No. 873,361.

B. O. FANSLOW. PATENTED DEC. 10, 1907.

DUPLICATING PRINTING MACHINE.

APPLICATION FILED FEB. 13, 1907.

3 SHEETS—SHEET 1.

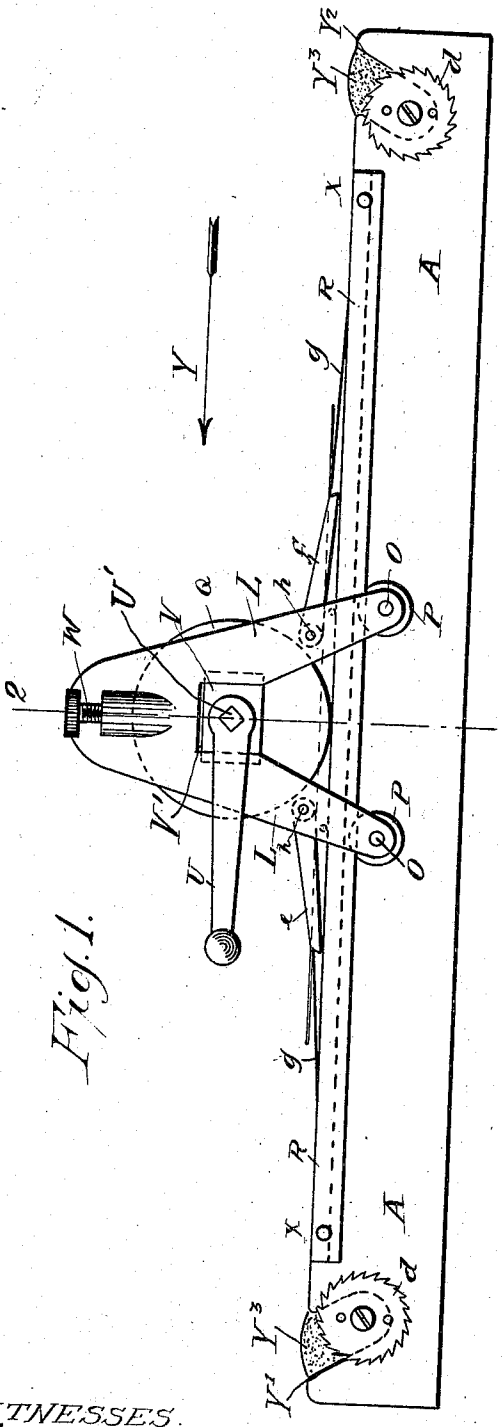

Fig. 1.

