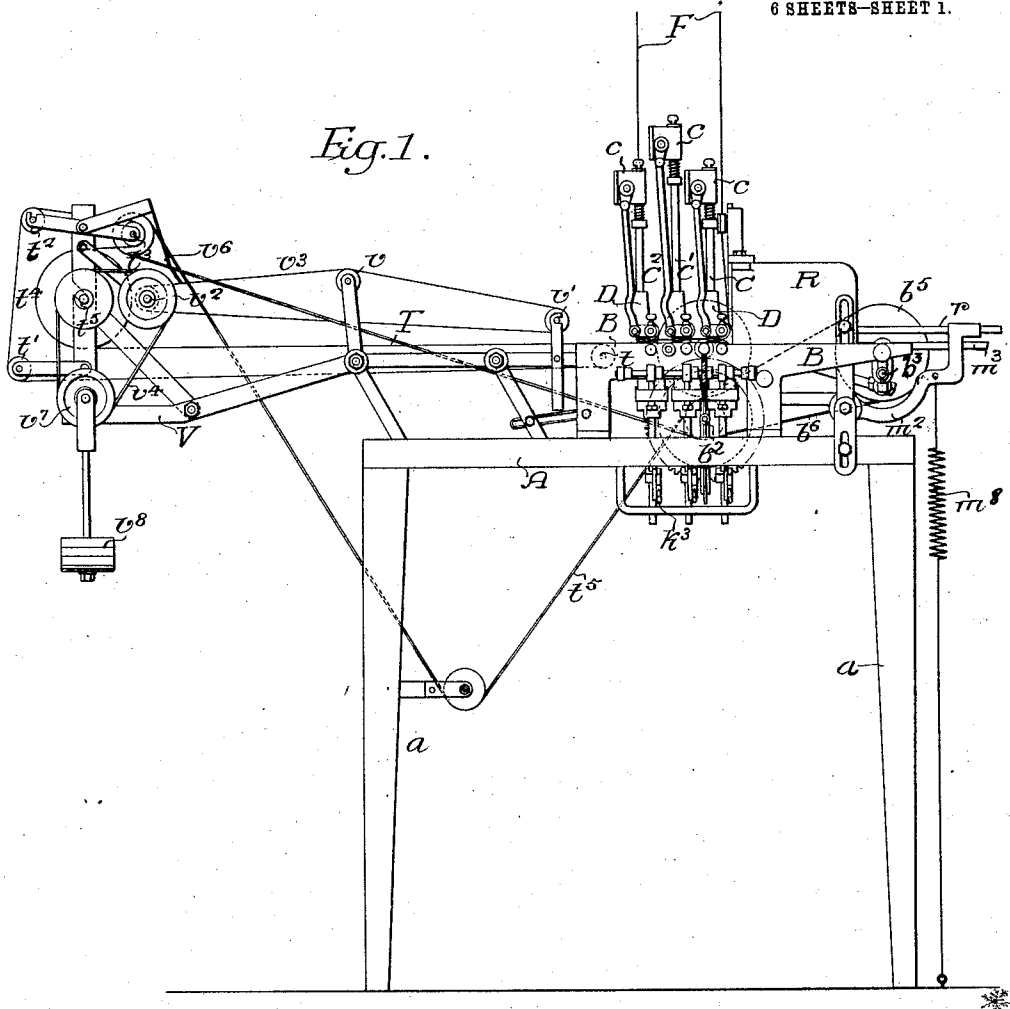


C. A. WRIGHT.
 RULING MACHINE.
 APPLICATION FILED APR. 29, 1907.

1,010,839.

Patented Dec. 5, 1911.

6 SHEETS—SHEET 1.



Witnesses:-
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Augustus B. Copes

