Jan 6, 1931. H. C. RYAN 1,787,456

PRINTING PRESS

Filed Dec. 27, 1927 2 Sheets-Sheet 1

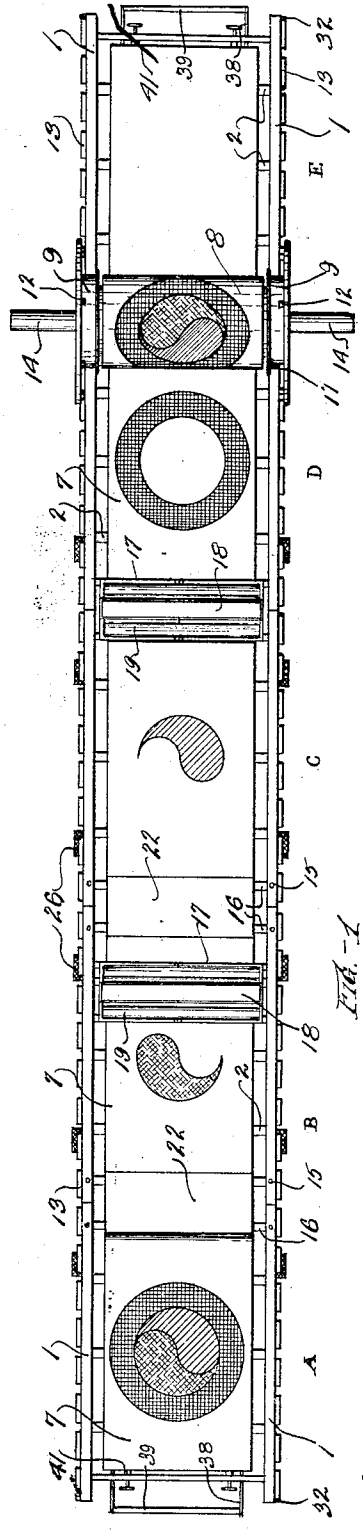


FIG. 1

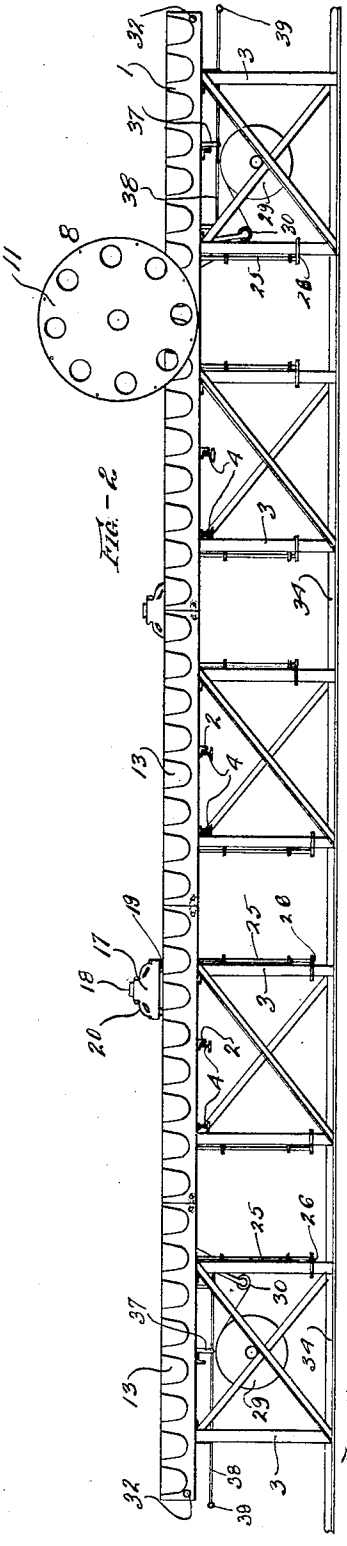


FIG. 2

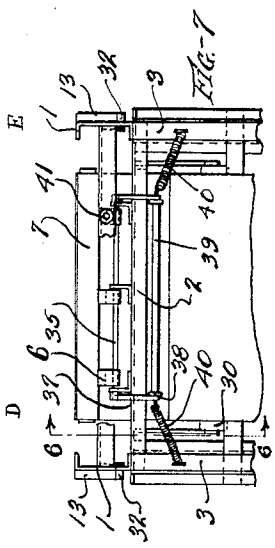


FIG. 7

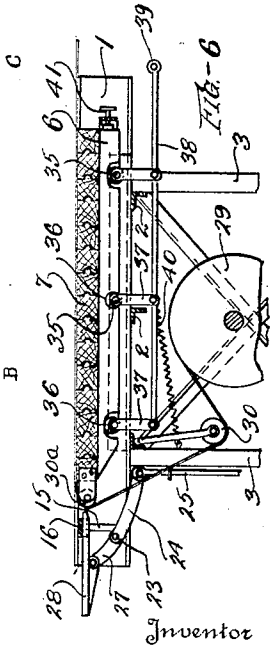


FIG. 6

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Jan 6, 1931. H. C. RYAN 1,787,456