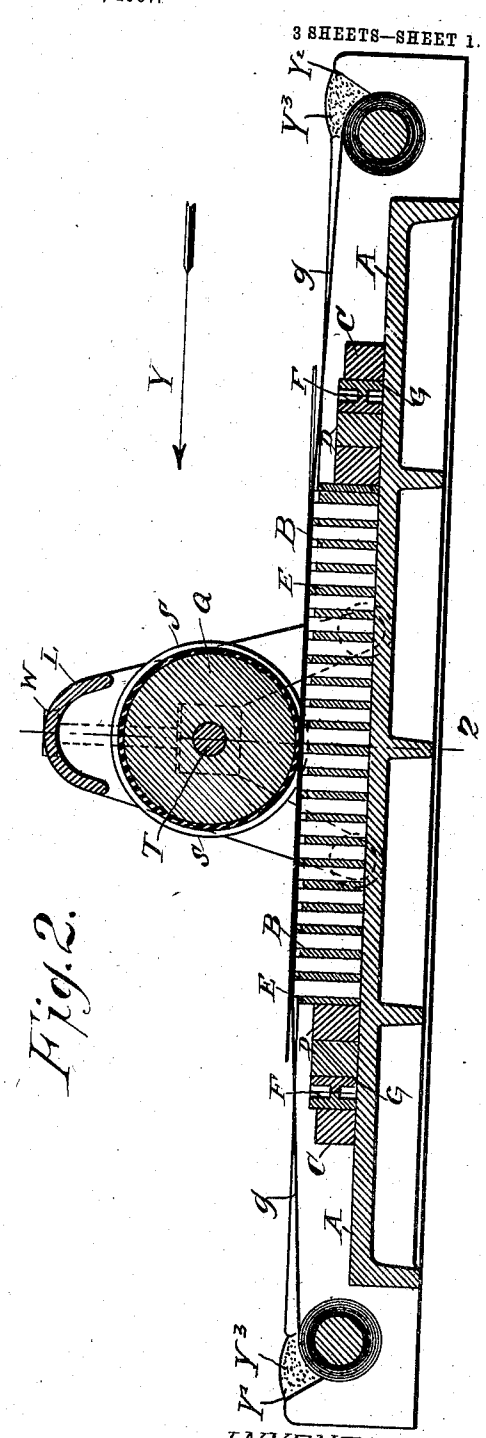

Fig. 2.

WITNESSES.

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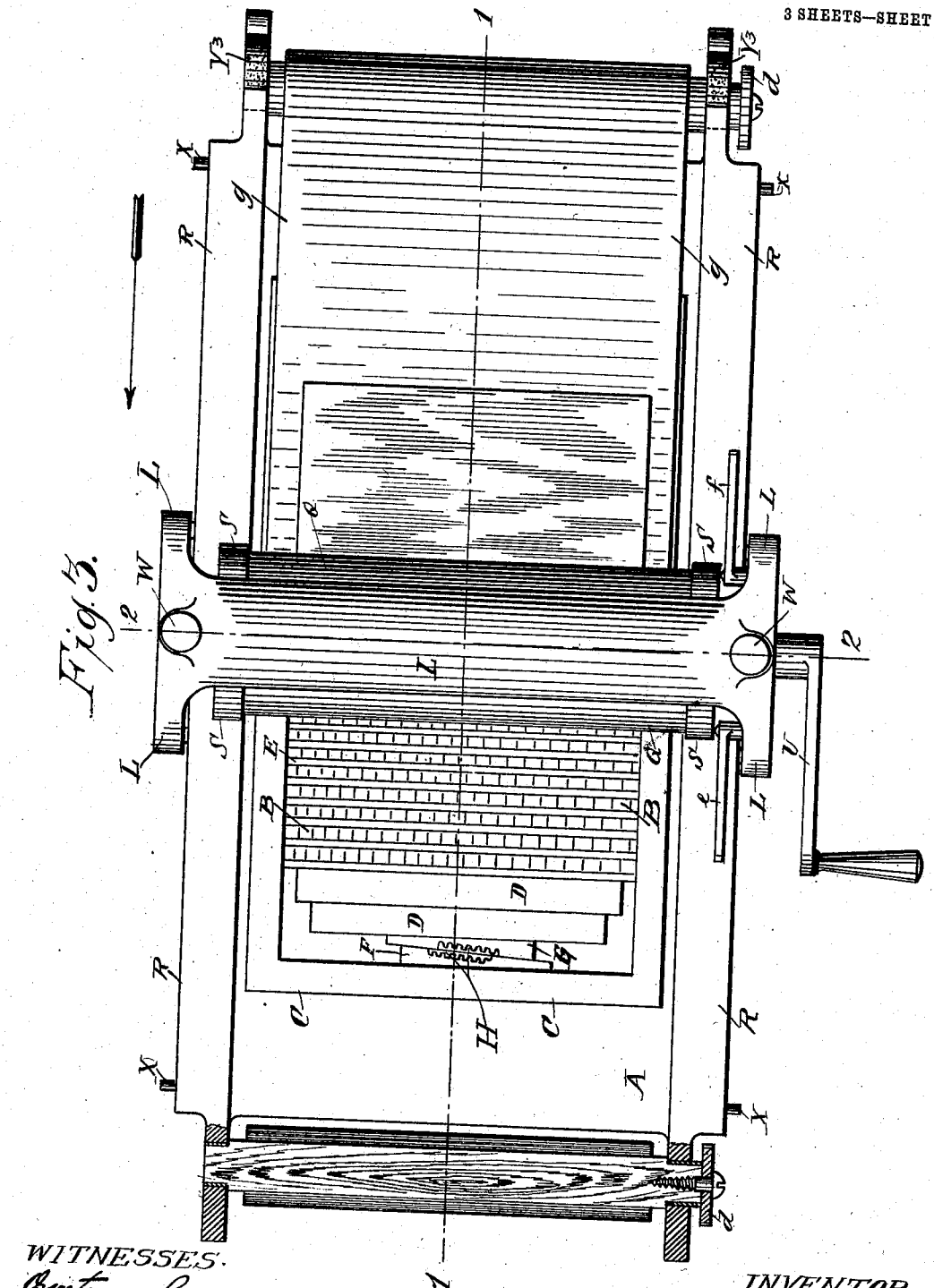
3 SHEETS—SHEET 2.

Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 6.

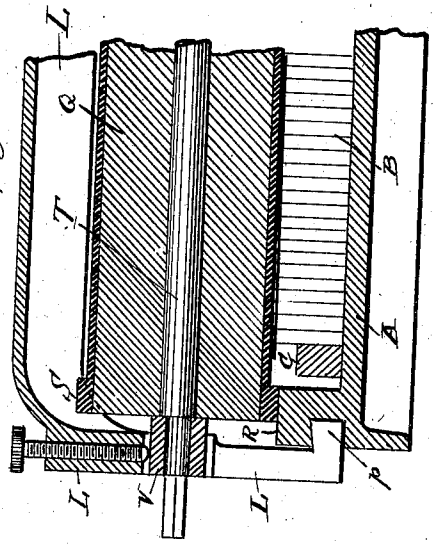


Fig. 7.

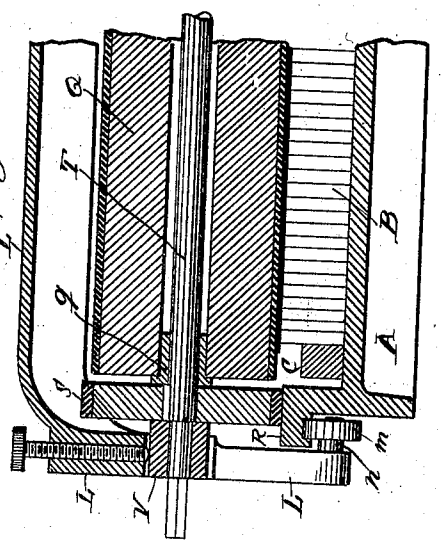


Fig. 4.

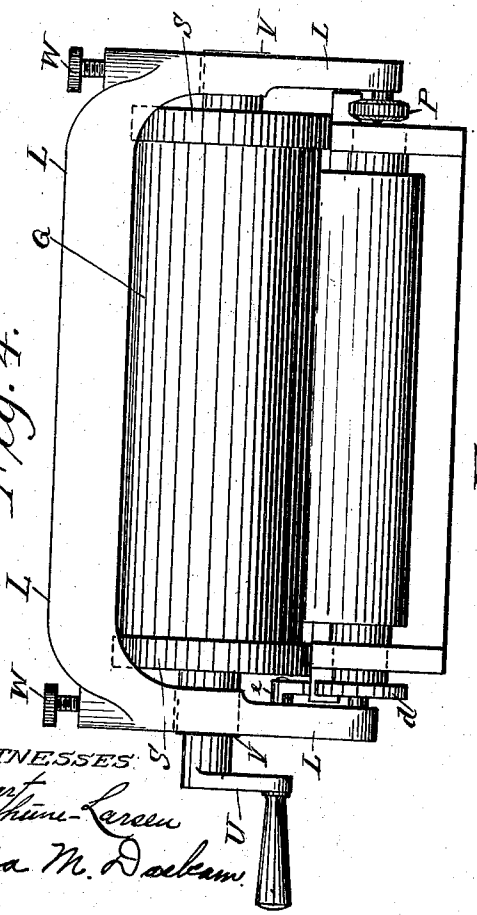
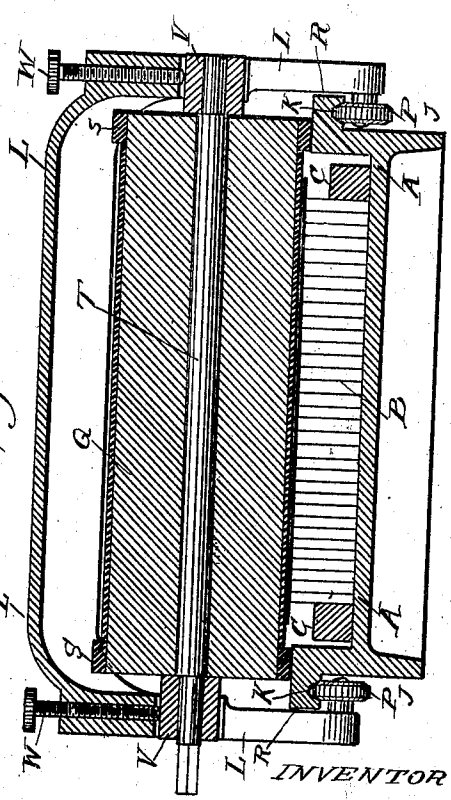


Fig. 5.



