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ROLL PRINTING MACHINES

Filed Dec. 13, 1950

3 Sheets-Sheet 1

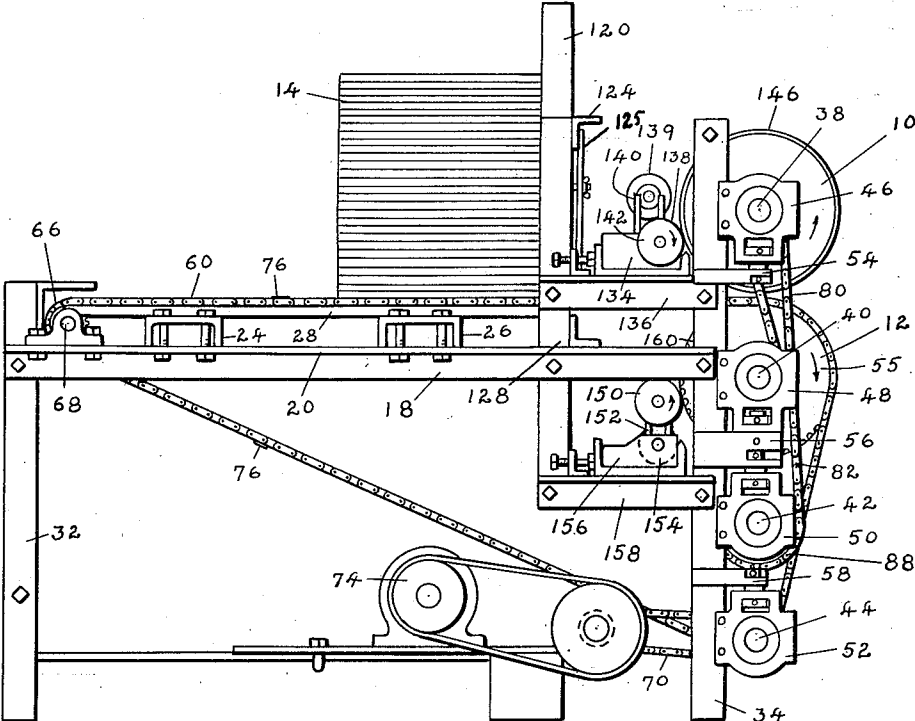


