of orbitally movable selective devices assembled in a number of sets, of mechanism for simultaneously shifting the said plurality of devices as a unit and that one of said sets in which the selected device is comprised, to bring said selected device, to the exclusion of all others, to its working position.

27. The combination with a plurality of orbitally movable selective devices assembled in a number of sets, of means for shifting the said plurality of devices as a unit, and for shifting the proper one of said sets of devices to bring a selected device to the exclusion of all others, to its working position; and a selective mechanism for controlling the amount of such unital shifting of the devices and the particular one of said sets so shifted.

28. The combination with a plurality of orbitally movable selective devices assembled in a number of sets, of means for simultaneously shifting the said plurality of devices as a unit, and for shifting the proper one of said sets of devices, to bring a selected device to the exclusion of the others to its working position; and a selective mechanism for controlling the amount of such unital shifting of the devices and the particular one of said sets so shifted.

29. The combination with an orbitally movable main carrier comprising a plurality of carrier-sections, of a plurality of selective devices mounted on the main carrier and comprising a plurality of sets of such devices, each set being mounted upon a carrier-section; and mechanism for shifting the main carrier and for shifting that one of said carrier-sections on which the selected device is mounted to thereby bring said selected device to the exclusion of all others to its working position.

30. The combination with an orbitally movable main carrier comprising a plurality

of rotatably shiftable carrier-sections, of a plurality of selective devices mounted on the main carrier and comprising a plurality of sets of such devices, each set being mounted upon one of said carrier-sections; and mechanism for shifting said main carrier axially to bring that carrier-section upon which the selected device is mounted into the plane of the working point and for rotatably shifting such carrier-section to bring the selected device to its working position.

31. The combination with a rotatably and orbitally movable impression device carrier, of selective mechanism for shifting said carrier rotatably and axially to bring the selected device into the plane of the working point.

32. The combination with a rotatably and orbitally movable impression device carrier, of selective mechanism for shifting said carrier, rotatably and axially to bring the selected device into the plane of the working point, and a detent for yieldingly holding the carrier in its axial position.

33. The combination with a rotatably and orbitally movable impression device carrier, of a shaft on which the carrier is mounted, a starting arm extending from the shaft, means for rotating the impression device carrier predetermined angular distances and loading the same thereat.

34. The combination with a rotary carrier or turret, of a plurality of sets of shafts carried thereby and mounted one within the other and which are capable of being shifted axially as a unit and also individually and which are also capable of conjoint and individual rotation and revolution, and means to actuate said shafts.

35. The combination with a rotatable and orbitally movable impression device, of selective mechanism carried thereby for shifting said carrier revolubly and axially to bring selected devices into the plane and angular position of the working point and yieldable means to hold the carrier in its axial and angular positions of adjustment.

36. The combination with an orbitally movable impression device carrier shiftable in transverse directions, of selective mechanism for shifting the same in each of said directions for bringing a selected impression device into the plane of the working point.

37. The combination with an impression device carrier, of means for orbitally moving the same, said device being shiftable thereon in two directions transverse to each other, and a selective mechanism for so shifting said carrier upon said means for bringing a selected impression device into the plane of the working point.

38. The combination of a plurality of selective devices, assembled in a plurality of groups and a number of said groups assembled in duplicate sets, mechanism for shifting

the devices of each set in unison, and for individually shifting that group of said devices in which the selected device is comprised which first passes said shifting actuator to bring said selected device, to the exclusion of all others, to its working position.

39. The combination of a plurality of selective devices, some of which are duplicates, assembled in a plurality of groups, duplicates assembled in different sets, mechanism for transporting the devices in unison of either sets containing the duplicates, and for transporting either of those groups of said devices in which the selected device is comprised, when passing said transporting actuator to bring one of the duplicates of said selected device, to the exclusion of all others, to its working position.

40. The combination with a plurality of orbitally movable selective devices assembled in a number of sets, and said sets assembled into a number of groups, of means for simultaneously transporting the said devices in a group of sets as a unit from the plane of its orbit, and for transporting the proper one of said sets of devices, to bring a selected device to the exclusion of the others to its working position, and a selective mechanism for controlling the amount of such initial transportation of the devices and the particular one of said sets so transported.

41. The combination of a plurality of selective devices assembled in a number of sets, the sets upon opposite sides being duplicates, one of the other, and a carrier for supporting said sets and passing them through an orbit.

42. The combination with a rotatable carrier, of a plurality of selective devices arranged in a number of sets and carried thereby and whereby the sets will be passed through an orbit, the devices at one portion of such carrier being duplicates of those at another portion thereof, and means for controlling the position of one of the sets containing a selected device for bringing the same to its working point and effective upon the first one of said sets passing said controlling means.

43. The combination with a rotary carrier, of a plurality of dies carried thereby and embodying duplicates, a plurality of disks for carrying said dies and disposed in a number of concentric groups at various points about said carrier, and means for rotating each disk independently of the others, for bringing the selected die into working position from the set containing the same which first passes the point of operation of the said actuator.