WITNESSES:

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ATTORNEY

UNITED STATES PATENT OFFICE.

BENJAMIN OTTO FANSLOW, OF LOS ANGELES, CALIFORNIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE UNIVERSAL POLYGRAPH COMPANY, INCORPORATED, A CORPORATION OF ARIZONA TERRITORY.

DUPLICATING PRINTING-MACHINE.

No. 873,361. Specification of Letters Patent. Patented Dec. 10, 1907.

Application filed February 13, 1907. Serial No. 357,219.

REISSUED

To all whom it may concern:

Be it known that I, BENJAMIN OTTO FANSLOW, of the city of Los Angeles, in the county of Los Angeles and State of California, have invented a new or Improved Duplicating Printing-Machine, of which the following is a full, clear, and exact specification, reference being had to the annexed drawings, and to the figures and letters marked thereon.

My said invention which relates to a new or improved machine for reproducing copies of documents, drawings, and pictorial representations, has for its object to effect such reproduction by printing operations hereinafter described.

The machine constituting my present invention consists of a flat stationary base, upon, or in which, there is carried either printing type, or other body having upon its upper surface the reproduction of any drawing, writing, or pictorial representation in the state capable of producing impressions from. In the parallel edges or opposite sides of this flat stationary base, parallel grooves which may be of various transverse sectional shapes are situated, and in these grooves the engaging parts of a movable carriage which contains the impression roller are retained in permanent operative relationship as hereinafter described. The upper faces of the opposite parallel sides of the base, constitute level parallel guides or rails upon which the ends of the impression roller bear throughout the entire travel of the impression roller, and the ends of the impression roller are provided with elastic rubber tires which always bear elastically upon these parallel guides or rails, while the elasticity of these tires insures a slightly yielding relationship between the impression roller, the paper on which the representations are printed, the printing ribbon, and the type or other printing surface from which the reproductions are taken. The movable carriage and the impression roller are traversed from end to end of their distance of movement in successive alternations of direction of these movements, that is to say, to and fro through any period of use of the machine for reproducing any required number of copies of documents, drawings, or other depictions. The arrangement of the machine otherwise, is generally such that it may be operated rapidly, with ease, certainty and economy, in the production of fac-simile copies of original documents, drawings or other representations.

Upon the annexed drawings Figure 1, is a side elevation of the reproducing machine constituting my invention. Fig. 2, is a longitudinal section of the same upon the line 1, 1, Fig. 3. Fig. 3, is a plan of my said machine partly broken away corresponding to Figs. 1, and 2. Fig. 4, is an end elevation of my said machine looking in the direction of the arrows Y, in Figs. 1, 2, and 3. Fig. 5, is a vertical section of my said machine upon the line 2, 2, Figs. 1, 2, and 3. Fig. 6, is a part cross section showing a modification of the grooves and of the guides of the carriage, as well as of the construction of the cylinder. Fig. 7, is a part cross section of one side of the machine showing a modified form of the roller, grooves and carriage guide at the side of the base.

In Figs. 1, 2, 3, 4, and 5, the horizontal base portion is marked A, and it is shown as consisting of a flat plate of cast iron or equivalent material, whose upper surface is planed true and level. Upon this surface either the types B, such as shown at Figs. 2, 3, and 5, are carried in the galley, or chase whose side and end portions are marked C, in Figs. 2, 3, and 5, and wherein the types B, as shown more especially at Figs. 2, 3, and 5, are retained operatively by being held in the chase C, by reason of the furniture of the galley D, being forced in the well known manner against the type slips E, and types B, by the toothed wedges F, and G, respectively, as particularly shown at Figs. 2, and 3, being operated by the attendant of the machine in placing the toothed key which being so well understood is not shown in the drawings, in between the toothed spaces H, and turning the toothed key by its handle so as to cause the wedge surfaces F, and G, to slide upon each other and thereby press the furniture D, against the type slips E, and types B, in the manner commonly practiced for holding type in a chase. The frame consisting of the chase C, and its contents, the furniture D, type slips E, and types B, rest on the flat bottom of the base A.