Inventor:
Charles A. Wright.
 By his Attorneys,
Houson & Houson

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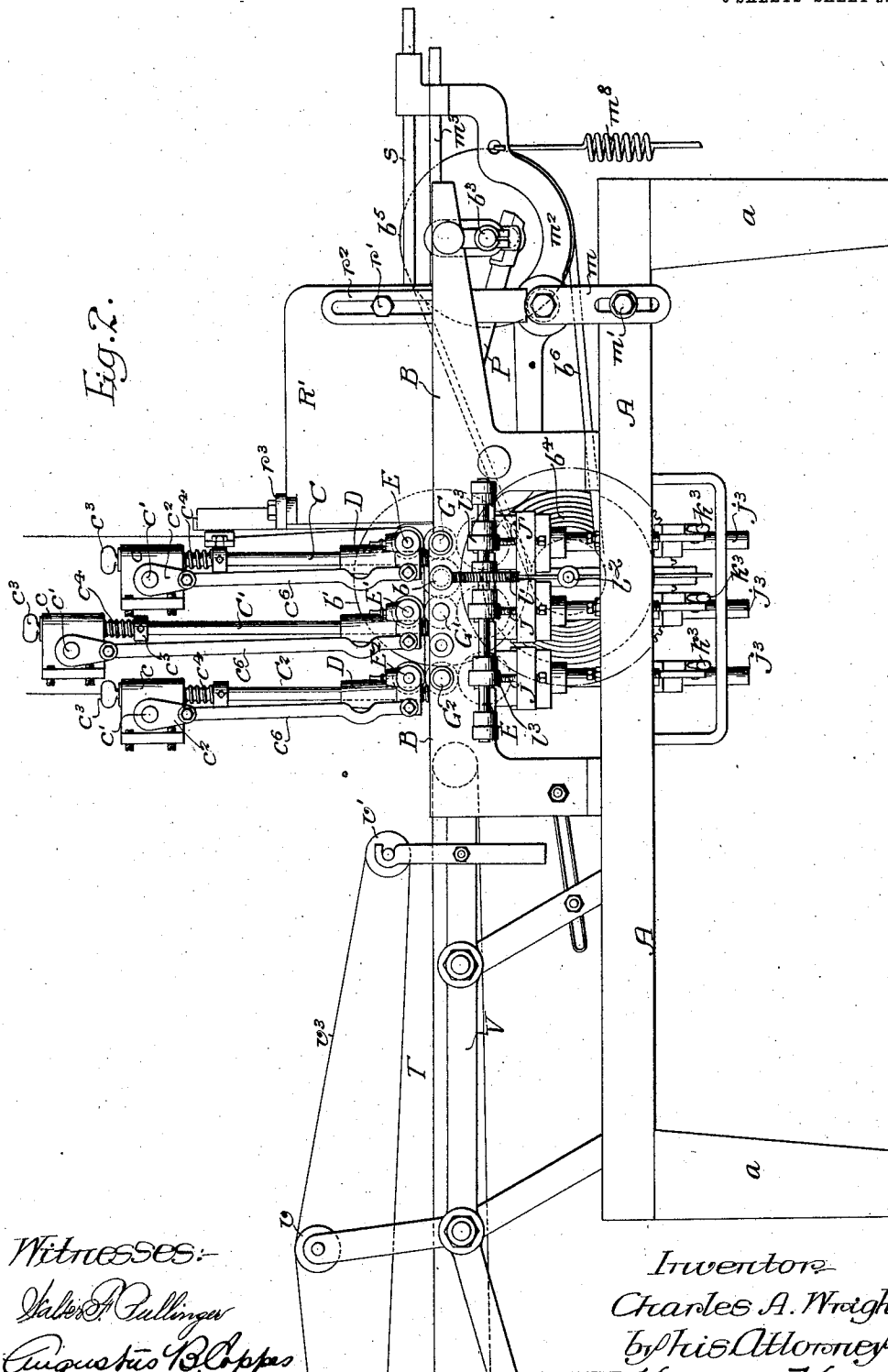
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6 SHEETS—SHEET 2.

Fig. 2.



Witnesses:

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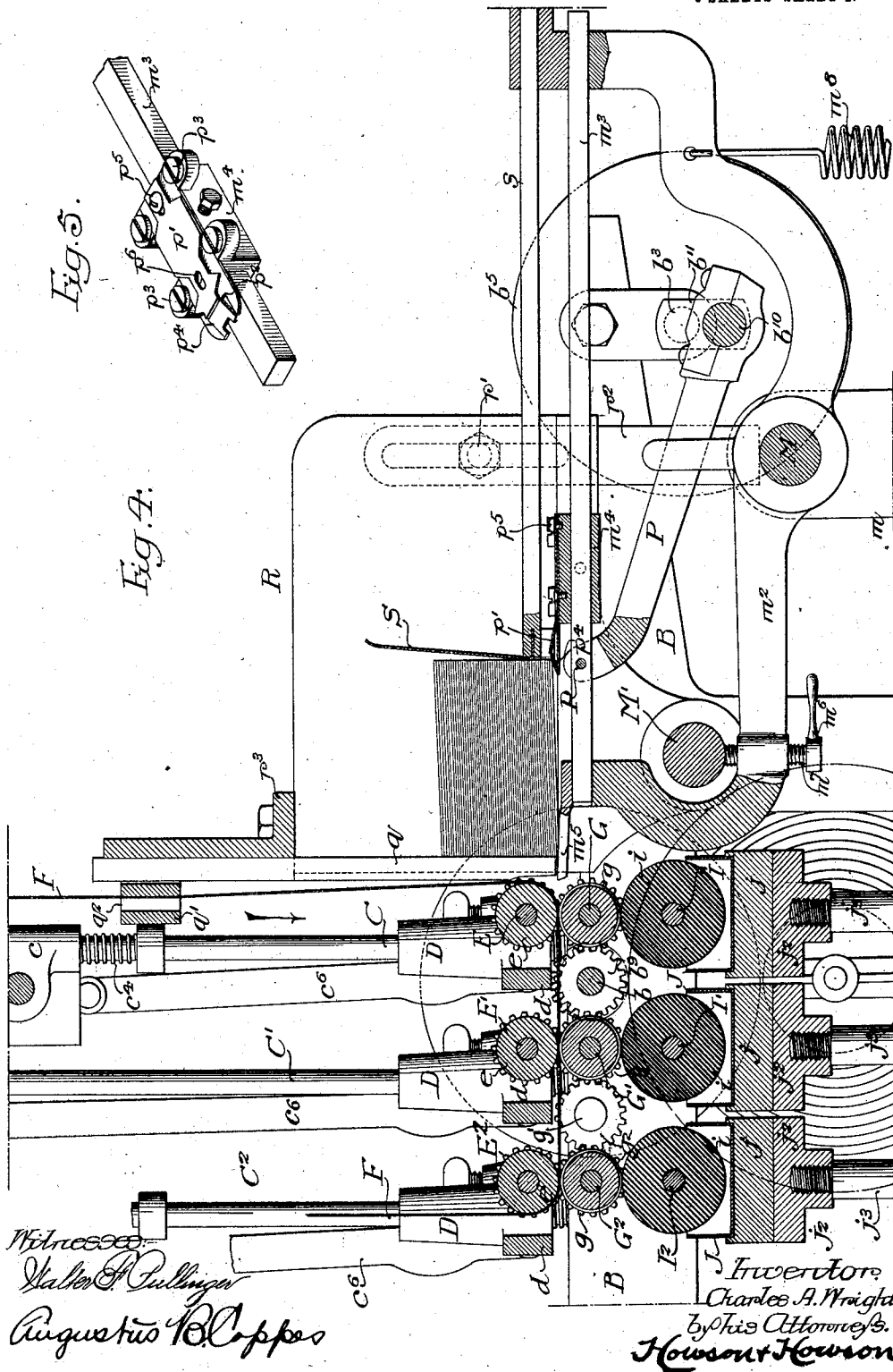
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6 SHEETS—SHEET 6.