FIG-1

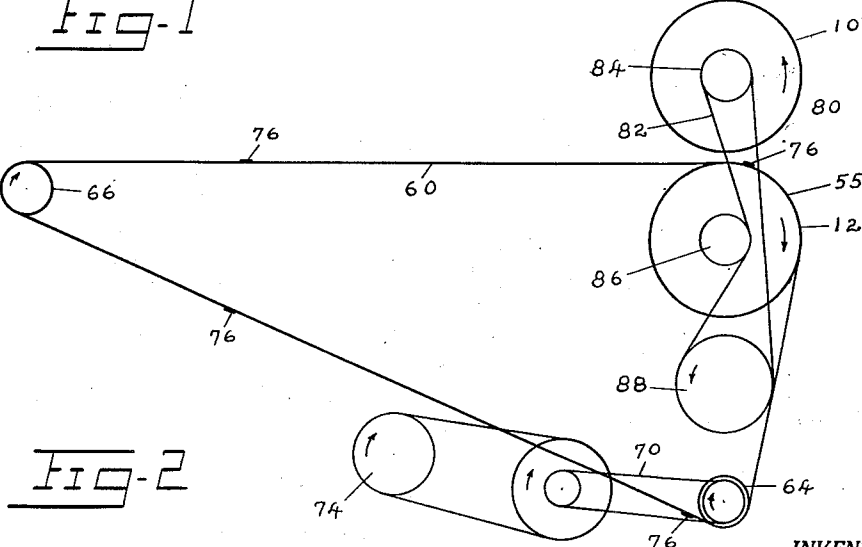


FIG-2

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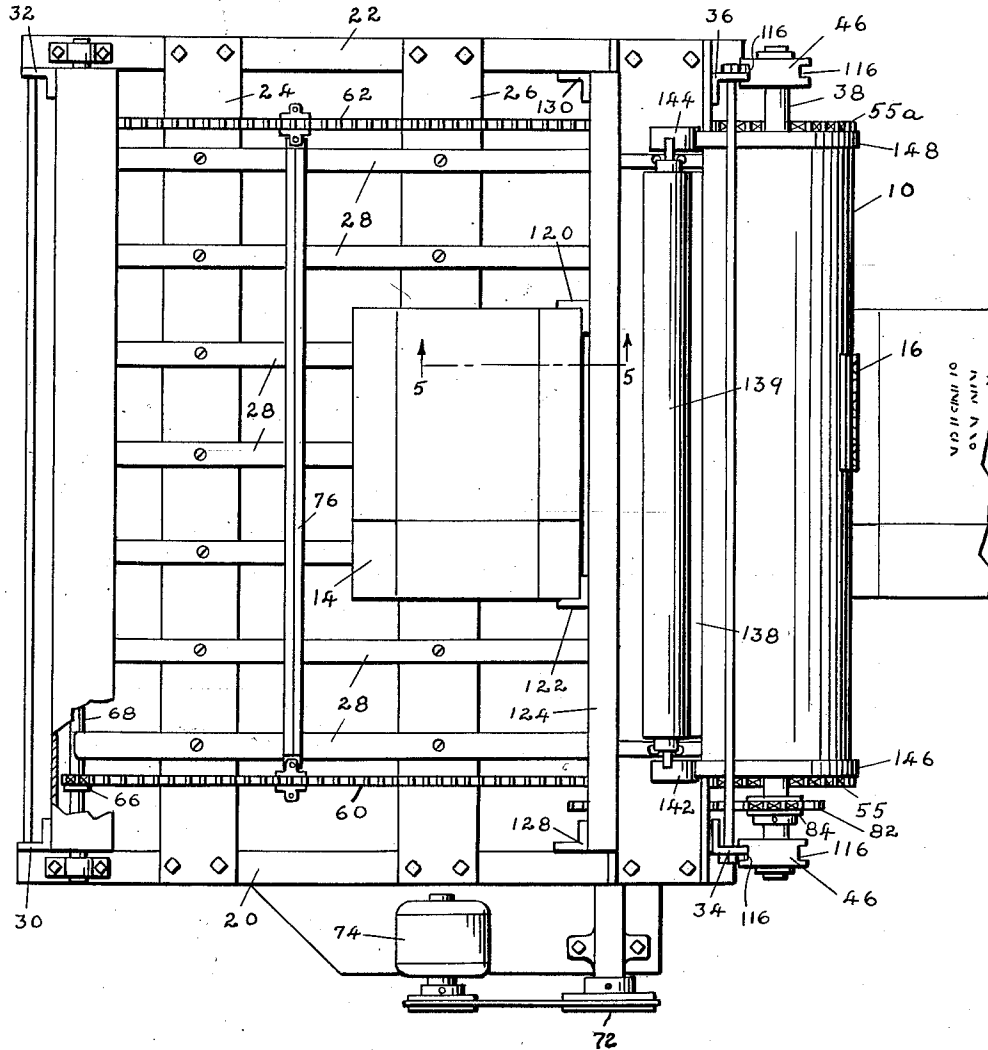