When instead of printing from a surface of type which may be either type, in style and

character corresponding to that commonly used in typewriting machines, or which may be of other kinds of type, such as type in imitation of script, or of other form or character, or when copies of drawings, pictorial representations or maps are to be made in the machine constituting my invention, then, instead of using the galley or chase and its equipment as hereinbefore described; a block of material such as type-metal, or other metal, a wood or metal engraving, electrotype, or other block containing on its upper surface the drawing, map, or representation to be reproduced by a printing operation, is carried.

At each of the sides of the base A, is a space J, extending throughout the entire length of the base A. In the under face of the rail R there is cut a V-shaped groove K, as shown more especially in transverse section in Fig. 5, the purpose of which will be hereinafter explained.

The carriage of my new or improved machine, consists of the frame L, which consists of a single casting as shown in the drawings. The lower part of each end of the frame L, is bifurcated as shown at Figs. 1, 2, and 3, more especially, and at the end of each bifurcated arm there is carried the stud O, upon the inner end of which there is also carried rotatively, the roller P, whose form and construction is more especially shown at Fig. 5. These rollers P, press up into and against the surface of the grooves K, and conjointly with the influence of the elastic rolling surfaces of the ends S, of the impression roller Q, maintain the carriage and impression roller Q, in proper operative relationship with the base A, in such manner that the carriage and the parts of the mechanism carried thereby cannot be dislocated from their proper relationship to and with the base A, either accidentally, or in any other manner than by taking asunder some of the parts for admitting of the separation when required, of the carriage and its connections on the base A, of the machine.

At the upper part of the base A, at the sides thereof, and of the requisite height or depth there are two parallel portions R, R, which while providing for the admission of the chase or galley, or type holder, or block, having a printing surface at the proper level below the impression roller Q, also provide at the top surfaces of these portions R, level faces upon which the two ends S, S, of the impression roller roll. The diameter of the ends S, S, of the impression roller Q, is preferably greater than the diameter of the intermediate portion of the impression roller, and being of elastic material, such as vulcanized india rubber, these ends S, S, when rotated as hereinafter described, roll smoothly upon the upper surfaces of the upraised portions R, R, and provide elastic slightly yielding action between the coöperating parts of the machine.

The impression roller Q, is carried upon the axis T, one end of which is formed square as shown at U', Fig. 5, in order to receive thereon the crank handle U, Figs. 1, 3, and 4, which on being rotated by the hand of the operator of the machine, causes the carriage and the impression roller to be traversed from end to end of the base A. The impression roller Q, in this case is fastened rigidly to the shaft T, so that as the shaft T, is rotated, the roller Q, is correspondingly rotated in either direction.

To more effectively regulate the elastic pressure of the ends S, S, of the impression roller Q, upon the top surfaces of the portions R, R, the carriage L, is provided with carrier blocks V, which are capable of vertical adjustment, that is to say, upwards and downwards in the parallel openings V', in the frames L, by means of the set screws W, W, as shown at Figs. 1, 2, 3, 4, 5, 6, and 7. The set screws W, W, at their lower ends bear upon the blocks V, in positive relationship with each block V, from which arrangement it results, that by turning the set screws W, in either direction, not only is the pressure of the end portions S, S, of the impression roller upon the parts R, regulated so as to adjust the elastic action of the end portions S, S, of the impression roller Q, upon the parts R, the rollers P, P, into their grooves K, K, with any required degree of elasticity for the efficient operation of the machine,—but this arrangement also enables the pressure of the intermediate part of the impression roller Q, upon the paper, the type ribbon, and the printing surface from which the copies or impressions are to be taken, to be regulated from time to time with the utmost nicety of adjustment.