PRINTING PRESS

Filed Dec. 27, 1927 2 Sheets-Sheet 2

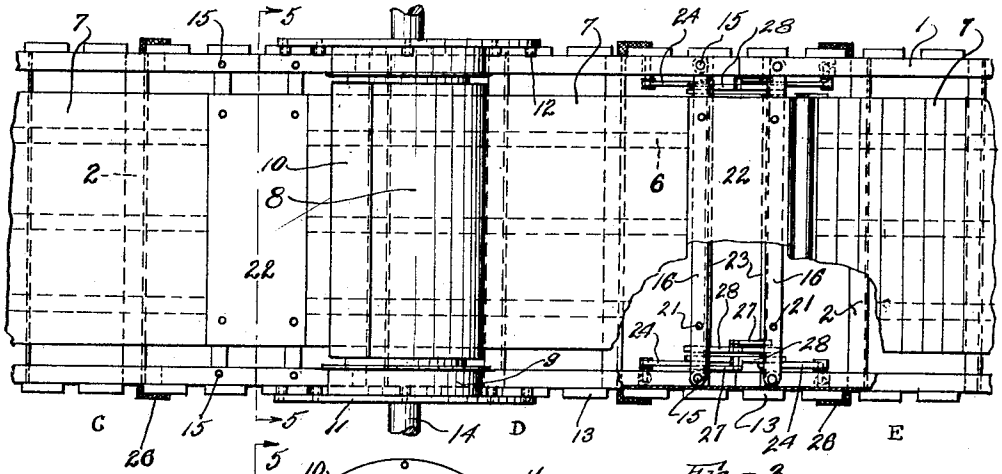


FIG. - 3

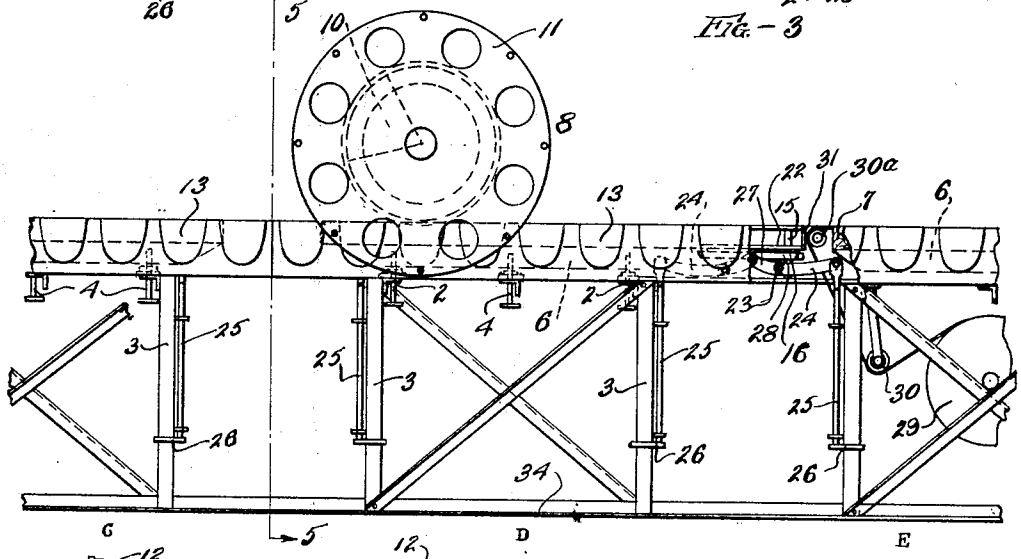


FIG. - 4

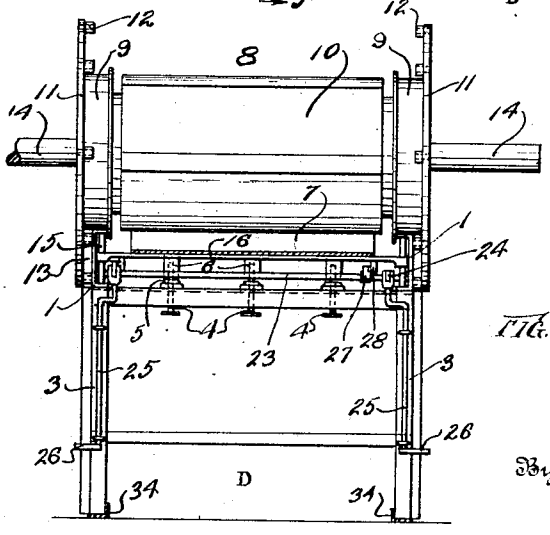


FIG. - 5

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Patented Jan. 6, 1931 1,787,456

UNITED STATES PATENT OFFICE

HARRISON CALVIN RYAN, OF SHAKER HEIGHTS, OHIO

PRINTING PRESS

Application filed December 27, 1927. Serial No. 242,788.

This invention relates to printing presses and more particularly to that type adapted for multicolor work wherein a flat bed having a number of color plates forms the basis of the press structure, means for inking each color plate with its particular color is provided and a transfer roll is arranged for movement along ways on the bed over the color plates to pick up the ink thereon, and to print by depositing this ink upon a sheet of paper or the like positioned on a platen plate secured on the bed in alignment with the color plates.

One object of my invention is to form the press bed of a number of similar units, each adapted to support one plate, and to be arranged in end to end relation with other press units whereby a press may be easily and quickly set up to handle any number of colors in a minimum of floor space, and whereby having a sufficient number of units on hand the same may be arranged to form a number of separate presses, each capable of handling a number of colors, although of course such number would be smaller than the number possible by assembling all of the units to form a single press.

The invention embraces the provision as a part of each bed unit, of track ways thereon along which the transfer roll is guided over the plate of the unit, the ways extending the entire length of the unit whereby when the units are placed in end to end relation to form the press the ways are continuous the length of the press bed.

A further object of the invention is to provide in conjunction with the ways, novel means for regulating the movement of the transfer roll therealong whereby firm contact will be maintained between the transfer roll and the plates, whereby slippage therebetween is impossible, and whereby perfect registry of the roll with each of the plates will be assured.