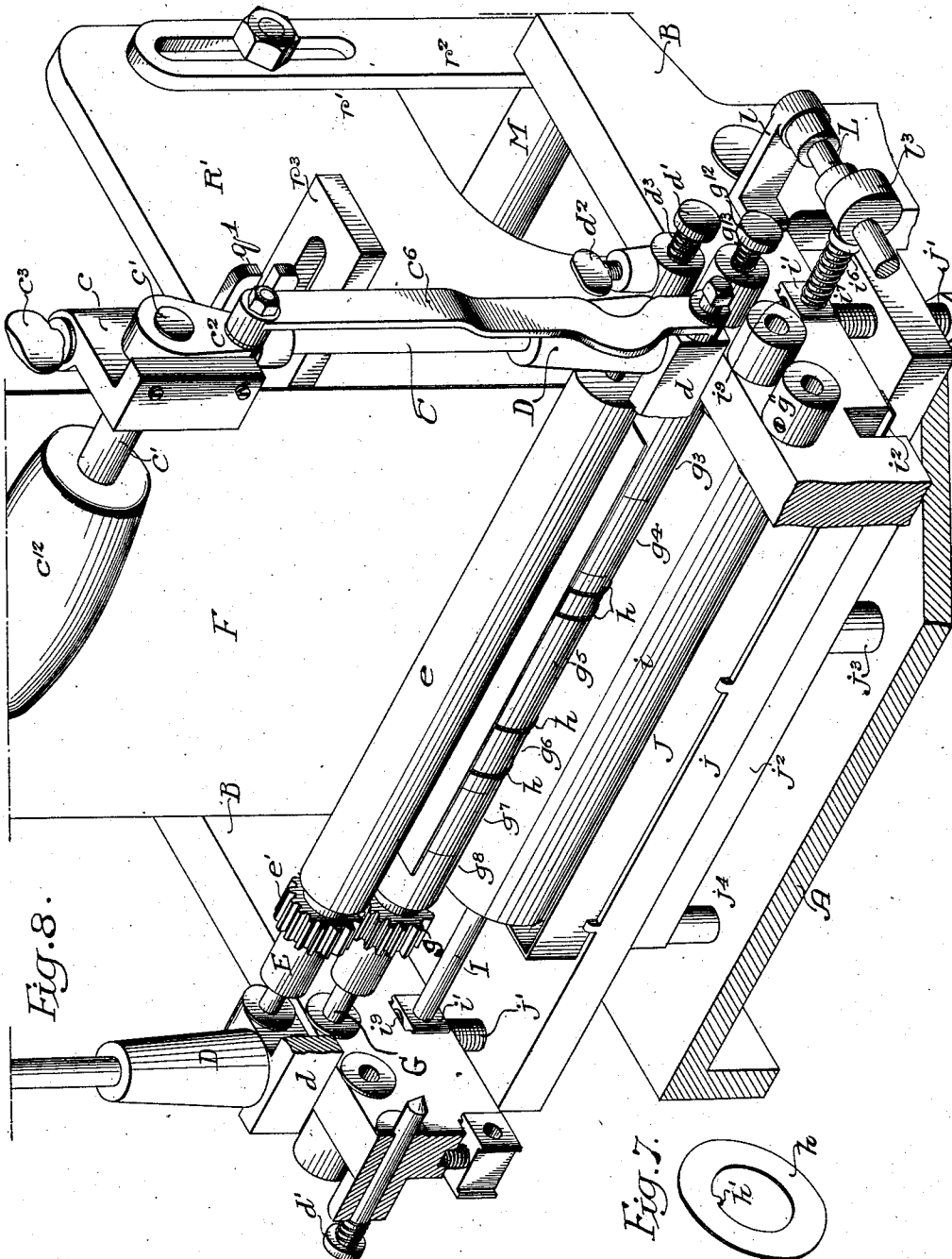


Fig. 8.

Fig. 7.

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UNITED STATES PATENT OFFICE.

CHARLES A. WRIGHT, OF PHILADELPHIA, PENNSYLVANIA.

RULING-MACHINE.

1,010,839.

Specification of Letters Patent.

Patented Dec. 5, 1911.

Application filed April 29, 1907. Serial No. 370,780.

To all whom it may concern:

Be it known that I, CHARLES A. WRIGHT, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Ruling-Machines, of which the following is a specification.

One object of my invention is to provide a novel combination of mechanisms for simultaneously ruling a number of parallel lines, which may, or may not, be in different colored inks; it being also desired that the machine shall be capable of relatively rapid operation and shall be so organized as to require but little attention.

Another object of the invention is to provide a machine of the general character above noted, in which the various parts shall be so arranged as to permit of the convenient and rapid removal and insertion of the various ruling members and which shall also permit of the relative adjustment of certain of the parts in order to adapt the machine to operation upon cards of varying dimensions.

It is further desired to provide a ruling machine in which it shall be possible to make at one operation a number of lines of different colors upon a succession of cards; the mechanism being particularly designed with a view to permitting the adjustment, as well as the insertion and removal, of the various ink fountains and their associated parts with a minimum of labor and interference with the operation of the machine.

These objects and other advantageous ends I secure as hereinafter set forth, reference being had to the accompanying drawings, in which:—

Figure 1, is a side elevation of a machine constructed according to my invention; Fig. 2, is a side elevation of the machine shown in Fig. 1, but on a larger scale, illustrating more clearly certain features of the invention; Fig. 3, is a front elevation of the machine shown in Fig. 2; Fig. 4, is a vertical section of my improved ruling machine on a still larger scale than Figs. 2 and 3, but taken on the line 4—4, Fig. 3; Fig. 5, is a perspective view of the feeding head preferably employed in my machine; Fig. 6, is a fragmentary perspective view on an enlarged scale illustrating certain details of the feeding and ruling mechanism with their associated parts; Fig. 7, is a perspective view of one of the annular ruling pens, and Fig. 8, is a sectional perspective view illus-

trating certain of the details of construction of one of the ink fountains and its associated parts.