Fig. 3

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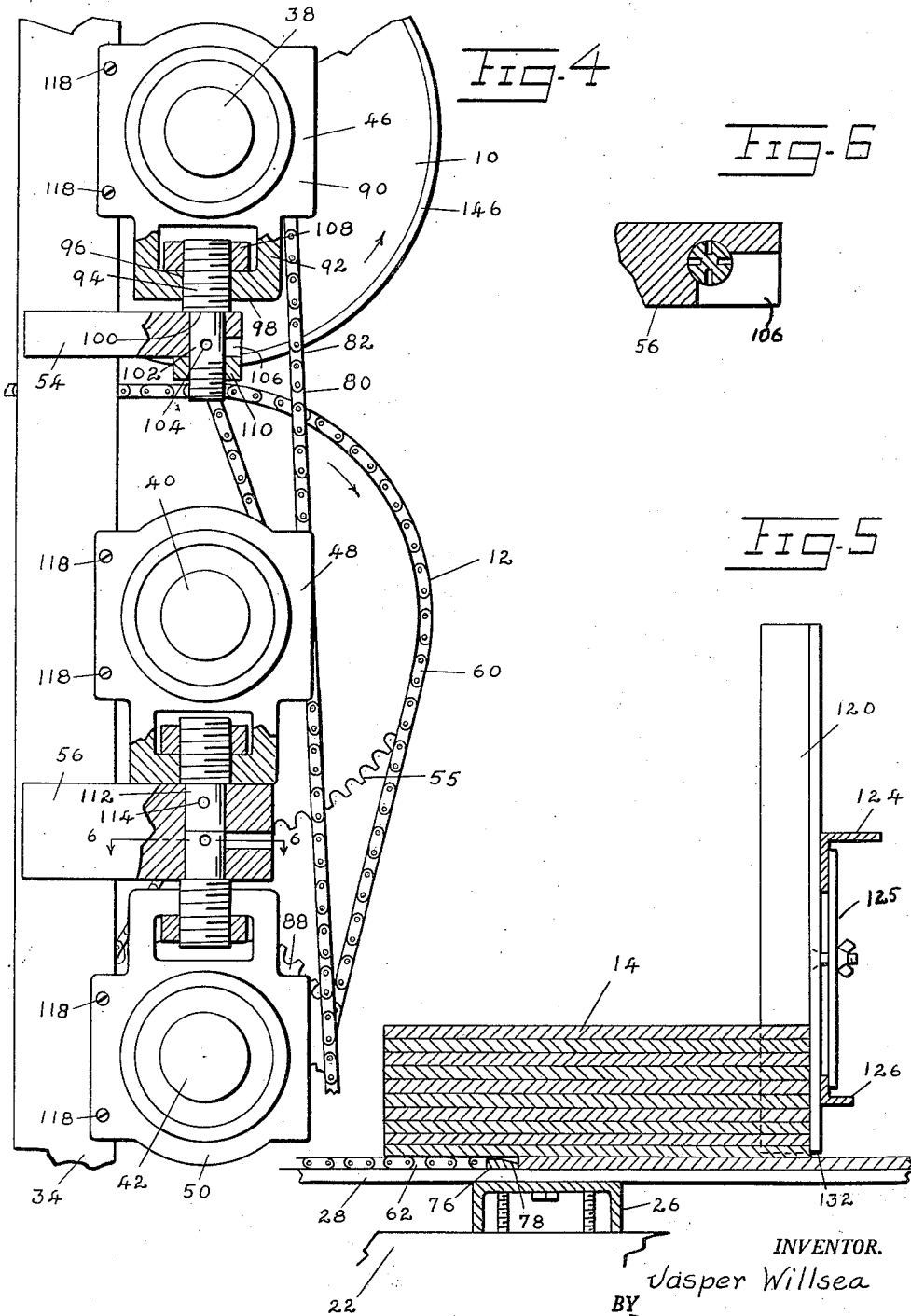
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ROLL PRINTING MACHINES

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Application December 13, 1950, Serial No. 203,576

3 Claims. (Cl. 101—232)

This invention relates to printing machines, and more particularly to machines of the type employing spaced print rolls between which board carton stock and the like is fed in a continuous manner.

In machines of the type described, it is essential that the stock be fed in a coordinated manner with the feed rolls, and that the velocity of the stock be the same as the circumferential velocity of the printing faces of the rolls, and that the opposed rolls rotate at uniform angular velocities in reverse direction. In such a machine it is desirable that the apparatus be compact, and that the bearing supports be accessible and readily adjustable to accommodate varying stock thickness, eliminate slack and lost motion, whereby chain drives may be employed to obtain the desired uniform operating results.

The present invention has for its object the provision of a bearing support frame at one end of a feed table in which the bearings for the roll shafts, idler and drive shaft are exposed, readily adjustable, and in which the apparatus as a whole comprises a compact, rapid, continuous chain feed for stacked board stock to be printed. The invention has further to do with the adaptation of a standard bearing for all shafts, of a compact nature embodying a jackscrew type compact adjustment, such bearings being capable of being arranged one above the other on relatively close centers, whereby the overall size of the machine is reduced.

The above and other novel features of the invention will appear more fully hereinafter from the following detailed description when taken in conjunction with the accompanying drawings. It is expressly understood that the drawings are employed for purposes of illustration only and are not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawings, wherein like reference characters indicate like parts:

Figure 1 is a side elevation of a machine for imprinting stiff board cartons and the like;

Figure 2 is a diagrammatic illustration showing the drive chains therefor;

Figure 3 is a top plan view of the machine;

Figure 4 is an enlarged end view, partly in section, of typical bearings for the rolls and idler shaft;

Figure 5 is an enlarged fragmentary side view, taken substantially on the line 5—5 of Figure 3, showing the board feeding operation; and

Figure 6 is a detail section taken on the line 6—6 of Figure 4.