Still another object of the invention is the provision as a part of each unit of means for supporting an inking carriage adapted to ink the plate of the unit. In this connection the transfer roll is interrupted peripherally by cutting away a portion thereof and timed out of registry with the plates, and provision is made to lower each inking carriage between adjacent plates; whereby provided an inking carriage be lowered, the roll may pass thereover, the cut away portion of the roll clearing the upper portion of the inking carriage. By such arrangement each inking carriage may traverse its plate and the transfer roll may travel over all of the plates.

By arrangement described a new method of printing is possible, and such is a further object of my invention. This new method comprises individually inking each printing plate with its proper color, inking all of the plates simultaneously if desired, and without removing the inking means from the press moving the transfer roll the length of the bed, first over the inked plates, whatever their number, and then over the sheet to be printed on, thus completing a printing cycle. It is also possible to arrange a platen plate unit at each end of the press, ink the color plates as the transfer roll is performing the actual printing operation over one platen plate, return the transfer roll along the press and over the second platen plate, and repeat this double action cycle which doubles the printing speed of the press.

Where extremes of light and dark colors are to be printed, it is sometimes desirable to "trim" a light color by laying thereover a dark color. Where such is the case and the double cycle of operation is to be employed it is convenient to employ duplicate dark plates each located adjacent one of the platen plates, the lighter color plates being arranged in any sequence between the two dark color plates. Such method also is a possibility and object of my invention.

