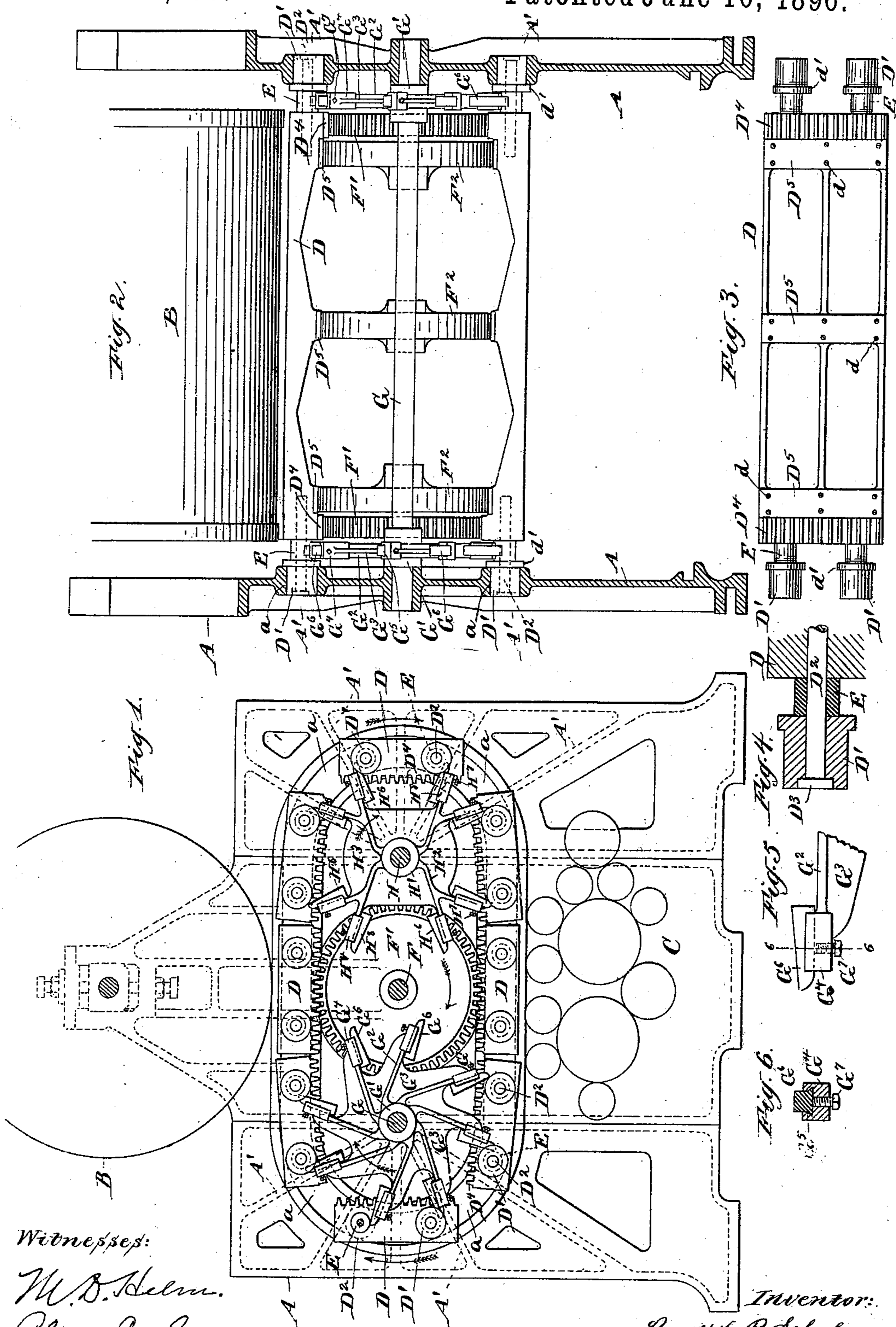


(No Model.)

R. P. SCHULZE.
PRINTING MACHINE.

No. 562,099.

Patented June 16, 1896.



Witnesses:

W. B. Helm.

Chas. E. Seale.

Inventor:

Rudolph P. Schulze,
by his attorney
Charles R. Seale.

UNITED STATES PATENT OFFICE.

RUDOLPH P. SCHULZE, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE COLUMBIA PERFECTING PRESS COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 562,099, dated June 16, 1896.

