May 17, 1949. G. O. FROSTAD 2,470,243

PRINTING APPARATUS

Filed April 16, 1945 2 Sheets-Sheet 1

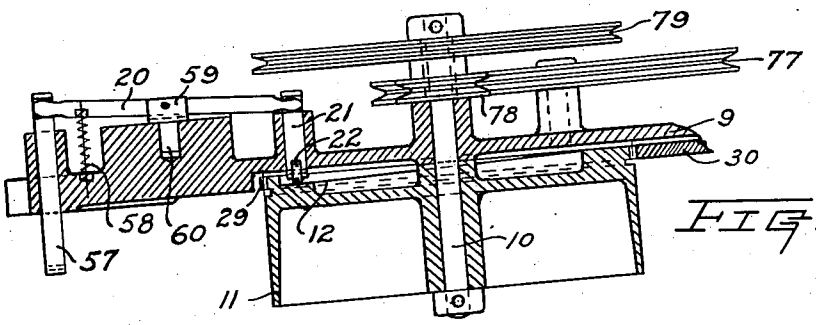

FIG. 3.

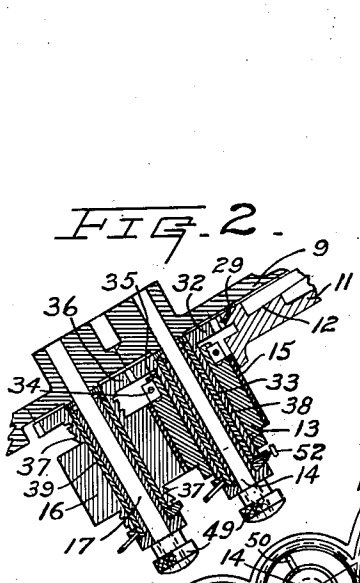

FIG. 2.

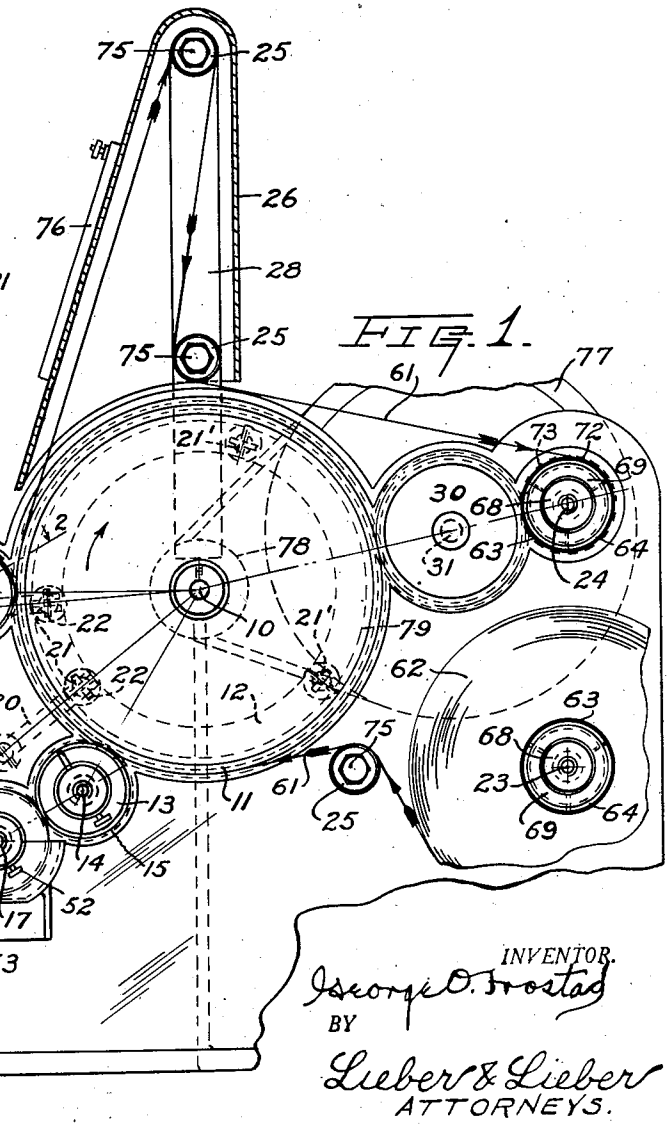

FIG. 1.