44. The combination with a rotary carrier, of a plurality of impression devices, some of which are duplicates one of another, a plurality of shafts mounted upon said carrier in a number of concentric groups, a disk

upon each of said shafts, said impression devices being mounted upon said disks, the duplicates being upon disks diametrically disposed to each other, a detent upon each shaft, the detents of duplicates traveling in the same radial plane, a number of latches for engaging the detents and arranged in groups disposed in radial planes, and means for actuating the latches.

45. The combination with a rotatable carrier, of a plurality of impression devices, some of which are duplicates, a plurality of disks upon the perimeter of each of which a set of said dies is mounted, said disks being arranged in a number of groups, shafts for carrying said disks, the shafts for the disks in each group being mounted concentrically one of the other, and the duplicates being disposed in groups on opposite sides of said carrier, detents upon the shafts, the detents upon the shafts carrying the duplicates being arranged to travel in the same orbit, and actuators one for each die and arranged to be interposed in the orbit traveled by the detents upon the shaft which they are intended to actuate.

46. The combination with a rotatable carrier, of a plurality of impression devices, some of which are duplicates, a plurality of disks carried by said carrier and upon the perimeter of each of which disks a set of said dies is mounted, the arrangement of said mounting leaving a portion of the perimeter blank or free of impression devices, said disks being arranged in a number of groups, the disks in each group being in axial alignment, shafts for carrying said disks, the shafts for the disks in each group being mounted concentrically one of the other, and the duplicates of the impression devices being disposed in groups on opposite sides of said carrier, means for normally holding the blank or free portions of said disks in alignment, detents upon the shafts, the detents upon the shafts carrying the duplicates being arranged to travel in the same orbit, and actuators one for each die and arranged to be interposed in the orbit traveled by the detents upon the shaft which they are intended to actuate for shifting the selected device into alignment with the blank portions of the other disks in its group.

47. The combination with a plurality of impression devices, of a number of carriers therefor, arranged in close proximity, one to another, means for severally shifting said carriers to a predetermined uniform position of rest with a free portion adjacent to the working position.

48. The combination with a plurality of impression devices, of a number of carriers therefor, each carrier having a portion free of said impression devices, means for normally maintaining said carriers at a predetermined position of rest with a free portion

presented toward the working position, and means for shifting a selected one of the said carriers to bring a selected impression device thereon into the working position.

49. The combination with a plurality of carriers, a number of impression devices arranged upon each of the carriers and each carrier having a space free from said impression devices, means for normally returning said free spaces to position toward the working point, and means for shifting one of said carriers to bring a device thereon opposite to the free spaces from the other carriers.

50. The combination with a number of disks, each having a portion of its perimeter cut away, a number of dies upon the uncut-away portions of the perimeters of said disks, said disks being mounted side by side in axial alinement, means for shifting said disks so that their cut-away portions will normally come adjacent to the working position and means for shifting a selected disk for bringing a selected die thereon to the working position while the cut-away portions of the other disks remain at such working position.

51. The combination with three or more disks arranged in axial alinement and each having a portion of its perimeter cut-away, a series of dies, several of which are arranged upon the uncut-away portion of the perimeter of each disk, means for normally holding the cut-away portions of the disks in alinement, means for shifting said set of disks in an axial direction, for bringing a disk having the selected die above the working position and means for rotating said selected disk for bringing the die thereon into the working position and into the position normally occupied by the cut-away portion of said disk.

52. The combination with a plurality of impression devices, a number of carriers therefor, each of the carriers normally presenting a blank portion at the region of the working point, and means for shifting the carriers for bringing a selected carrier and the selected device thereon to the working position while maintaining the blank portions of the other carriers at such position.

53. The combination with a plurality of

impression devices, of a number of carriers therefor, means for normally maintaining said carriers in a position for holding the impression devices in an idle position, means for shifting all of said carriers for bringing the carrier containing the selected device into working position, and means for shifting said carrier for bringing the said selected device into working position.

54. The combination with a plurality of impression devices, of a number of axially and rotarily shiftable carriers therefor, means for normally maintaining said carriers in a position for holding the impression devices in idle positions, means for axially shifting all of said carriers for bringing the carrier containing the selected device into working position, and means for rotarily shifting the said carrier for bringing the said selected device into working position.

55. The combination with a plurality of impression devices, of a number of carriers upon which said impression devices are mounted, the disposition thereof being such that each of the carriers has a blank portion, means for normally holding said carriers with the blank portions at the region of the working point, means for shifting all the carriers for bringing the carrier carrying the selected device into working position, and means for shifting the said carrier for bringing said selected device into working position.

56. The combination with a plurality of impression devices, of a number of carriers upon which said impression devices are mounted, the disposition thereof being such that each of the carriers has a blank portion, means for normally holding said carriers with the blank portion at the region of the working point, means operative upon all the carriers for shifting these for bringing the carrier carrying the selected device into working position, and means individually operative upon said carrier for bringing said selected device into working position.

FRANCIS H. RICHARDS.

Witnesses:

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