In the above drawings, A represents a table-like structure or frame, having supporting legs *a* and upwardly extending side frames B, mounted so as to be substantially parallel to each other. These frames are provided with bearings for a main shaft *b*, which has a driving pulley *b'* designed to be connected to any suitable source of power. Also supported in suitable bearings on said frame are two shafts *b²* and *b³* extending parallel to the shaft *b* and respectively provided with oppositely disposed cone pulleys *b⁴* and *b⁵*, as shown in Fig. 3, which are grooved for the reception of a rope or cable *b⁶* of circular section. The first of these cone pulleys has fixed to its supporting shaft a relatively large gear wheel *b⁷*, which meshes with a pinion *b⁸* fixed to the driving shaft *b*. From the upper edge of each of the side frames B extend bars C, C' and C²; which are disposed in pairs respectively opposite each other and each having mounted upon it a head *c*, as best shown in Figs. 2 and 3. Mounted in and extending between each pair of these heads is a substantially horizontal shaft *c'* which extends beyond said heads and is provided with crank arms *c²*.

It is to be noted that the bars C are not rigidly connected to the respective heads, but, as shown in detail in Fig. 2, are held thereto by headed screws *c³*, which enter correspondingly threaded recesses in their upper ends; there being provided springs *c⁴* confined between each head and a collar *c⁵* on the bar, whereby said head is maintained in contact with the headed screw, and as far as possible, away from the side frame B.

Each of the cranks *c²* carried by the shaft *c'* has connected to its end a downwardly extending connecting rod *c⁶* attached at its lower end to a cross head D slidably mounted upon the adjacent bar C, C' or C², as the case may be. The various cross heads are connected in pairs by transverse bars *d* and are provided with horizontally extending recesses for the reception of headed pintles or pivots *d'*, which may be held in any given position by means of set screws *d²* extending through a suitable portion of the cross head at right angles to the line of said pintles. These latter have springs *d³* confined between their heads and the adjacent face of

the cross head D, and are pointed so as to properly enter conical recesses in the ends of the roller shaft E. There are, in the present instance, three such shafts E, E' and E², each provided with a roller *e* and a pinion *e'*.

Supported in any desired manner above the machine is an endless belt or apron F, which extends down in front of the machine, around the roller *e* of the shaft E, under the roller of shaft E' and under and around the roller of shaft E², from whence it passes upwardly to whatever supporting structure may be desired in any particular case.

Vertically under each of the shafts E, E' and E² are a second set of shafts G, G' and G² mounted in suitable bearings in the side frames B and each provided with a pinion *g* meshing with a pinion *e'* of the shaft immediately above it.

The various parts of the machine are so arranged that the main shaft *b* extends midway between the two shafts G and G' and has mounted upon it a pinion *b*³, which meshes with the pinions *g* on each side of it, there being also a fifth shaft *g'* extending midway between and parallel to the two shafts G' and G² and provided with a pinion *g*² which meshes with the two pinions *g* upon said two shafts. By means of these various pinions it will be at once appreciated that the two sets of shafts E and G are driven from the main shaft *b*.

Mounted upon each of the shafts G, G' and G² and confined thereon in any desired manner, are a series of bushings *g*³, *g*⁴—*g*⁸, between any two of which is mounted an annular ruling pen *h*, of the form shown best in Fig. 7. These pens consist of rings of thin sheet metal having relatively sharp but flat edges and each provided with an inwardly extending projection *h'* designed to enter a key-way *g*⁹ in its supporting shaft G. It will, of course, be understood that the bushings *g*³, etc., may be of any desired length so as to bring the pens *h* confined between them in any desired relative positions upon their shafts.