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FIG. 5

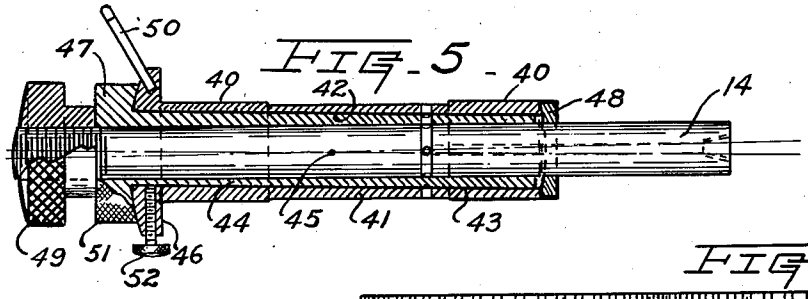


FIG. 6

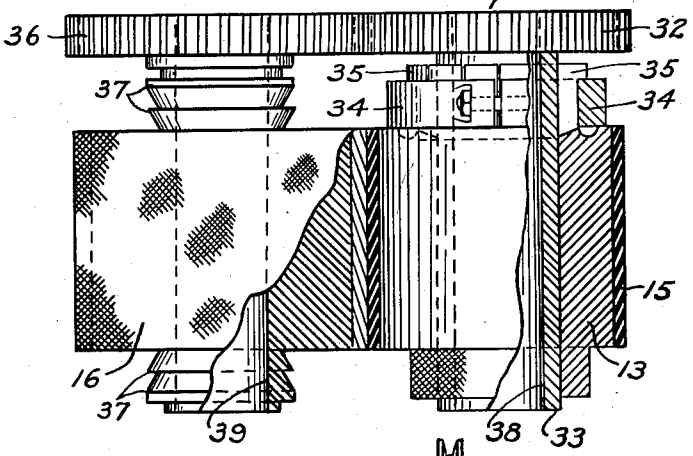


FIG. 4

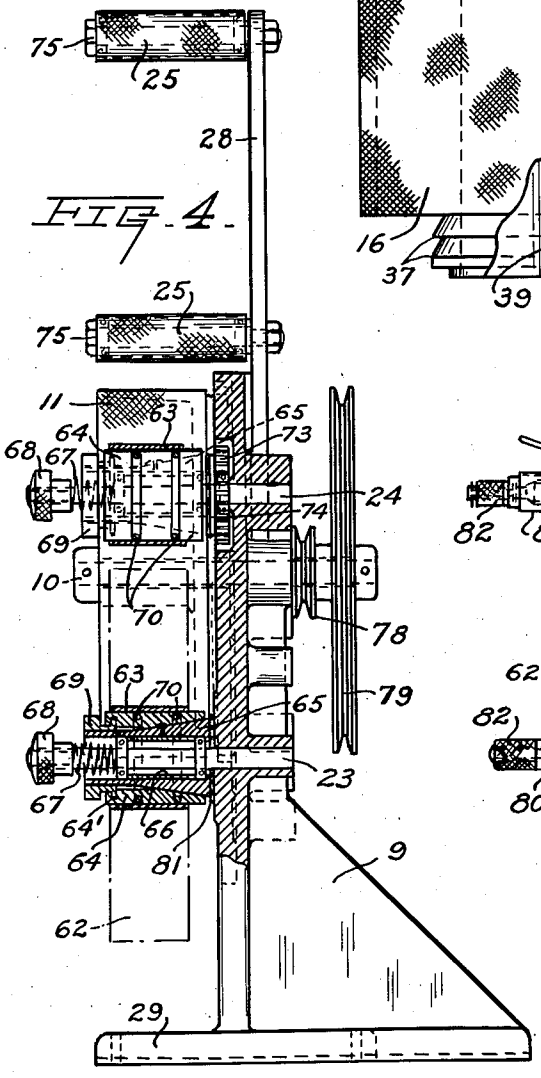
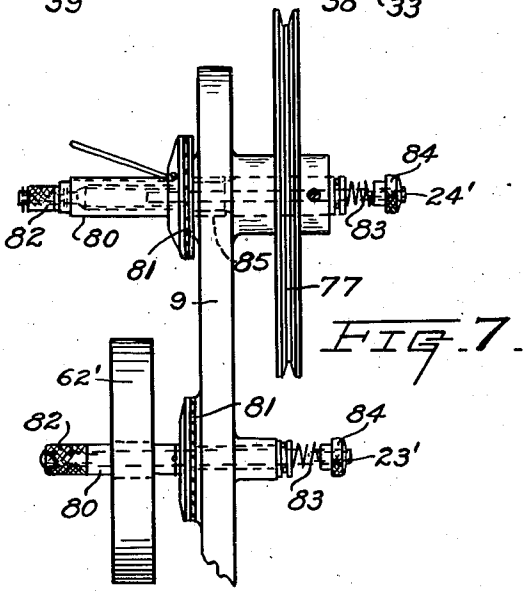