Still another method possible with the use of my invention is that of setting up a job in the press including preparation of the printing plates, and is as follows: The design of one color is laid out on one printing plate which with the others are adjusted and secured in the press to properly contact with the transfer roll. The face of the plate bearing the design is then cut away throughout the area of one of the remaining colors. The plate is then inked and the transfer roll em-

ployed to transfer the first color area directly onto the next color plate. From the second plate is then cut away the inked portion and that color area thereof to be occupied by all but one of the remaining colors. The first and second color areas are then similarly transferred to the third plate, which is also cut away as before. Perfect registry is thus easily obtained, since the plates are not moved after their preparation until the printing run is accomplished.

Further objects and advantages of my invention together with the exact nature thereof will be apparent from the following description taken in connection with the accompanying drawings, in which Fig. 1 is a plan view of a press formed by assembling five of the units which comprise a part of my invention, the end units bearing platen plates, the three units disposed therebetween bearing each a color plate of a three color design; Fig. 2 is a side elevation of the parts shown in Fig. 1; Fig. 3 is an enlarged plan view of the parts appearing in Fig. 1 portions being broken away to show details of construction; Fig. 4 is a side elevation of the parts shown in Fig. 3, also partly broken away to show details of construction and Fig. 5 is an end view of the unit of the press bearing the transfer roll and therefore corresponding to a section through the press assembly as in the plane of line 5—5, Figs. 3 and 4; Fig. 6 is a longitudinal section as in the plane of line 6—6 of Fig. 7, of one of the platen plate bearing units, showing details of construction thereof and particularly those differing from the color plate unit construction; and Fig. 7 is an end view of the platen plate bearing unit shown in Fig. 6.

Referring now to the drawings in which the five units illustrated are generally designated by the capital letters A to E inclusive, it being understood that these units are generally of similar construction except as in certain details hereinafter pointed out, the general construction of each unit is as follows:

The principal structural parts of the unit are a pair of longitudinal members 1, of channel section interspaced by transverse angle iron members 2 and suitably supported upon legs 3 which may be cross braced as indicated. The assembly described thus comprises a sort of table.

In the color plate bearing units, each of the transverse members 2 is drilled to receive the shank portion of a handled adjusting member 4 which has threaded connection with a bolt 5 resting upon the corresponding transverse member 2 and prevented from rotation thereon by a suitable overhanging portion of the bolt. The upper extremities of the adjusting members 4 are not threaded and are faced off to bottom in tight fitting deep corresponding depressions in backing members 6 of a color plate 7. By arrangement described the plate 7 is vertically adjustable but horizontally secured between the longitudinal members 1 of the unit, and at the same time may be firmly supported throughout its area.

The top surfaces of the upper flanges of the members 1 form longitudinal track ways adapted to support a transfer roll 8 having bearing wheels 9 preferably flanged as indicated. The medial portion of the transfer roll is generally cylindrical and of length dependent on the width of the plate 7, and is surfaced throughout its cylindrical face with resilient ink receiving material such as rubber. The face of the transfer roll is interrupted as at 10 through a relatively small portion of its circumference. Adjacent each bearing wheel 9 is a flange disk 11 having equally spaced about its periphery a number of inwardly extending projections 12 which are preferably in the form of rollers, as indicated.

For the purpose of regulating the movement of the transfer roll, I prefer the following arrangement:

Along the web portions of members 1 are secured a number of rack plates 13. The outer parallel faces of the rack plates bear against the inner faces of the flanges 11 of the tranfer roll; and the rack plates are so spaced and so contoured at their edge faces that the rollers 12, as the transfer roll moves along the member 1, will travel in succession each down, around, and up, the edge of one of the rack plates 13 during the lower arc of its motion; and the wheels 9 will always be positively maintained against their tracks along the members 1 though the plates 7 be adjusted to bear tightly against the resilient face of the transfer roll. The transfer roll is provided with a pair of axially arranged handles 14 whereby the same may be moved along its bed.

It will be apparent that when any number of units are placed in alignment in end to end relation, in effect, a continuous press bed will be formed, along which the transfer roll may be moved to traverse in succession the several plates 7, the longitudinal members 1 of each unit terminating, of course, with respect to the spacing of the rack plates 13, so that the rack plate spacing along the entire length of the bed will be unvaried.