Under each of the shafts G, G' and G² are mounted shafts I, I' and I² respectively, each of which is provided with an ink roller *i* so placed as to engage, when properly adjusted, the various annular ruling pens on the shafts G, etc. These shafts I are mounted in bearings *i'* which fit recesses in the side frames B and which are prevented from dropping out of said recesses by means of small plates *i*², as shown in Fig. 8. The ink fountain for each roller, as indicated at J in Figs. 4 and 8, is removably mounted upon a supporting structure *j* extending transversely of the machine and having through its ends vertically extending set screws so placed as to be capable of engagement with the under faces of the slidable bearings *i'* for

the ink roller shafts. Each of the structures *j*, in the present instance, consists of a wooden block mounted upon an elongated piece *j*² supported at its central portion upon the upper end of the rod *j*³, which is screwed into it in the present instance. In addition to these rods each of the pieces *j*² has adjacent to its end a guide pin *j*⁴ extending downwardly through suitably placed openings in the table structure A of the machine. Each of the rods *j*³ has connected to its lower portion one end of a hand lever K pivoted at *k* to a link *k'*, in turn pivoted to the underside of the table structure A; there being also for each lever a cam-shaped piece *k*², as shown in Fig. 3, which, when the handle *k*³ of the lever has been depressed, may be swung upwardly so as to fit between said lever and the end of the adjustable set screw *k*⁴, which projects from the under side of the table structure A.

In order that the annular ruling pens may not always engage their ink rollers in the same lines, I provide means whereby said rollers may be moved longitudinally and for this purpose extend the shaft of each roller beyond the side frames B, as shown in Fig. 8, providing each of such extensions with a head *i*⁶. Between such head and the adjacent sliding bearing *i'* I place a spring *i*⁷ which tends to maintain the ink roller at one extreme of its possible path of motion.

For the purpose of shifting the ink rollers, I provide a shaft L mounted in bearings formed in brackets *l* projecting from one of the side frames B, and I provide such shaft with a worm wheel *l'*; it being noted that the shaft extends at right angles to the driving shaft *b*. Said latter shaft has a worm *l*² engaging with said worm wheel and the shaft L has adjacent to each of the heads *i*⁶ of the shafts I, I' and I², cams *l*³, which, as their shaft is turned, periodically move the shafts I, etc., longitudinally through bearings and consequently vary the points at which the ruling pens engage their ink rollers.

For the purpose of feeding cards from a pile thereof to the machine one at a time, I provide the apparatus illustrated clearly in Figs. 4 to 6 inclusive, and for the purpose of supporting this apparatus employ a transverse bar M mounted on the vertically adjustable brackets *m* carried by the table structure A, and slotted, as illustrated in Fig. 2, to receive bolts *m'*, whereby they may be retained in any desired position. This bar serves as a means of support for a lever *m*² having its ends turned upward and recessed to provide guides for a longitudinally slidable bar *m*³. A spring *m*⁴ extends between the extreme front end of the lever and any suitable holding structure in such manner as to constantly tend to maintain the rear end of the lever elevated; the position,

however, of said rear end being determined by means of an adjustable screw m^7 in the rear arm of the lever, said screw having an operating handle m^6 and bearing against a transverse bar M' supported like the bar M , from the side frames B . The shaft b^3 is made in two relatively short lengths connected by a pair of cranks b^{11} and a long crank pin b^{10} which has connected to its central portion one end of a connecting rod P whose second end is pivoted to the slidable bar m^3 at p . Said bar m^3 has rigidly pinned to it a block m^4 having fixed to its top face superposed plates p' and p^2 . The latter of these plates is held in place by screws p^3 and has a tongue p^4 struck up from its rear end in an inclined position, as shown best in Figs. 4 and 5. Said plate p' is provided with longitudinally extending slots for the reception of screws p^5 and p^6 and has its front end bent upwardly at an angle so that the edge thereof extends above the inclined tongue p^4 by an amount equal to or less than the thickness of the cards to be operated upon. The extreme rear end of the lever m^2 is extended to form a relatively flat plate m^5 , which extends adjacent to and just below a vertically extending bar q mounted in front of the roller on the shaft E . The distance between this plate portion m^5 of the lever and the lower end of the bar q may, as is obvious, be adjusted by means of the screw m^7 . Upon the transverse bar M' , I provide a pair of hubs r from which extend two substantially vertical side plates or cheek pieces R and R' . Each of these at its front portion has held to it by a bolt r' a slotted bar r^2 , which rests upon the transverse bar M and permits of the said cheek pieces being adjusted upon the bar M' as an axis. Extending between the rear portions of the top edges of the two cheek pieces is a transverse structure r^3 held in position by bolts, as shown, and serving as a guide for the vertical bar q ; it being noted that, as shown in Fig. 6, this transverse structure is slotted so as to permit of its lateral adjustment and the consequent movement of the bar q across the space between the cheek pieces R and R' . The apron F is preferably guided at the rear of the vertical bar q by a transverse bar q' provided with a longitudinal slot q^2 for the reception of said apron; said bar being bolted to the front pair of vertical rods C . Extending between the guide or cheek pieces R and R' is a substantially vertical strip S mounted upon the rear end of a bar s extending parallel to the bar m^3 ; there being transverse projecting arms s' carried by the rear end of this bar s whose front edges lie substantially in the same plane as the lower portion of the strip S . Said bar s is guided in the front end of the lever m^2 .