FIG. 7



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UNITED STATES PATENT OFFICE

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PRINTING APPARATUS

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7 Claims. (Cl. 101—247)

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The present invention relates in general to improvements in the art of printing, and relates more specifically to improvements in the construction and operation of automatic printing apparatus.

The primary object of my invention is to provide an improved automatic printing machine which is simple in construction and efficient in operation.

It is frequently desirable in the printing industry, to produce a succession of similar impressions upon a rapidly travelling ribbon or band, in either one or several colors, and to insure accurate registry of the superimposed impressions if more than one color is desired. The type of band or ribbon to which printed matter is thus applied, also varies considerably, and may be either relatively heavy and tenacious stock, or comparatively thin and frail tissue, textiles, or rather sticky material such as "Scotch" tape having adhesive or a similar coating on one side thereof. In order to insure maximum production in this kind of work, the ribbon or band stock while advancing at high speed, should preferably be withdrawn from a supply roll, printed, and promptly thereafter wound upon a receiving arbor; and in order to minimize production costs when operating on gummed tape, it is desirable to utilize the center cores of the supply rolls in the finally printed rolls of the ribbon. While many different types of high speed single and multi-color continuous printing machines have heretofore been proposed and used with varying degrees of success, these prior mechanisms are either too complicated and costly, or they are not adapted to function effectively when operating at rapid speed on varying types of material, or they are relatively bulky and difficult to adjust in order to insure sufficiently accurate performance.

It is therefore a more specific object of the present invention to provide a new and useful printing assemblage which is especially adapted to produce a succession of impressions upon a ribbon travelling at high speed, and which is extremely simple and compact in construction, and flexible in its adaptations for the performance of various kinds of work.

Another specific object of this invention is to provide an improved automatic continuous band or ribbon printer comprising few readily adjustable parts, and which may be utilized to effectively handle various types of ribbon stock including thin and frail tissue, textiles, and adhesively coated material.

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A further specific object of my invention is to provide an improved printing press adapted to perform either single or multi-color work and to produce accurate registration of superimposed impressions, while the stock is advancing continuously at exceedingly high speed.

Still another specific object of the invention it to provide a compact and durable automatic prising relatively few sturdily built and readily adjustable parts, which may be manipulated by a novice to produce excellent results.

An additional specific object of this invention it to provide a compact and durable automatic printing machine which may be manufactured and operated at moderate cost, and wherein the stock supply roll center cores may be applied to the finally printed ribbon rolls in order to avoid waste of materials.

Another specific object of my invention is to provide a simplified and efficient inking mechanism for high speed printing machines, and improved mechanism for insuring most effective cooperation between the impression and type cylinders of such machines.

A further object of the invention is to provide an improved printing assemblage which is operable by inexperienced help to produce perfect impressions, and wherein the supply and discharge mandrels may be quickly loaded and unloaded.

These and other specific objects and advantages of my invention will be apparent from the following detailed description.

A clear conception of the various features constituting the present improvement, and of the construction and operation of printing apparatus embodying the invention, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a part sectional side elevation of a typical two-color printing assemblage built in accordance with the invention, looking toward the stock supply roll, the impression cylinder, the type cylinders, and the inking rollers, and showing the heating chamber and one ink scraper in action.

Fig. 2 is a central section through one of the type cylinders and through the adjacent ink roller, the section having been taken along the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary transverse section taken centrally through the impression cylinder

and through a portion of the inking mechanism of the improved printing assemblage;

Fig. 4 is a part sectional end view of the improved printing assemblage, the section having been taken through the ribbon supply roll mandrel, and a supply roll having been shown in dot-and-dash lines;

Fig. 5 is an enlarged central longitudinal section through one of the type cylinder adjusting spindles;

Fig. 6 is an enlarged part sectional top view of one of the improved type cylinder and inking roller units; and

Fig. 7 is a fragmentary end view of a somewhat modified printing assemblage embodying the invention.