Referring to Figures 1, 2, and 3, there will be seen a pair of printing rolls or die cylinders 10 and 12, located one above the other and in spaced relation, between which the apparatus feeds knocked-down board cartons stacked as shown at 14, one carton at a time being fed through the rolls from the bottom of the stack. The rolls are slightly spaced from one another a sufficient distance to accommodate the passage of a knocked-down carton and a further distance sufficient to allow the positioning upon

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the rolls of raised lettering such as 16, which is adapted to print upon the boxes any desired characters, trade marks, etc. The raised lettering may be formed of rubber-like material cemented to the rolls. Such lettering may be placed upon both the top and bottom roll, so that the cartons are printed simultaneously on both sides. The cartons 14 may be the typical strawboard or corrugated board carton in knocked-down form, or similar material. Where lettering is placed upon one roll, a back-up pad is positioned upon the corresponding part of the opposite roll to support the board for printing, unless raised lettering of commensurate area and corresponding locations are employed on both rolls. Any back-up pad will normally have a radial height slightly less than that necessary to contact the inking rolls.

The apparatus comprises a frame 18 composed of side members such as 20 and 22, and cross channel members 24 and 26, upon which are supported guide rails 28. The frame 18 is supported upon legs 30 and 32 at one end, and upon a bearing support frame composed of vertically disposed angle irons 34 and 36 at the other end. The bearing frame is adapted to support the rolls 10 and 12 and their respective shafts 38 and 40, and an idler shaft 42 and a lower drive shaft 44, such shafts being arranged compactly one above the other in bearings such as 46, 48, 50, and 52, arranged at opposite ends of the respective shafts and supported upon brackets such as 54, 56, and 58, mounted as by welding upon the upright angle irons 34 and 36.

The shaft 40 of the roll 12 is provided with sprockets 55 and 55^a at either end having a pitch circle diameter equal to the diameter of the rolls 10 and 12 as increased by twice the thickness of the raised lettering 16 affixed to the rolls. Traveling over each of such sprockets are driving and feed chains 60 and 62, each chain passing over spaced sprockets 64 on the drive shaft 44 and over spaced sprockets 66 arranged at either end of a table-supported shaft 68 mounted upon the opposite end of the table from the bearing frame 34—36. The shaft 44 is driven from a sprocket and chain 70 from a countershaft 72 and drive motor 74. The two chains 60 and 62 are provided with transverse feed bars 76 of a thickness substantially that of the knock-down board cartons upon which printing is to be effected. Such feed bars may be chamfered as at 78 (see Figure 5), so as to assure engagement with a single carton at a time as the feed bar engages the bottom carton of the stack 14 to feed the same toward the rolls. The transverse bars 76 ride upon the smooth guide rails 28 and feed the bottom-most carton along such rails along a plane passing between the rolls 10 and 12.

The feed bars 76 are arranged at spaced points along the chains 60 and 62, the spacing being equal to the exact circumference of the pitch circle of the sprockets 55 and 55^a, and the total length of the chains 60 and 62, in their substantially triangular path, is a multiple of the pitch circuit circumference of the sprockets 55 and 55^a. In the arrangement shown, four such feed bars are utilized, this being the optimum number for a compact machine.

It will be appreciated that the printing surface of the raised lettering 16 on the rolls 10 and 12 must travel at the same speed as the board material moves in passing between the rolls, in order to effect clear printing, and that the rolls 10 and 12 must be driven in opposite directions at precisely the same speed in order to secure this result. In order to drive the roll 10 from the roll 12 in reverse direction and at the same speed, a chain drive 80 comprising chain 82, running on sprockets 84 and 86, and over an idler sprocket 88 on shaft 42 is employed. It will be observed that the chain passes around the sprocket 84 and one reach thereof passes over the sprocket 86, and that the sprocket 88 is of slightly larger diameter than either sprocket 84 or 86, so that the return reach

of the chain will run clear of the reach extending around the sprocket 86. The sprockets 84 and 86 being of the same diameter and the same number of teeth, cause the rolls 10 and 12 to rotate at opposite directions at precisely the same speeds.