To the rear of the ruling and inking

rollers of the machine, I provide an endless conveying belt T , which extends around the roller t immediately to the rear of the ruling roller shaft G^2 and around the guide rollers t' , t^2 and t^3 as well as a relatively large roller t^4 . These latter rollers are mounted upon a framework V carried from the table structure A of the main portion of the machine. This frame structure also serves to support rollers v , v' and v^2 carrying a second endless belt or apron v^3 . This latter apron is so mounted that its upper run will receive cards delivered from the apron T and it is driven by a suitable belt t^5 passing over guide pulleys and receiving its power from the shaft b^2 . A second belt v^4 serves to convey power from the spindle of the roller v^2 to a pulley mounted on the spindle t^5 of the roller t^4 and hence to the belt or apron T . I preferably so proportion the various pulleys that the apron T is caused to move at a very much higher speed than the apron v^3 and for the purpose of properly guiding the cards as they are delivered upon said latter apron, I mount on the upper portion of the framework V a shield v^6 , as shown in Fig. 1. For the purpose of maintaining the belt v^4 at the proper tension I provide this with a tension pulley v^7 from which is hung a weight v^8 .

With the above described assemblage of apparatus I drive the main pulley b' from an appropriate source of power. The ink fountains J are provided with supplies of the same or different colored ink, as desired, and a package of cards to be ruled is placed between the cheek pieces R and R' , the bar q and the strip S . The belt b^6 is placed so as to turn the cone pulley b^5 and consequently the shaft b^3 at the most desirable speed for the work in hand, and, as a result, the bar m^3 will be rapidly reciprocated in the guideways of the lever m^2 . The apron F is moved by the rollers E , E' and E^2 in the direction of the arrows, while the rollers of the shafts G , G' and G^2 are driven by their respective gears and the gears b^9 and g^2 from the driving shaft b . Consequently, as the revolution of the crank b^{11} causes the bar m^3 , through the connecting rod P , to move forward, the block m^4 fixed to said bar is likewise moved forward. As above noted, the upwardly inclined edge of the plate p' projects above the highest portion of the tongue p^4 of the plate to such an extent that it engages the front edge of the lowermost card of a package of cards, driving it forward through the space between the bar q and the plate portion m^5 of the rear end of the lever m^2 . The rest of the package of cards remains as before, while the lowermost card is engaged between the apron F and the pens of the roller upon the shaft G ; these latter ruling upon its lower face certain parallel lines whose posi-

tions are determined by the adjustment of the cheek pieces R and R', as well as by the dimensions of the bushings interposed between the pens. The direction of rotation of the main shaft *b* is such that a card, after passing the roller on the shaft G, is engaged between the pens on the roller G' and the apron F and finally between said apron and the pens upon the roller shaft G², after which it is delivered from the machine with sufficient impetus to fall upon the rapidly moving apron T.

In order that the various pens on the shafts G, G' and G² may be supplied with ink, it is necessary for each of the three levers K to be so turned on its pivot *k* as to raise the rod *j*³ and, therefore, the transverse members *j*² and *j* with the ink fountains J. The upward movement of these parts causes the set screws *j'* to engage with the movable bearings *i'* and raise the ink roller shaft up into contact with the various ruling pens of one of the adjacent pen shafts G, G' or G², as the case may be. When no cards are being fed, I lower the ink fountains and permit the ink rollers to drop away from engagement with the pens, either under the action of gravity or by the operation of small springs *i*³.

It will be seen that the apron F is apt to receive ink from the pens at such time as cards are not being passed through the machine and it is for this purpose that I make it of relatively great length so that such ink has an opportunity to dry after passing away from the pens and before its return into engagement with another series of cards.