While the improvements have been shown and described herein as having been incorporated in a two-color printing assemblage adapted to be driven and heated electrically, it is not my desire or intention to unnecessarily restrict the scope or utility of the improved features by virtue of this specific embodiment.

Referring to the drawings, the typical two-color automatic printing apparatus shown therein comprises in general a stationary main frame 9 having a fixed horizontal shaft 10 mounted thereon and projecting forwardly and rearwardly therefrom; an impression cylinder 11 of relatively large diameter rotatable upon the forward portion of the fixed shaft 10 and having an annular cam surface 12 facing the frame 9; one or more type cylinders 13 journalled for rotation upon fixed horizontal shafts 14 secured to the frame 9 and projecting forwardly therefrom beyond the periphery of the cylinder 11, and each having an annular rim of type 15 embracing its periphery; an ink transfer cylinder or roller 16 peripherally engaging the type rim 15 of each type cylinder 13, and being mounted for rotation upon horizontal shafts 17 also fixed to the frame 9 and projecting forwardly therefrom; an ink supply well or pan 18 detachably secured to the front of the frame 9 beneath each of the rollers 16; a flexible scraper 19 slidably coacting with the periphery of each inking roller 16 and being reciprocable relative thereto by means of a lever 20 coacting with a plunger rod 21 carrying a roller 22 engaging the cam surface 12; a stock ribbon supply supporting shaft 23 secured to the lower portion of the frame 9 on the side of the impression cylinder 11 remote from the type cylinders 13; a printed ribbon receiving shaft 24 likewise secured to the frame 9 above the shaft 23; ribbon guiding rollers 25 mounted for rotation upon the frame 9 in various selected localities; a heating chamber casing 26 suspended from a bracket 28 secured to the frame 9 and being disposed above the impression cylinder 11; and mechanism for constantly rotating the cylinders 11, 13, rollers 16, and the ribbon supply and receiving mandrels at desirable speeds.

The main frame 9 consists primarily of an upright wall having an integral broad base 29', and the horizontal shafts 10, 14, 17, 23 and 24 are all firmly secured to bosses formed integral with the upstanding wall of the frame. The impression cylinder 11 is of relatively large diameter, and besides having the scraper actuating cam surface 12 formed thereon, the rear portion of the cylinder 11 is provided with an annular series of peripheral teeth 29 which mesh with the teeth of a driving gear 30 mounted upon a shaft 31 journalled for rotation in the frame 9 between the shafts 10, 24. Each of the type cylinders 13

is also provided with a driving gear 32 formed integral with a sleeve 33 which snugly engages the central bore of the type cylinder 13 and is secured thereto by a two-part clamping ring 34 coacting with a split rear annular extension 35 formed integral with the cylinder 13 in Fig. 6; and the front portion of each cylinder 13 is provided with an integral knurled extension for effecting axial adjustment of the type cylinder 13 when the ring 34 has been loosened, so as to insure accurate registry of the printing impressions. Each of the inking rollers 16 which coact with the type cylinders 13, is also provided with a driving gear 36 which meshes with the adjacent type cylinder gear 32, thereby providing a positive drive from the main driving gear 30 to the impression cylinder 11, from the cylinder 11 to each type cylinder 13, and from the latter to the adjacent ink transfer rollers 16.