In order to support the shafts 38, 40, 42 and 44 upon the bearing frame in proper spaced relation, and to provide for taking up such slack in the chain drives as may appear from time to time, such bearings are adjustable vertically with respect to the frame and one another. The bearings 46, 48, 50, and 52 are all similar, and a description of one will suffice. As shown in Figure 4, the bearing 46 comprises a block 90 having an open extension 92 into which is threaded a shouldered support stud 94. Such stud has threaded engagement as at 96 with the integral strap 98 of the block 90, and the shoulder 100 bears against the bracket 54 for vertical support. The shank 102 swivels freely within the aperture in the support 54, and is provided with radial capstan apertures 104 which, by reason of the cut-away portion 106 of the bracket 54 enables such stud to be turned by a capstan bar. (See Figure 6.) Rotation of the stud 94 elevates or lowers the bearing block 46. When the desired adjustment of the bearing block is secured, the lock nut 108 may be jammed against the strap 98, and the lock nut 110 may be jammed against the bottom face of the bracket 54. Thus, a solid support for the bearing block 46 is afforded which at the same time is adjustable. The arrangement is such as to occupy a minimum of space, so that the four shafts may be arranged vertically above one another without undue or unnecessary spacing which might otherwise be required were some other form of bearing and take-up provided. The bearing block 48 is precisely the same as the remaining bearing blocks, with the exception that it is rigidly secured to the bracket 56, the stud 112 therefore being pinned as at 114 to the bracket 56.

The bearing blocks 50 and 52 are supported similarly to the bearing block 46 in depending fashion, the load upon the shafts 42 and 44 being upwardly directed. Each of the bearing blocks is provided with channels 116 on either side edge, all adapted to embrace the flanges of the angle irons 34 and 36 of the bearing frame. Set screws 118 are utilized in cooperation with a side wall of the channel 116 to grip the frame flange within the channel once the position of the bearings has been roughly adjusted, and the grip may be tightened when the final adjustment is completed.

The stack of material 14 is placed upon the guide rails 28 and is adapted to be held in vertical position by angle irons 120 and 122, acting as guides. Such angle irons are laterally adjustable and held upon transverse bridging angle irons 124 and 126 by clamp plates 125. The angle irons 124 and 126 are in turn supported from posts 128 and 130, the latter being secured to the side angle irons 20 and 22. It will be observed that the angle irons 120 and 122 are adjusted with their lower edge 132 sufficiently above the bed of the guide rails 28 so as to permit the passage of one thickness of the board material 14 therebeneath in its travel toward the rolls 10 and 12.

Inking rolls are provided for inking the lettering or other indicia placed upon the rolls, for printing upon the board material as it passes between the rolls. The upper roll is inked by means of an inking tray 134 horizontally adjustably mounted upon angles 136. Within the tray is journaled an inking roll 138 adapted to engage such raised lettering as is applied to the roll 10. Rolling upon such inking roll 138 is a wiping roll 139, the same being freely vertically movable in ways 140, as will be well understood in the art. The inking roll is provided with friction rolls 142 and 144 at either end outside of the inking tray 134, which are adapted to engage the end drive rings 146 and 148 on the roll 10, such rings having a radial thickness substantially that of the thickness of the raised lettering 16 applied to the roll. Such rings may be in the form of relatively thick rubber bands. It will be seen that

the inking roll 138 rotates in a clockwise direction, and that the wiper roll 139 removes excess material before contact of the inking roll with the raised lettering.

The lower roll 12 is inked by engagement with an ink-carrying roll 150 vertically movable in ways 152 and resting upon an ink pot roll 154 contained within the ink tray 156. Such tray is adjustable horizontally and rests upon horizontally extending angle members 158. It will appear that the inking roll 150 acts as a wiper roll upon the ink roll 154 so that a proper supply of ink is distributed to such lettering as is carried by the roll 12. The roll 150 is provided at its ends with driving roll extensions adapted to engage end bands 160 on the roll 12, similar to bands 146 on roll 10, the end bands being of a radial thickness consistent with the radial height of the lettering on such roll.

In practice, it will appear from the foregoing description that roll 12 is located on its bearings 48 so as to receive board material fed to it substantially tangential of the roll, or more specifically, tangential to any raised lettering or backup pad applied to the roll. After the bearings 48 are set, the shaft 38 of roll 10 is adjusted by elevating or lowering the bearings 46, by rotation of the threaded studs 94, until the proper spacing between the rolls is established, such spacing being dependent upon the thickness of the board stock passing between the rolls. Bearing blocks 46 are then locked in place by tightening nuts 108 and 110. Thereafter, the bearings 50 supporting shaft 42, and the bearings 52 supporting shaft 44, are moved in order to take up all slack on the chain 80, and chains 60 and 62, respectively.