During the operation of the machine the revolution of the cams *l*³ moves their respective ink rollers longitudinally and thereby continually brings fresh portions of their surfaces into engagement with the ruling pens.

The ruled cards deposited upon the apron T are delivered between this and the rear roller *t*⁴ and are thence discharged upon the apron *v*³ to the rear of the regulating flap *v*⁶. Inasmuch as this latter apron moves at a relatively slow speed, the cards collect upon it close together and are periodically removed by the operator.

When it is desired to remove any of the ruling pen shafts, this may be very conveniently accomplished by loosening the set screw *g*¹¹ Fig. 8, whereby the pintles or pivot pins *g*¹² are held in the conical recesses at the ends of the shafts, in the manner clearly described in connection with the rollers *e* of the apron shafts E, etc. Springs *g*¹³ at once force outwardly the pintles, after which the shaft may be removed by hand. In order to permit of convenient access to these pen shafts, I temporarily raise any one or all of the rollers *e* belonging to the shafts

E, etc., by giving the transverse shafts *c'* a quarter revolution, thereby turning the cranks *c*² and moving upwardly their attached connecting rod *c*⁶ and the cross heads D, together with the attached rollers, etc. For the easy manipulation of these cross shafts *c'*, I provide hand grips *c*¹², as shown in Fig. 8.

In the event of a variation in the thickness of the cards operated upon, I adjust the space between the plate *m*⁵ of the lever *m*² and the lower end of the vertical bar *q*, and it is, of course, obvious that the cheek pieces R and R' and the strip S may be adjusted, as desired, to suit any particular size of card, as well as to vary the particular portion of the machine into which the cards are fed.

I claim:—

1. The combination in a ruling machine, of a plurality of shafts, each having a series of ruling pens, means for supplying ink to said pens, guide rollers adjacent to the pen shafts, an apron passing between said guide rollers and the pens, a frame for each of the guide rollers, guides, and means for moving any one of the rollers upon its guides toward and from its adjacent pen shaft, substantially as described.

2. The combination in a ruling machine of a plurality of shafts each having a series of ruling pens, means for each series of pens for supplying ink thereto independently of the others, means for driving the pen shafts, a series of guide rollers mounted above the pen shafts, and an endless apron passing between the guide rollers and the pen shafts, with means for independently adjusting any of said guide rollers to permit the apron to be raised adjacent to one of said pen shafts.

3. The combination in a ruling machine, of side frames, a plurality of shafts mounted on said frames, a series of ruling pens mounted on each shaft, vertically extending guides on each side frame, a frame movably mounted on each pair of guides, a guide roller carried by each of said frames, an apron passing between said guide rollers and the pen shafts, with means for moving any of said frames at will upon its guides, substantially as described.

4. The combination in a ruling machine, of side frames, a plurality of shafts mounted on said frames, a series of ruling pens mounted on each shaft, perpendicularly extending guides on each side frame, a frame movably mounted on each pair of guides, a guide roller carried by each of said frames, an apron passing between said guide rollers and the pen shafts, with means for moving any of said frames at will upon its guides, substantially as described.

5. The combination in a ruling machine, of a supporting frame, a shaft mounted therein and provided with a series of ruling

pens, an ink roller having bearings slidable in recesses in said frame, an ink fountain, and means including a hand lever for moving the fountain and ink roller toward the ruling pens, substantially as described.

6. The combination in a ruling machine, of a frame, a plurality of shafts mounted therein and each provided with a series of ruling pens, an ink roller adjacent to each shaft, a fountain for each roller, and means including a lever for independently moving each fountain and ink roller toward its particular pen shaft, substantially as described.

7. The combination in a ruling machine, of a frame, a plurality of shafts mounted therein, ruling pens on each of said shafts, an ink roller and fountain for each shaft, a shaft extending substantially at right angles to said ink roller, a series of cams on said latter shaft, and means for turning the pen shaft and the cam shaft, said cams being

placed to engage and longitudinally move the shafts of the ink rollers, substantially as described.

8. The combination in a ruling machine, of a frame, a plurality of shafts each having a series of ruling pens, an ink roller for each pen shaft supported so as to be longitudinally movable, the shaft of each roller being provided with an extension having a spring, a shaft having a series of cams respectively placed to engage the ends of the ink roller shafts, means driving the pen shafts and the cam shaft, and a fountain for each ink roller, substantially as described.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

CHARLES A. WRIGHT.

Witnesses:

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F. ED. STUTZ.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."