As previously indicated and as illustrated in Fig. 6, each of the type cylinders 13 is provided with a type rim 15 which is preferably formed of rubber or the like; and the periphery of each of the ink transfer rollers 16 is coated with copper and is etched to provide an ink distributing screen the mesh of which may be varied to suit the work which is to be performed. The peripheral etched coating of each roller 16 may also be chromium plated or otherwise treated to protect the etching, and each inking roller 16 is moreover provided with ink throwers 37 at its opposite ends, as clearly shown in Fig. 6. The central sleeves 33 of the type cylinders 13 are provided with through bores 38, while the inking rollers 16 are provided with similar central through bores 39, and the diameters of these bores 38, 39 are identical and normally coact with the outer eccentric surfaces 40 of outer adjusting sleeves 41 such as shown in detail in Fig. 5. Each outer sleeve 41 has a through bore 42 which snugly engages the eccentric peripheral surface 43 of an internal adjusting sleeve 44 adapted to rotatably engage the adjacent supporting shaft 14, 17, and the surfaces 40, 43 and bore 42 of each assemblage are generated about longitudinal axes which intersect the central shaft axis at a point 45 disposed intermediate the opposite ends of the sleeves 41, 44. Each outer sleeve 41 has an end head 46 provided with a convex spherical zone surface which engages a similar concave surface formed on the end head 47 of the corresponding inner sleeve 44, and the opposite end of each outer sleeve 41 is moreover provided with a fixed bearing plate 48 adapted to engage the adjacent frame 9 around the anchored end of each shaft 14, 17. A clamping nut 49 has screw thread coaction with the outer free end of each fixed shaft 14, 17 and clampingly engages the adjacent inner sleeve head 47, and by tightening these nuts 49, the sleeves 41, 44 of the several sets may be clamped together in various positions of relative adjustment. Each inner sleeve end head 46 is provided with a stem 50 while the sleeve end head 47 is provided with a knurled periphery 51, for effecting convenient relative axial alinement by rotary adjustment of the sleeves 41, 44 of each set about each other and about the corresponding fixed shafts 14, 17 when the nuts 49 are loosened; and after relative axial adjustment has been effected, the sleeves 41, 44 may be locked together by a locking screw 52, whereupon the stem 50 again provides for convenient relative rotary adjustment of the eccentric surface 40 for proper impressions of type matter upon the impression cylinder 11.

Each of the ink supply pans 18 is detachably and adjustably secured to the frame 9 beneath its ink transfer roller 16 by means of a clamp 53, and the rollers 16 are adapted to dip into the ink confined within these pans 18 in a well known manner. Each of the flexible scrapers 19 which coact with the etched peripheries of the adjacent transfer rollers 16, is secured to a carrier slide 54 movably suspended from a plate 55 which is adjustable toward and away from its cooperating roller 16 with the aid of an adjusting screw 56. The blade carrier slides 54 besides being adjustable with the aid of the screws 56, are also constantly reciprocable by the levers 20 through connections 57 such as shown in Figs. 1 and 3, and the actuating plungers 21 of the levers 20, are constantly urged toward the cam surface 12 of the impression cylinder, by means of springs 58 coacting with these levers and with the frame 9. Several pressure equalizing plungers 21' coacting with the surface 12 may also be provided, as shown in Fig. 1 of the drawing. The medial portion of each blade reciprocating lever 20 is pivotally attached to a block 59 having a pivot pin 60 coacting with the frame 9, and with this assemblage of elements, each blade 19 may be accurately adjusted to properly bear against its roller 16 and will also be automatically reciprocated so as to uniformly distribute proper amounts of ink upon the peripheries of the revolving ink transfer rollers.

As shown in Figs. 1 and 4, the ribbon supply and discharge roller supporting shafts 23, 24 respectively are rigidly secured to the frame 9 and while the arbor or mandrel for the receiving roll is positively driven, the supply ribbon mandrel is only frictionally restrained. The ribbon 61 may be either relatively heavy ordinary material, or thin and frail tissue, textile, or coated with adhesive or other substance, and the supply roll 62 is ordinarily provided with a center core 63 of cardboard, metal, wood or the like. The core 63 frictionally engages an outer segmental sleeve 64 which in turn coacts with a tapered solid internal sleeve 65 through a pin carried by each segment of the sleeve 64 and engaging a key-way in the sleeve 65. The segmental sleeve 64 is urged into frictional engagement with the center core 63 by a knurled nut 69 which interlocks with an annular recess 64' formed in the segmental sleeve 64, and the segments of this sleeve are held together by coil springs 70. A centering member 66 having spaced ball bearings coacting with the fixed shaft 23, engages the bore of the inner sleeve 65, and a fibre friction brake 81 is interposed between the inner sleeve 65 and the adjacent frame 9. The degree of frictional pressure exerted by the assembled segmental sleeve 64 and inner sleeve 65 against the friction brake 81, may be varied by a compression spring 67 interposed between the ball bearing member 66 and an adjusting nut 68 screw threaded upon the outer end of the shaft 23. The knurled nut 69 obviously serves to expand or collapse the outer segmental sleeve 64 and the successive cores 63 may thus be frictionally secured to the outer mandrel sleeve 64. The crescent shaped springs 70 confined in peripheral grooves of the segmental sleeve 64 are adapted to collapse the segments and to hold them in engagement with the flange of the nut 69. With this mandrel assembly, a fresh roll 62 may be readily loosely applied by merely slipping the roll core 63 over the outer split sleeve 64, and may be frictionally restrained against subsequent free rotation by merely adjusting the nut 69 so as to expand the segments of the outer sleeve 64 into engagement with the core 63.