It will thus be seen that all of the bearings on the end frame may be alike, and nest together one above the other, while providing enough clearance for vertical adjustment, as is necessary to maintain the various chains free from backlash producing slack. The apparatus, when once adjusted, will feed board stock through the rolls successively, and at a speed limited only by the ability of the printing blocks to hold ink. Thus, by use of the relatively compact machine described, unlabeled standard board cartons or the like may be rapidly processed, and have applied thereto printing in the form of special instructions, warnings and addresses, with little delay. Compact as the machine is, its bearing structure and feed means provide for accurate, clear printing, with free access to the bearing blocks for maintaining the machine in proper adjustment.

At the same time, the inking apparatuses are supported in accessible locations whereby quick cleaning, replacement, substitution of colors, and the like, can be effected. The entire apparatus is relatively simple, and built about the chain feed and frame supporting the shafts, utilizing common form of bearing for all shafts.

While a single embodiment of the invention has been illustrated and described, it is to be understood that the invention is not limited thereto. As various changes in the construction and arrangement may be made without departing from the spirit of the invention, as will be apparent to those skilled in the art, reference will be had to the appended claims for a definition of the limits of the invention. The specific bearing support mechanism is the subject matter of a divisional application Serial No. 394,093, filed November 24, 1953.

What is claimed is:

1. In a roll printing machine, a feed table, a vertical bearing-supporting frame at one end comprising spaced uprights extending above and below the table, four bearings mounted on each of said uprights, one above the other, a pair of print rolls juxtapositioned one above the other and journaled at opposite ends in the upper two bearings on each of said uprights on said frame, the plane of said table passing between the rolls, sprocket and chain means for driving one roll from the other at the same speed and in a reverse direction located within the frame, duplicate chain drive means for the lower roll,

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located at the opposite ends of said lower roll, said chain drive means having reaches extending along said table and in the plane thereof, and transversely extending feed means interconnecting said chain drive means and adapted to move along said table toward and between said rolls, at a speed substantially equal to the peripheral velocity of said rolls, an idler shaft mounted in two of said bearings below said print rolls having a sprocket for said chain drive means, and a second shaft journaled in the remaining two of said bearings having drive sprockets meshing with said duplicate chain drive means.

2. In a roll printing machine, a feed table, a vertical bearing-supporting frame at one end comprising spaced uprights extending above and below the table, four bearings mounted on each of said uprights, one above the other, a pair of print rolls juxtapositioned one above the other and journaled in the upper two bearings supported on the uprights of said frame, the plane of said table passing between the rolls, chain drive means including an idler shaft journaled in bearings supported on said frame below said rolls for driving the upper roll from the lower roll at the same speed and in a reverse direction, means for shifting the bearings of said upper roll and idler shaft vertically to vary the spacing between said rolls, duplicate chain drive means for the lower roll, located at the opposite ends of said lower roll, said chain drive feed means having reaches extending along said table, and transversely extending feed devices interconnecting said chain drive means and adapted to move along said table toward and between said rolls, at a speed substantially equal to the peripheral velocity of said rolls, said idler shaft mounted in two of said bearings below said print rolls having a sprocket for said chain drive means, and a second shaft journaled in the remaining two of said bearings having drive sprockets meshing with said duplicate chain drive means.

3. In a roll printing machine for board material, an end frame, having a pair of rolls juxtapositioned one above the other and mounted on shafts journaled on the frame one above the other on one side thereof, a feed table, extending to the other side of said frame along a plane passing between the rolls, an idler shaft journaled on the one side of the frame beneath the rolls, and a

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drive shaft journaled on the one side of the frame beneath said idler shaft, duplicate chain drive feed means having reaches extending along said table and passing over sprockets on opposite ends of the lower roll shaft and passing over sprockets on said drive shaft, said feed means including transversely extending members interconnecting said reaches, said lower roll sprockets being of substantially the same diameter as said rolls whereby to move said members between the rolls at roll peripheral speed, roll coordinating chain drive means including like sprockets on said roll shafts and a sprocket on said idler shaft, said drive means including an idler chain passing around one of said like sprockets, and over the other, and around said idler sprocket, and bearing means for each of said shafts at opposite ends thereof mounted on the said one side of said frame, said bearing means including screw adjustments arranged on vertical axes intersecting the axes of the respective shafts for positioning said shafts in selected spaced relation with normal tension of the drive chains and said idler chain.

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