At each end of the base A, there are recesses Y', and Y², respectively, preferably inclined as shown at Figs. 1, and 2. In each pair of these recesses there are situated the bearings of the rollers to which the printing ribbon is attached, and by which the printing ribbon is operated as hereinafter described. Each ribbon holder is provided with a ratchet wheel *d*, at one of its ends which is firmly fastened to one end of each ribbon roller, and the frame L, of the carriage at the same side of the machine whereat the ratchet wheel *d*, is situated, carries pivoted to each bifurcated arm the pawls *e*, and *f*, respectively, as shown at Figs. 1, and 3. When the carriage and impression roller of the machine are moved towards either end of the base A, then either the pawl *e*, or the pawl *f*, engages with one or the other of the ratchet wheels *d*, *d*, according to the direction in which the carriage and impression roller of the machine are being operated, and since each pawl *e*, or *f*, makes contact with

one or the other of the ratchet wheels *d*, before the carriage arrives at the termination of its travel, the further movement of the carriage after the contact of its pawl *e*, or *f*, with either of the ratchet wheels *d*, *d*, causes the rotation of one or the other of the ratchet wheels *d*, through a distance corresponding to the distance through which the carriage and impression roller moves, after the contact of either pawl *e*, or *f*, with its corresponding ratchet wheel is made, and in this manner the printing ribbon *g*, is wound through a corresponding distance off one of the ribbon carrying rollers, and upon, or on, to the other ribbon carrying roller. By this arrangement a fresh surface of printing ribbon is presented to the type or other printing surface, at each traverse of the carriage and impression roller, and anteriorly to making the next succeeding impression or printing operation; the rotation of one ribbon roller being about twice that of the other ribbon roller. This variation in the amount of rotation of the two inking rollers results from different lengths of the pawls *e*, *f*, which may be of equal lengths, or may be of different lengths, and when of different lengths one of these pawls operates upon one of the ratchet wheels *d*, for a longer time than the other pawl operates upon the other ratchet wheel *d*.

To insure the requisite length of movement of the ribbon rollers for producing the requisite movement of the ribbon *g*, shall be capable of adjustment, the pawls *e*, and *f*, while carried pivotally upon the pins *h*, *h*, rest upon the top surface of one of the guides or rails R, as shown at Figs. 1, and 3, until reaching the ratchet wheels *d*, one on the end of each ribbon roller, when the pawls respectively engage with the ratchet wheels *d*, and rotate them together with each ribbon roller alternately, so as to wind off one of the ribbon rollers and on to the other ribbon roller a length of printing ribbon adequate to supply a fresh surface of such ribbon at each printing operation.

Instead of operating the machine hereinbefore described by turning a crank handle U, as described, the machine may be operated by the attendant applying his hand to the top of the carriage L, and by pushing or pulling the carriage horizontally, causing it and the impression roller to make the successive journeys or traverses upon the base of the machine which have already been described as being performed by turning the crank handle U. When the machine is operated by pushing or pulling the carriage or impression roller, then the crank handle U, may be taken off the axis T, of the machine, but it is not necessary to remove the crank handle U, in order to operate the machine by the attendant pushing and pulling upon the bridge of the carriage L.

Instead of using the V-shaped grooves K, K, in the bottom of the guides R, R, as shown at Figs. 1, 2, and 5, the under parts of the guides R, may be constructed with a rectangular groove as shown at Fig. 7, in which case, instead of using the V-shaped rollers P, P, a cylindrical roller *m*, carried upon the stud *n*, fixed in the lower part of the frame L, may be substituted. Instead of using either of the rollers P, P, as in Fig. 5, or the roller *m*, as in Fig. 7, these rollers may be dispensed with, in which case the lower part of the carriage L, is formed with an inwardly projecting lug *p*, preferably of dovetailed form fitting into a dovetailed groove in the longitudinal sides of the base A.

Instead of so constructing the impression roller Q, that it is firmly fixed upon its shaft T, so that the shaft T, and the impression roller Q, rotate as one piece or detail of my improved machine, the roller Q, and the end portions S, S, may be constructed separately as shown at Fig. 7, in which case the end portions S, S, are keyed or otherwise firmly fixed to the axle T, while the impression roller Q, has fastened into its ends a bushing *q*, which enables the impression roller Q, to rotate upon the axle T.