It will be understood also that the track length of each unit corresponds exactly with one complete revolution of the transfer roll, and the transfer roll is so timed on the track that the cut away portion 10 thereof will fall as the roll traverses the bed, over adjoining unit ends, so that the cylindrical face of the transfer roll as the same traverses the bed will make contact with the several plates in succession and throughout the area of each.

For each color plate an inking carriage 17

is provided. A preferred form of inking carriage is described in detail in my copending application, Serial No. 242,789, filed of even date herewith, and it will suffice here to state that each inking carriage is provided with a fountain ink container 18 and spaced therebelow inking rollers 19 adapted to support the carriage as it traverses the color plate and to deposit on the color plate ink from the fountain, the frame of the inking carriage having downwardly projecting fingers adapted as the carriage traverses the plate, to bear against the inner edges of the upper flanges of members 1 to maintain alignment of the carriage, and also having handles 20 whereby the inking carriage may be moved.

It should be noted however that the inking carriage is generally of triangular section, the fountain at the apex and the two supporting rollers at the equal base angles thereof; and the transfer roll is in section correspondingly cut away in a sector thereof; so that clearance between the two parts is obtained in the least space possible.

Adjacent each end of each channel member 1 and secured between the flanges thereof is a vertical rod 15, and transversely extending between each pair of rods is a supporting member 16. Each of the supporting members 16 is provided with a pair of holes 21, and for each adjacent pair of supporting members on adjacently assembled units of the press is provided an inking carriage bearing and elevating plate 22 having on its roller surface dowel pins adapted to fit the holes 21. The transverse dimension of each elevating plate is the same as that of the color plates, and the longitudinal dimension of the bearing plate is substantially the distance between adjacent color plates, and sufficient that the inking carriage may be lowered therebetween.

Adjacent each supporting member and extending between the corresponding longitudinal members 1 is a shaft 23 having adjacent each member 1 a lever arm 24 to which is pivotally secured an actuating rod 25 extending downward of the adjacent leg 3 and terminating in a pedal 26. Adjacent each lever 24 each rod 23 carries an arm 27 bearing at its outer or free extremity, by a pivotal connection, a bracket member 28 having oppositely disposed arms, one extending beneath each adjacent supporting member. The outer arm of each bracket member is slightly weighted so that the inner arm of the same will bear against the adjacent supporting member 16 regardless of the arrangement of the corresponding unit relative to another unit.

The proportion and arrangement of the parts is such that when an inking carriage is resting upon a bearing plate 22 the bearing plate will be lowered to the position shown in Fig. 4 in which position the transfer roll will clear the inking carriage; upon depression of any of the four adjacent pedals 26 the bearing plate 22 will be elevated to the level of the faces of the color plates so that the inking carriage may be lowered from the bearing plate onto either adjacent color plate.

The end units, bearing platen plates, are adapted to support, by their intersecting leg braces, a roll 29, of paper to be printed upon, the free end of the paper being brought up as indicated and preferably over a weighted roller 30, an idler roller 30*a* and back across the face of the platen plate, whereon it is secured in any convenient manner. A guard 31 is conveniently provided adjacent the idler roller 30*a* to protect paper passing thereover from contact with any part of the inking carriage when the same rests upon the adjacent bearing plate 22; and as indicated in Figs. 1 and 2, bearing plate means are provided only on the inner ends of the end units.

In place of the adjusting means 4, provision is made for lowering the platen plates 7 on the end units. Such provision may comprise a number of transverse rock shafts 35 each mounted in longitudinal angle irons as indicated and carrying in the plane of each backing member 6 an eccentric 36 resting in a corresponding notch in the backing member. As indicated in Fig. 6 one of the notches of each backing member fits closely its corresponding eccentric 36, the other notches being longitudinally extended. Then while each backing plate is supported by three eccentrics, adjustment of eccentrics to provide such backing may be made. Each shaft 35 carries a pair of downwardly extending arms 37 the lower extremities of the arms of each shaft being jointed by a rod 38 terminating at the end of the unit in a handle 39. Preferably springs 40 are arranged to maintain the parts with the platen plates 7 in an extreme elevated position, which position is determined by adjustment of stop bolts 41, so that paper will lie on the platen plate at the level of the color plates.

