Sept. 3, 1963 M. H. SHERMAN 3,102,469

SCREEN PRINTING APPARATUS

Filed July 20, 1959 3 Sheets-Sheet 1

FIG. 1.

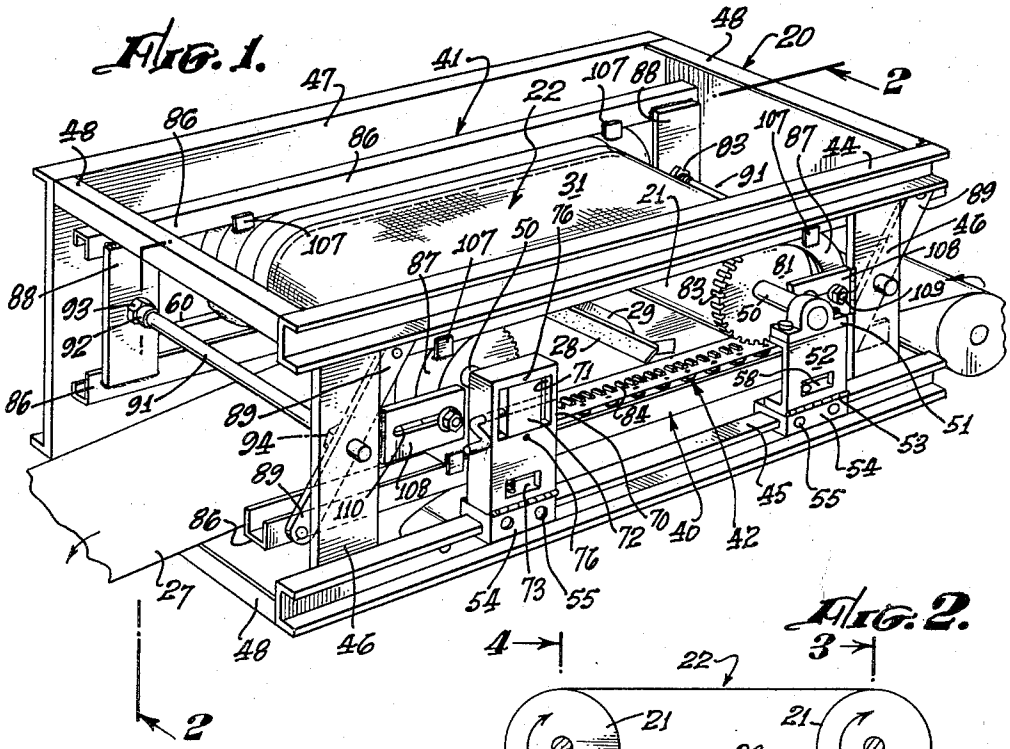


FIG. 2.

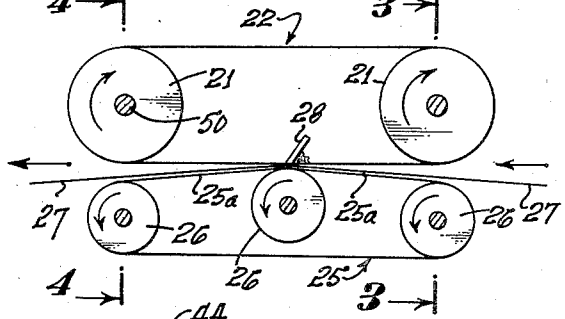
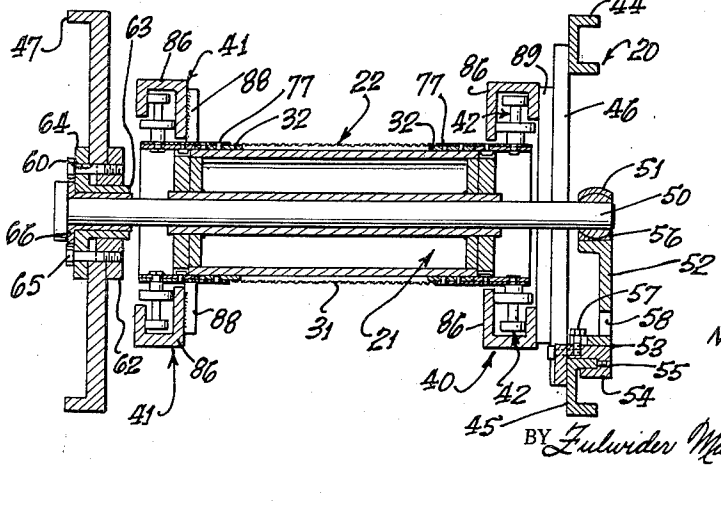


FIG. 3.



INVENTOR
MAURICE H. SHERMAN

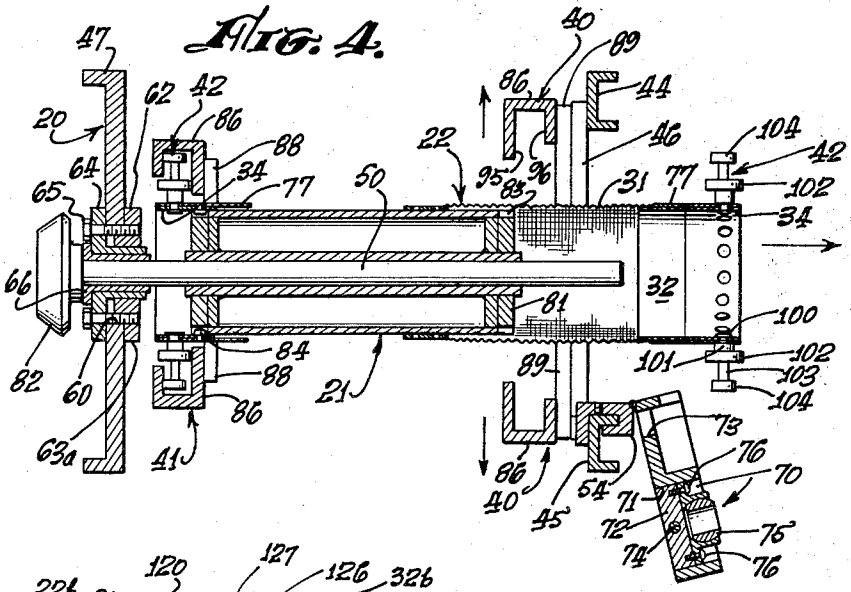
BY Fulwider Mattingly & Huntley
ATTORNEYS