Application filed December 21, 1895. Serial No. 572,855. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH P. SCHULZE, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Printing-Machines, of which the following is a specification.

The invention applies to printing-machines in which the forms are carried horizontally under the impression-cylinder on a series of continuously-moving independent beds traveling between the side frames in ways formed therein and guided by rollers mounted on the beds and matching such ways. The path described by each bed is a general ellipse having straight horizontal portions above and below, joined by true semicircles at the ends. Letters Patent No. 373,354 to J. C. Fowler and E. A. Henkle, dated November 15, 1887, shows a press of this type. The beds are driven through the straight portions of their course by gear-wheels meshing with racks on the under face of each.

As heretofore constructed additional curved racks and additional gear-wheels matching thereto conforming to the curved portions of the ways were necessary to carry the beds through those portions of the travel, and by reason of the difficulties of adjustment to compensate for wear of the parts and lost motion from other causes there was always danger of presenting the rack-teeth in improper position relatively to the gears at the transition periods, resulting in annoying and serious accidents.

My construction dispenses with the curved racks and obviates the objections to their use. The corresponding gear-wheels are also omitted, their places being taken by spider-frames having adjustable bearing-blocks on their arms engaging rollers on the beds, which may be extensions of the guide-rollers, or independent rollers properly placed to receive the bearing-blocks. The main advantage due to the use of my invention is the increased positiveness of the action and the avoidance of accidents due to the non-coincidence of the racks with the gear-wheels when presented thereto.

The accompanying drawings form a part of

this specification and represent what I consider the best means of carrying out the invention.

Figure 1 is an elevation of the main parts with the side frame removed. Fig. 2 is an end elevation, partly in vertical section. Fig. 3 is a plan view of the under face of one of the beds alone. The remaining figures are on a larger scale and show certain details. Fig. 4 is a vertical section through one of the rollers and adjacent parts. Fig. 5 is a side elevation of one of the arms and bearing-blocks. Fig. 6 is a cross-section on the line 6 6 in Fig. 5.

Similar letters of reference indicate the same parts in all the figures.

A A are the side frames of the press, B the impression-cylinder, and C the inking mechanism, both the latter being of any ordinary or approved construction. The frames A A are of cast-iron, each a counterpart of the other and each provided with an elliptic slot α , having a horizontal straight portion above and below, joined by true semicircular portions at the ends. The central portion of the frame within the slot is supported by the webs A', extending across the slot and forming part of the casting.

D D are the beds, (I have shown eight in the series,) all exactly similar in construction. A description of one will suffice for all. It is rectangular in plan, the longer dimension lying transversely of the press, and is provided at each short end with two guide-rollers D' D' of a diameter to match to the width of the slot α , mounted on strong pins D² D², firmly set in the bed, and having heads D³ lying in the corresponding counterbored recesses in the guide-rollers D' to hold them against axial displacement outwardly. Between the inner face of each roller D' and the adjacent end of the bed is mounted a bearing-roller E smaller than the guide-roller and turning on the same pin D².

The bed is strengthened on the under face by webs extending in both directions and the upper face is plane and finished to receive the forms. (Not shown.) At each extreme outer edge on the under face is a straight rack D⁴, matching to a gear-wheel F', to be presently described. Immediately adjacent to the

racks and also across the center are hardened steel plates D^5 , three in all, secured to the bed by screws d .

F is a shaft extending transversely of the press, its axial line coinciding with the center of the elliptic slot, mounted in suitable bearings in the frame and driven in the direction indicated by the arrow by a belt or otherwise from a steam-engine or other motor. It carries two gear-wheels F' F' , one near each end within the side frames, cut to mesh with the racks D^4 , above described, and performing the function of driving the beds through the straight portions of the slots. The shaft F also carries three strong supporting-rollers F^2 F^2 F^2 , matching the steel plates D^5 on the beds, and through them supporting the beds against the pressure of the impression-cylinder during the passage under the latter.

In the same horizontal line with the shaft F and on each side thereof are mounted the shafts G and H , their axes coinciding with the centers of the semicircular portions of the slots a . They are mounted in bearings in the frames A and are driven in the direction indicated by the arrows—the same direction as the shaft F —by gearing from the latter. (Not represented.) Each carries a spider-frame at each end within the framing, having arms matching to the bearing-rollers E and performing the function of carrying the beds around the curves.