Provision also is made upon the end units for preventing running of the transfer roll off the bed, such provision being conveniently stop bolts 32 secured through longitudinal members 1 and adapted to engage the projections 12, and the units may be secured together by conecting pieces extending longitudinally between corresponding bolts having heads countersunk to clear the projection 12.

Operation of my invention will be as follows: Supposing a "three color job" is to be printed, five of the units are arranged as shown in Figs. 1 and 2, the end units carrying paper rolls 29 and being equipped with stop bolts 32. Conveniently the units are maintained in alignment by angle irons 34 upon the floor so that in effect a single press bed of five units length is provided.

Supposing the design shown printed upon

the paper lying on the platen plate of the unit A is to be produced, the unit B is provided with a color plate having its working face cut away except in the area indicated in the cross hatching which represents, say the color orange. The next color plate, upon the unit C, in similar manner has say a green working face and is cut away through the remainder of its surface, and the D unit is cut away except for the circle portion of the design, which is, say, black.

For each of the color plate units B, C, and D there is provided an inking carriage the fountain of which is filled with ink of the proper color; and a single transfer roll 8 is arranged to travel the length of the bed traversing as it does so, all five of the plates. It will be understood that the raised working surface of the three color plates are properly located relative to each other so that the three colors of the design will be picked up by the transfer roll and laid upon the paper resting on the platen plates as indicated in Fig. 1.

Suppose the press is to be manipulated by six operators, one manning each handle 14 of the transfer roll, one stationed on each side of the press for working the inking carriages and one upon each end of the press to control the paper upon which the printing is to be done.

Suppose also the parts in the position shown, in which the paper on the A unit has received its printed impression the transfer roll is moving toward the E unit, the C and D inking carriages are stationary, the D carriage being now beneath the transfer roll and the B carriage moving toward the A unit.

The operators of the transfer roll,—which, since printing upon the A unit, has picked up ink from the color plates of the B, C and D units,—have simply to continue the transfer roll in movement over the paper on the platen plate of the E unit, and then reverse the direction of movement of the transfer roll to return the same to the opposite end of the press.

As the printing operation is performed the platen plate is maintained in upper position by the action of the spring 40 through the mechanism described. During return movement of the transfer roll across the platen plate the end unit operator will pull upon the handle 39 to lower the paper from contact with the transfer roll. The paper lowering movement of the platen plate having a component in the direction of the roll movement, slack in the paper during this movement is taken up by the free weight of the roll 30. As the transfer roll is moving to the right, Fig. 1 the operators of the inking carriages move the same successively in the opposite direction each across its color plate.

In detail, to traverse an inking carriage across its color plate, the carriage being in lowered position, the inking carriage operators first elevate the carriage to color plate level by depressing each his nearest pedal 26. The carriage is then moved by hand across the color plate and onto the bearing plate at the opposite end thereof, which bearing plate by balance of the parts is in upper position. As soon however as the carriage rests entirely upon the bearing plate the same is lowered by action of gravity; whereupon the carriage operators proceed to the next operation.

As shown, the B inking carriage is being traversed across the B plate, and this operation will be followed by corresponding manipulation of the C and D inking carriages. Meanwhile the printed paper on the A unit will be removed by the operator thereof and replaced with fresh paper.

By the time the transfer roll reaches the position indicated, but moving to the left, Fig. 1, the D color plate will have been inked and the inking carriage operators will remain relatively stationary, allowing the transfer roll operators to pass between them. From this point the operations are reversed, left for right, Fig. 1, but are otherwise identical with those described.

It will thus be seen that a printing operation is completed with every complete traversing stroke of the transfer roll, and that the complete press operating cycle embraces two traverses of the transfer roll the length of the bed. Where a fourth color is to be printed, as for example, a red background for the design shown, it would simply be necessary to insert a fourth unit between the end units, and provide the same with a suitable fourth color plate; and likewise where merely a two color job is desired the unit bearing the color plate corresponding to the color to be eliminated would simply be removed from the series and the remaining units "closed up"; or if the three colors were to be subsequently restored in the job, the color plate to be temporarily eliminated could simply be lowered in its unit.