The mandrel assemblage for supporting the core 63 of the finally printed ribbon delivery roll 72 may be similar to that just described, but since the roll 72 and its core 63 should be positively rotated, the inner sleeve 65 of the upper mandrel is also provided with a driving gear 73 which meshes with the main driving gear 30 and is journalled upon the upper shaft 24 as shown in Figs. 1 and 4. This mandrel driving gear 73 is preferably connected to the inner sleeve 65 through a safety friction or fibre brake 74 in order to permit slippage when the tension upon the ribbon 61 becomes excessive. The ribbon guiding rollers 25 are journalled for rotation upon horizontal shafts 75 and have knurled peripheries, and one of these rollers 25 is disposed between the supply roll 62 and the impression cylinder 11 so as to insure delivery of the ribbon 61 to the cylinder periphery at a constant tangent, while two of the rollers 25 are mounted upon similar shafts 75 secured to the upstanding bracket 28 so as to guide the printed ribbon through the heating chamber 26 before delivery thereof from the machine. The heating chamber 26 may be electrically heated by means of a heater 76 applied to a wall thereof, and quick drying ink is preferably applied to the pans 18.

The main driving gear 30 of the printing assemblage may be driven at any desired speed in any suitable manner, preferably with the aid of an electric motor, and when such a motor is utilized, speed reducing mechanism should be interposed between the motor and the gear 30. As shown in Figs. 1, 3 and 4 a pulley 77 of relatively large diameter is secured to the rotory shaft 31 rearwardly of the frame 9 and is connectable by means of an endless belt to a smaller pulley 78 which is journalled for free rotation upon the rear end of the fixed shaft 10. The small pulley 78 is drivingly connected to another large pulley 79 which is also journalled for free rotation upon the shaft 10 and is adapted to be belt driven directly by the electric motor, thus providing a simple, compact and effective speed reducing drive for the main gear 30 confined in back of the frame 9 and having its propelling motor supported directly upon the frame base 29. The entire printing apparatus together with its driving motor may thus be associated with the main frame 9 to provide a compact and relatively portable unit adapted to be readily shifted from place to place.

While the type of drive shown in Figs. 1, 3 and 4 is entirely satisfactory for most purposes, it may be desirable when printing gummed tape, to provide a modified drive such as shown in Fig. 7. In this modification, the supporting shafts 23', 24' for the supply and discharge roll supporting arbors, are slidably and rotatably supported in bearings carried by the upright wall of the main frame 9, and collapsible mandrels 80 are applied to the forwardly projecting portions of these shafts 23', 24'. Each mandrel 80 is provided with a fibre friction brake 81 coacting with the adjacent frame 9, and is held upon its carrying shaft by a nut 82; and both shafts 23', 24' are constantly urged toward the right as viewed in Fig. 7, by means of compression springs 83 the tension of each of which is adjustable with the aid of a nut 84. The upper delivery roll shaft 24' is direct driven by means of a pulley 77 mounted thereon, and is provided with a driving gear 85 which

meshes with a gear 30 as in Fig. 1. In the modified drive, the gear 30 is merely an idler gear interposed between the driving gear 85 and the impression cylinder 11, and the pulley 77 may again be driven by an electric motor in the manner previously described. The modified drive, because of its use of the collapsible mandrel 80, makes it possible to utilize in the finally printed roll, the same wood or paper core which is ordinarily supplied in a supply roll 62' of gummed tape, thus effecting considerable saving in cost and avoiding necessity of carrying an assortment of cores for replacements.

Since the normal operation of the two printing assemblages, disclosed herein, is substantially the same, it will suffice to specifically describe the operation of only one of the units. During such normal operation, it is necessary for best results, to have the impressions produced by the several type cylinders 13 perfectly alined or registrable, and such perfect registration may be quickly and readily effected with the aid of the adjusting mechanism shown in Figs. 5 and 6. After the ink supply pans 18 have been properly supplied with ink of the desirable color and texture, the machine may be placed in operation by starting the driving motor and energizing the heater 76 so as to confine warm air within the chamber 26. Rotation will then be imparted to the discharge mandrel assemblage and to the impression cylinder 11, and from the latter to the type cylinders 13 and ink transfer rollers 16, through the gear teeth associated with these parts, thereby causing the ribbon 61 to be withdrawn from the supply roll 62. The ribbon 61 thus withdrawn from the supply roll 62 will be advanced in succession past the type cylinders 13 which receive ink from the rollers 16, and the printed ribbon will be constantly delivered to the discharge roll 72 after having passed through the heating chamber 26 in order to dry the impressions made thereon.