The rotation of the shaft G carries the beds upward around the curve at the left in Fig. 1 and has only to support them against the force of gravity and present their racks properly to the gear-wheels F' , while the shaft H , besides supporting the beds, also pushes them downward around the curve at the right in the same figure, requiring spider-frames differing somewhat from those on the shaft G . The latter consist each of a boss or hub G' from which radiate eight arms G^2 , connected each to its neighbor by webs G^3 and carrying at its outer end a thickened portion G^4 , in which is produced by milling or otherwise a dovetail groove receiving a corresponding dovetail G^5 on a tapered bearing-block G^6 , mounted with its thicker end toward the center of the spider-frame, its plane working face in radial line therewith and in the direction of the motion. The bearing-blocks G^6 are adjusted inward or outward by sliding in the dovetail grooves and are secured in the desired position by set-screws G^7 , tapped through the back face of the thickened portions G^4 and impinging against the concealed faces of the bearing-blocks.

The arms G^2 in each spider-frame are arranged in pairs spaced to match to the rollers E , so that the bed will be supported at four points during its upward travel and the forward bearing-blocks will engage the forward rollers before the racks D^4 have left the gear-wheels F' , the rearward blocks continuing to lie against their rollers in delivering

the beds to the gear-wheels until the latter has meshed with the forward teeth of the racks. The shaft H is similarly equipped with bosses H' , arms H^2 , and webs H^3 ; but the thickened portions H^4 , having the dovetail grooves, face alternately in opposite directions, so that the pair of rollers E on each end are received between two bearing-blocks H^6 H^8 , having their plane working faces presented toward each other. The rearward blocks force the bed forward and downward around the curve at the right in Fig. 1 and then rearward to engage its racks with the gear-wheels F' similarly to the action of the blocks G^6 just described. The forward blocks H^8 , facing backwardly, receive the forward rollers E and thereby support the weight of the bed and prevent it from falling through the nearly perpendicular portion of the slot a at that end during the downward travel. These blocks H^6 and H^8 are, like the blocks G^6 , adjustable in the dovetail grooves and are held by the screws H^7 .

Each of the shafts F , G , and H revolves at the same speed, and as the point of contact of the bearing-blocks is farther from the center than the pitch-line of the gear-wheel F' it follows that the bed travels faster when driven by the spider-frames than by the gear. This fact necessitates that the rollers E shall be at such distance relatively to the first rack-tooth and the distance between the shafts shall be such that the first tooth will not be presented to the gear-wheel until the plane radial face of the rearward bearing-blocks G^6 has passed the vertical center line of the shaft G sufficiently to reduce the forward motion of the block to a rate of speed equal to that of the pitch-line of the gear-wheel. The taper of the block carries the line of contact farther forward or backward, according as the block is set farther away from or nearer the center of the spider-frame, and thus allows sufficient adjustment to insure the proper presentation of the first tooth. It will be observed that the adjustment inward of the block not only carries the line of contact backward, but also quickens the release on the roller E by reason of shortening the radius. The projecting end of the block should be normally but little, if any, beyond the concentric line joining the centers of the rollers. The extreme edge of the block is slightly rounded to avoid scraping the roller on the release, and the back face is curved rapidly away from that edge, so the release will be quick and positive. The same is true of the forward block G^6 in receiving the bed at the bottom of the upward curve and also of the blocks H^6 , carried by the shaft H .

Each guide-roller D' is provided with an annular flange d' , lying against the inner face of each side frame A , to prevent transverse motion of the beds.

It will be understood that all parts not particularly described, such as the paper feeding and delivering, the inking device, &c.,

may be of any preferred construction. The forms (not shown) for holding the matter are secured to the upper faces of the beds by any suitable fastening devices such as are usually employed in machines of this class. The present invention relates to the bed motion alone, as previously stated.

An advantage to which attention has not been called is in the fact that the rollers E are placed in the mid-thickness of the beds in a line passing through or near the center of gravity of the bed when the latter is on edge, so that when supported by the bearing-blocks on the curves there is little or no increase of friction in the slots due to torsional strains, as is the case when the lifting force is applied to curved racks projecting from the under face of the beds and lying considerably out of the center of the load.

Modifications may be made in the forms and proportions within wide limits without departing from the principle or sacrificing the advantages of the invention.