I desire it to be understood that when using my new or improved machine for printing copies of drawings, maps, landscapes, pictures, etc., or when used for making copies of representations wherein there are not parallel lines, such as the lines of type in typewriting, or the lines in writing in ordinary manuscript, or the lines of engraving, such as is used in the production of public state and national documents, wills, and other papers written by hand, or copies of copper or steel engravings wherein lines of writing or literary signs are placed in parallel, that I do not in such cases use the pawls and ratchets for regulating the motion of the inking ribbon carried upon the winding rollers of my machine, but instead thereof, when a larger surface is to be printed at each successive impression making or printing operation of a drawing, map, picture, or other large continuous surface, that I then remove the pawl and ratchet gearing from my machine and wind by the attendant applying his or her hand to one of the inking ribbon rollers a new surface of inking ribbon of sufficient length corresponding to such surface for each such impression when necessary to be printed from.

The bed A, of the machine, is provided with four projecting pins X, X, X, X, which check the travel of the carriage L, in either direction.

For the purpose of maintaining sufficient frictional resistance upon the bearings of the inking ribbon rollers, there is pressed into the upper part of the bearings Y', and Y^2, a correspondingly shaped block of india rubber, as shown at Y^3, in Figs. 1, and 2, which by reason of its elasticity not only holds in place,

when pressed into the upper part of each bearing Y′, and Y², but also acts as an elastic drag upon the inking ribbon rollers.

I claim as my invention.

1. A printing machine wherein impressions from type and printing surfaces are conveyed to the paper to be printed upon by means of an intermittently moving printing ribbon carried by rollers in the base of the machine and between the printing surfaces and paper, the base of the machine with parallel sides having grooves therein, the carriage, the impression roller, the rollers in the bottom of the carriage operating in said grooves, adjustable bearings for the impression roller, the ribbon rollers, the ratchet wheels of the ribbon rollers, the adjustable pawls of the carriage alternately making contact with each ratchet wheel of the ribbon rollers, bearings for the ribbon rollers, the type holder and blocks in the base containing the impression surfaces of the representations to be printed, the elastic circular end portions of the impression roller traveling upon parallel rigid smooth surfaces upon the base and, the stops at each end of the base, substantially as set forth.

2. The combination in a printing machine wherein impressions from type and printing surfaces are conveyed from such type and printing surfaces to the paper to be printed upon, by means of an intermittently moving printing ribbon carried by inking ribbon rollers in the base of the machine which base has parallel sides with grooves therein, a carriage containing an impression roller for pressing the paper to be printed upon the printing ribbon and the printing ribbon upon the type and impression surfaces, the vertical guides in the ends of the carriage, the bearing blocks and set screws whereby the impression roller is carried in the vertical guides of the carriage, and adjusted therein the rollers in the bottom of the carriage operating in the grooves in the parallel sides of the base, the adjustable pawls and ratchet wheels for operating the inking ribbon rollers, the inking ribbon, the type and printing surfaces from which the impressions are to be taken, the elastic tires on each end of the impression roller in operative engagement with the upper parallel parts of the base constituting two smooth rigid flat rails, substantially as set forth.

3. In a printing machine wherein impressions from type and printing surfaces are conveyed from such type and printing surfaces to the paper to be printed upon by means of an intermittently moving printing ribbon carried upon the base thereof, the combination of the base carrying parallel guide rails at its top above parallel grooves in the base, the carriage, means coöperatively engaging the carriage with these parallel grooves, the impression roller having an elastic tire at each end coöperating with the flat top guide rails of the base, the type and impression surfaces, all operating in such manner that elastic pressure is maintained by the elastic tires of the impression roller between all the coöperating parts of the machine, the base having stops in its sides for terminating the travel of the carriage, substantially as set forth.

4. In a printing machine wherein impressions from type and printing surfaces are conveyed from such type and printing surfaces to the paper to be printed upon, by means of an intermittently moving printing ribbon carried on the base of said machine, the combination of the base having parallel guide rails at its top and parallel grooves in the under parts of these guide rails, the carriage, the impression roller having an elastic tire at each end coöperating with the flat top guide rails of the base, the impression roller being carried so as to revolve upon the driving shaft of the machine, the type and impression surfaces, all operating in such manner that elastic pressure is maintained by the elastic tires of the impression roller between all the operating parts of the machine, the stops at the sides and toward the ends of the base for terminating the travel of the carriage, substantially as set forth.

In testimony whereof, I have hereunto set my hand and seal at the city of Los Angeles aforesaid, in the presence of two subscribing witnesses.

BENJAMIN OTTO FANSLOW. [L. S.]

Witnesses:
ST. JOHN DAY,
J. D. CORY.