During the rotation of the type cylinders 13 and the adjacent ink transfer rollers 16, the latter will remove ink from the corresponding pans 18 and this ink will be distributed in the form of a thin layer entirely across the periphery of each roller 16 by the reciprocating scraper blade 19 coacting therewith, and this reciprocation is effected automatically and continuously by the levers 20 and plungers 21 coacting with the rear cam surface 12 of the impression cylinder 11. If, after a test run has been made, it is found that the successive impressions which are superimposed over each other by the successive type cylinders 13, do not register accurately, perfect registration may be effected either by merely adjusting the type cylinders 13 along their supporting sleeves 33, or by releasing the adjusting nuts 49 and screws 52 and thereafter relatively adjusting the eccentric sleeves 41, 44. Since these sleeves 41, 44 are adjustable about independent intersecting axes, the axes of rotation of the cylinders 13 and of the coacting ink transfer rollers 16, may be universally adjusted about the point 45 so as to insure perfect alinement between the rollers 16 and the type matter 15, and also between the type matter and the impression cylinder 11 by utilizing the eccentricity of the surface 40 of the sleeve 41 for perfect kiss contact or impression with close tolerance. The adjustment of these rollers and cylinders may be made while the machine is operating because of the fact that the rollers 16 and cylinders 15 are journalled for rotation upon the outer sleeves 41, and after proper adjustment has been effected, the nuts 49 may be driven into clamping position and the adjustments will thereafter be maintained. It has been found in actual practice, that such adjustments can be made quickly and effectively, and after perfect cooperation of the several parts has been effected, the operation of the machine may be continued until the supply of ribbon stock 61 has been depleted. After perfect axial alinement of the type matter 15 with the impression cylinder 11 has been effected, the sleeves 41, 44 can be permanently united with the locking screw 52, and the eccentricity of the surface 40 can thereafter be utilized to obtain proper impression contact with the ribbon 61.

From the foregoing detailed description it will be apparent that my present invention provides a relatively simple, compact and highly efficient printing assemblage which may be operated at comparatively high speeds to print various types of ribbon stock 61 including ordinary relatively heavy material, thin and frail tissue stock, gummed Scotch or masking tape, also silk rayon textile materials in ribbon form, or the like. In each case, friction clutches or brakes provided between the supply and receiving roll cores will maintain proper tension upon the ribbon 61 during normal operation of the machine, and the frictional resistance may be readily and conveniently varied to prevent possible overtensioning of delicate materials. The supply rolls 62 and the printed rolls 72 may be conveniently applied to and removed from the machine, and the automatic heating assemblage insures complete drying of the impressions before the ribbon 61 is rolled upon the final receiving roll 72. The ink supply pans 18 may be readily removed and renewed and the improved ink distributing reciprocable scrapers 19 serve to most effectively distribute the ink and to prevent excessive ink from being applied to the type cylinders 13. These scrapers 19 while being constantly and automatically reciprocable by means of the levers 20, may also be readily adjusted to vary their cooperation with the ink transfer rollers 16, by merely manipulating the screws 56 while the machine is operating. The type cylinders 13 may be quickly and conveniently removed for replacement of the type rims 15, and the ink transfer rollers 16 may also be quickly and conveniently removed for inspection and cleaning purposes. It may also be desirable in some cases to perforate the ribbon 61 at intervals, after the printed matter has been applied, and this may be readily accomplished by providing a rotating perforator in the heating chamber 26 above the lower guide roller 25 disposed within this chamber, and which may also be suspended from the bracket 28.