The guide-rollers D' may, if preferred, be set close to the beds and the width of the framework correspondingly narrowed, the bearing-rollers E in such case being placed outside the frames and operated by spider-frames or their equivalents also outside on the overhung ends of the same or similar shafts. I prefer the whole as shown.

I claim—

1. In a printing-machine of the character herein specified, the side frames having vertically-arranged elliptic slots therein forming guideways for a series of beds, in combination with the latter and the guide-rollers thereon traveling in said slots, racks on the under faces of the beds and gear-wheels matching thereto for carrying the beds through the straight portions of their travel, bearing-rollers on the said beds, and spider-frames having arms arranged to contact with said bearing-rollers and thereby carry the beds through the curved portions of their travel, all substantially as herein shown and described.

2. The side frames having vertically-arranged elliptic slots therein forming guideways for a series of beds, in combination with the latter and the guide-rollers thereon traveling in said slots, racks on the under faces of the beds and gear-wheels matching thereto for carrying the beds through the straight portions of their travel, bearing-rollers on the said beds and spider-frames having arms and the adjustable tapered bearing-blocks carried by said arms arranged to contact with said bearing-rollers and thereby carry the beds through the curved portions of their travel, all substantially as herein specified.

3. The side frames having vertically-arranged elliptic slots therein forming guideways for a series of beds, in combination with the latter and pins thereon carrying guide-rollers traveling in said slots, the racks on the under faces of the beds and gear-wheels matching thereto for carrying the beds

through the straight portions of their travel, bearing-rollers mounted on said pins, a spider-frame carried by the shaft G arranged in the center of the curved portions of the slots at one end of the press, the radial arms G² having thickened portions G⁴, adjustable tapered bearing-blocks G⁶ dovetailed in said thickened portions, arranged to contact with said bearing-rollers and thereby carry the beds through the upwardly-curved portion of their travel, and the set-screws G⁷ for holding said blocks, all substantially as herein specified.

4. The side frames having vertically-arranged elliptic slots therein forming guideways for a series of beds, in combination with the latter and pins thereon carrying guide-rollers traveling in said slots, racks on the under faces of the beds and gear-wheels matching thereto for carrying the beds through the straight portions of their travel, bearing-rollers mounted on said pins, a spider-frame carried by the shaft H arranged in the center of the curved portions of the slots at one end of the press, the radial arms H² in pairs, having thickened portions H⁴, adjustable tapered bearing-blocks H⁶, H⁸ dovetailed in said thickened portions and arranged with their plane working faces toward each other, and set-screws H⁷ for holding the blocks in place, one of each pair of arms serving to drive the beds forward and downward through the curved portion of their travel and the other serving to support the beds during such travel, all substantially as herein specified.

5. The side frames A having vertically-arranged elliptic slots *a* forming guideways therein for a series of beds, in combination with the latter and the pins D² set therein carrying bearing-rollers E and guide-rollers D' traveling in said slots, the racks D⁴ on the under faces of the beds, the shaft F supported in the framing in the center of the guideways, the gear-wheel F' thereon matching to said racks for driving the beds through the straight portions of their travel, shafts G and H mounted in the centers of the curved portions of the ways in line with the said center shaft, the arms G² and adjustable tapered bearing-blocks G⁶ secured thereon arranged to contact with said bearing-rollers for driving the beds through the upwardly-curved portion of their travel, and the arms H² and adjustable tapered bearing-blocks H⁶, H⁸ thereon arranged to contact with the bearing-rollers for driving and also supporting the beds through the downwardly-curved portion of their travel, all substantially as herein specified.

6. The side frames A having vertically-arranged elliptic slots *a* forming guideways therein for a series of beds D, in combination with the latter and the guide-rollers D' matching to said slots, the pins D² set in the mid-thickness of the beds, the bearing-rollers E mounted thereon, the shaft G arranged with its axis in the center of the upwardly-curved portion of said slots, and arms G² carried by

said shaft arranged to drive the beds through the upwardly-curved portion of their travel by contact with said bearing-rollers and avoid the friction due to torsional strains, all substantially as herein specified.

5 In testimony that I claim the foregoing as my invention I have signed my name, in pres-

ence of two witnesses, this 21st day of November, 1895.

R. P. SCHULZE.

Witnesses:

ROBT. CONNOR,
CECILIA D. SEARLE.