To make a neater job as by "trimming" the relatively light orange and green colors, a unit bearing a color plate identical with the D color plate could be inserted between the A and B units, whereupon the printing operation would involve, regardless of the stroke direction of the transfer roll, the laying of black ink over both the orange and green.

It will be understood that for each color plate a corresponding inking carriage is always provided; and that if desired only one platen plate unit may be employed, although of course, such arrangements would decrease by one half the printing speed of the press.

It will be understood also that while I have shown each unit as equipped with means at each end for only partially sup-

porting an inking carriage bearing plate it would be possible and within the scope of my invention to provide instead complete inking carriage bearing plate supporting means at one end only of each unit; in which case however, the units would not be individually reversible, left and right, Fig. 1, as described.

While for simplicity of illustration I have shown an arrangement adapted for hand operation it is obvious that my invention embraces the provision of power means for performing the operations described.

What I claim is:

1. A printing unit of the class described, comprising a bed having longitudinally disposed ways adapted to join without interruption the ways of a similar unit when said units are placed in end to end relation, and a plate on said bed, said ways being adapted to guide and to regulate the movement of a transfer roll therealong and across said plate.

2. A printing unit of the class described, comprising a bed having longitudinally disposed ways adapted to join without interruption the ways of a similar unit when said units are placed in end to end relation, a plate on said bed, said ways being adapted to guide and to regulate the movement of a transfer roll therealong and across said plate, inking carriage supporting means associated with said bed, and means for moving said inking carriage supporting means to lower an inking carriage supported thereby, whereby the same will be cleared by said roll, and to raise the carriage whereby the same may be moved to and from said plate.

3. A printing unit of the class described, comprising a bed having longitudinally disposed ways adapted to join without interruption the ways of a similar unit when placed in end to end relation therewith, a plate on said bed, said ways being adapted to guide and to regulate the movement of a transfer roll therealong and across said plate, on each end of said bed a supporting member adapted to support an end of an inking carriage bearing plate, and means associated with each said supporting member for raising and lowering the same and adapted to similarly move the adjacent supporting member of said similar unit when placed in said relation, whereby an inking carriage on a bearing plate resting on said adjacent supporting members may be lowered between the plates of said units to be cleared by said roll as the roll is moved along said ways from one unit to the other and whereby the inking carriage may be raised to the elevation of said plates and be moved to and from either thereof.

4. In a printing press having a bed, a plurality of plates including color plates and a platen plate thereon and ways therealong, inking means for each color plate comprising an inking carriage arranged to traverse the plate and to ink the same thereby, inking carriage supporting means between adjacent plates, a transfer roll arranged to move along said ways across said plates, and means for moving said supporting means for lowering and raising an inking carriage thereon whereby when lowered the carriage may be passed by said transfer roll, and when raised the carriage may be moved between supporting means and plate.

5. In a printing press having ways and a roll movable therealong over a printing plate, peripherally spaced laterally extending projections on said roll, and rack plates spaced along said ways and having edges corresponding with the paths of movement of said projections and engageable with the same to positively corelate the rotational movement of the roll and its transitional movement along the ways.

6. In a printing press having ways and a roll movable therealong over a printing plate, said ways having roll supporting faces and said roll having flange portions extending therebelow, peripherally spaced projections on said flange portions, and rack plates spaced along said ways and having edges corresponding with the paths of movement of said projections and engageable with the same to regulate the movement of the roll along the ways and to maintain bearing of the roll against the supporting faces.

7. In a printing press having ways and a roll movable therealong over a printing plate, projections located on said roll to move beyond the pitch line of rolling movement, and rack plate means associated with said ways to lie between said projections and said pitch line during said rolling movement, whereby bearing of the roll upon the plate is positively maintained.

8. In a printing press of the class described and having a bed, and a printing roll and inking means movable therealong, means associated with said bed for receiving said inking means and for moving the same to clear said printing roll whereby said roll may pass said inking means.

9. In a printing device having ways and a roll movable therealong over a printing plate, means for positively regulating rotational roll movement dependent upon its transitional movement, said means being arranged to positively maintain bearing of the roll upon the plate.

In testimony whereof I hereby affix my signature.

HARRISON CALVIN RYAN.