The knurling of the peripheries of the impression cylinder 11 and of the guide rollers 25 is important when operating upon "Scotch" tape or other gum coated ribbon, as it prevents the gum from sticking or clinging to these surfaces; and the machine may be utilized to print individual rolls of ribbon material of various widths and in large or small quantities, thus especially adapting the improvement for the production of various kinds of printed ribbon stock at extremely moderate cost. The apparatus may be utilized with analine, water, tar, and oil base inks, and eliminates necessity of employing more costly mill run printing in the production of labels, tabs or other strip printed items, since the type cylinders 13 and ink transfer rolls 16 may be quickly and readily replaced by similar elements of different diameters by virtue of the adjustability of their mountings upon the frame 9. The entire apparatus may

be mounted upon a single sturdy frame 9 to provide a compact and portable unit, and the invention has proven highly satisfactory in the commercial printing of various types of ribbon stock, and especially tissue and gummed tape, the printing of which heretofore presented many difficult problems.

It should be understood that it is not desired to limit this invention to the exact details of construction or to the precise mode of operation, herein shown and described, for various modifications within the scope of the appended claims may occur to persons skilled in the art.

I claim:

1. Ribbon stock printing apparatus comprising, a frame, an impression cylinder journalled for rotation upon said frame about a fixed axis, a type cylinder coacting with said impression cylinder and being journalled for rotation upon said frame about a fixed shaft disposed beyond the periphery of said impression cylinder, a driving sleeve for said type cylinder surrounding but spaced from said shaft, means for effecting adjustment of said type cylinder longitudinally of said driving sleeve and across the face of said impression cylinder, and a pair of normally stationary but relatively adjustable and eccentric sleeves interposed in the space between said driving sleeve and said fixed shaft for effecting adjustment of said type cylinder toward and away from said impression cylinder.

2. Ribbon stock printing apparatus comprising, an impression cylinder, a type cylinder coacting with said impression cylinder, and a pair of relatively rotatably adjustable and eccentric sleeves one embracing the other and providing a journal support for one of said cylinders, said sleeves having relatively eccentric annular surfaces generated about axes intersecting each other within the supported cylinder.

3. Ribbon stock printing apparatus comprising, an impression cylinder, a type cylinder coacting with said impression cylinder, a pair of relatively rotatably adjustable and eccentric sleeves one embracing the other and providing a journal support for one of said cylinders, said sleeves having relatively eccentric annular surfaces generated about axes intersecting each other within the supported cylinder, means for effecting relative rotary adjustment of said sleeves, and means for locking said sleeves in various positions of relative adjustment.

4. Ribbon stock printing apparatus comprising, a frame having a fixed shaft projecting from one side thereof, an impression cylinder journalled for rotation upon the free end of said shaft, a type cylinder coacting with said impression cylinder and being journalled for rotation upon said frame about another fixed shaft projecting from the same side of the frame and disposed beyond the periphery of said impression cylinder, a driving sleeve for said type cylinder, means for effecting adjustment of said type cylinder longitudinally of said driving sleeve, and a pair of normally stationary but relatively adjustable and eccentric sleeves interposed between said driving sleeve and said fixed shaft, said eccentric sleeves having relatively inclined axes intersecting each other within said sleeve and being manipulable for adjustment at the free end of said second mentioned shaft.

5. Ribbon stock printing apparatus comprising, a frame having main and auxiliary shafts projecting from one side thereof, an impression cylinder journalled for rotation upon the free end of said main shaft, a type cylinder coacting with said impression cylinder and being journalled for rotation upon the free end of said auxiliary shaft near the periphery of said impression cylinder, an ink transfer roller journalled for rotation upon said frame about another fixed shaft, and a set of normally stationary but relatively adjustable and eccentric sleeves interposed between said type cylinder and its supporting shaft and between said roller and its supporting shaft, the eccentric sleeves of each set having relatively inclined axes intersecting each other within the supported cylinder and each eccentric sleeve set being adjustable at the free end of said auxiliary shaft and also being interchangeably similar.

6. Ribbon stock printing apparatus comprising, an impression cylinder, a type cylinder driven by and coacting with the periphery of said impression cylinder, and a pair of relatively rotatably adjustable and eccentric sleeves one embracing the other and providing a journal support for said type cylinder, said sleeves having relatively eccentric cylindrical surfaces generated about axes which intersect each other within the sleeve length.

7. Ribbon stock printing apparatus comprising, an impression cylinder, a type cylinder driven by and coacting with the periphery of said impression cylinder, a pair of relatively rotatably adjustable and eccentric sleeves one embracing the other and providing a journal support for said type cylinder, said sleeves having relatively eccentric cylindrical surfaces generated about axes which intersect each other within the sleeve length, means for effecting relative rotary adjustment of said sleeves, and means for locking said sleeves in various positions of relative adjustment.

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