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SCREEN PRINTING APPARATUS

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FIG. 4.



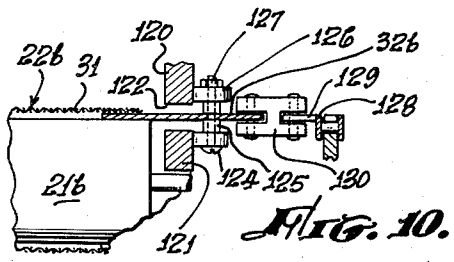


FIG. 10.

FIG. 5.

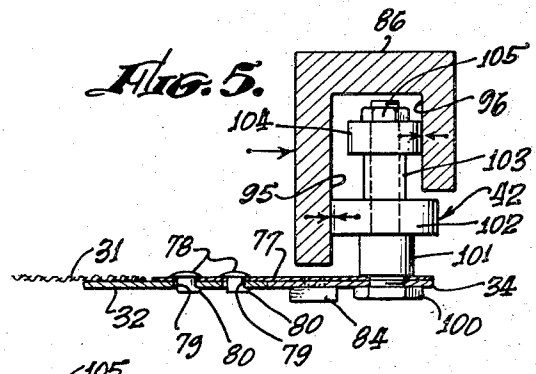
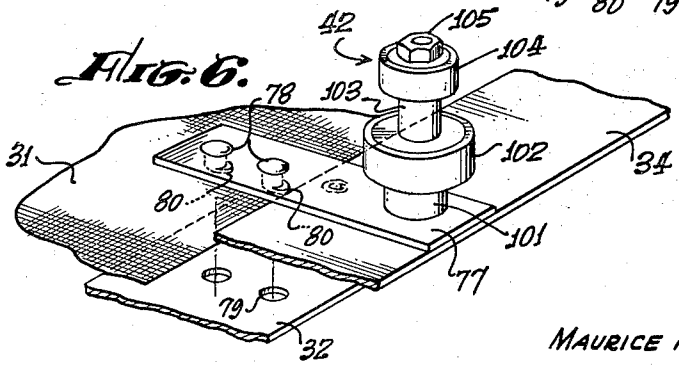


FIG. 6.



INVENTOR
MAURICE H. SHERMAN

BY Fulwider Mattingly & Hunttley
ATTORNEYS

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FIG. 7.

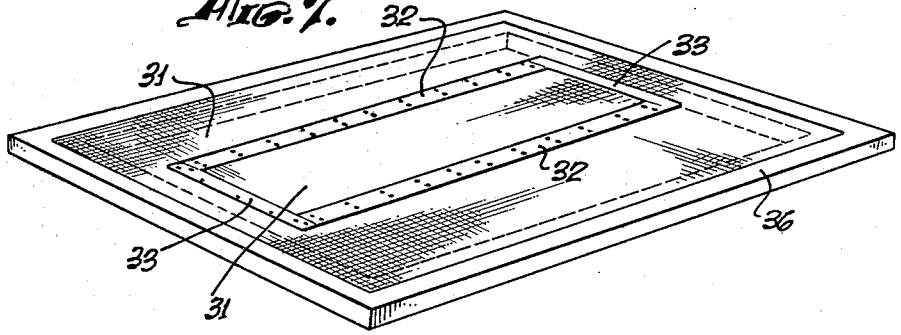
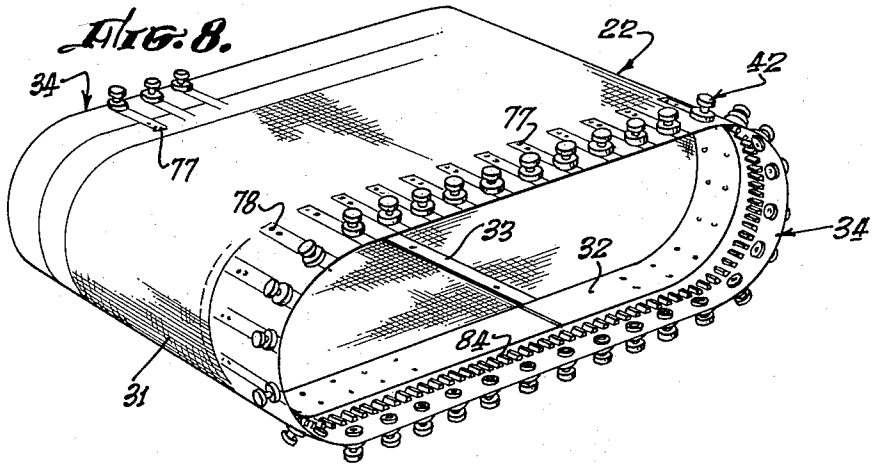


FIG. 8.



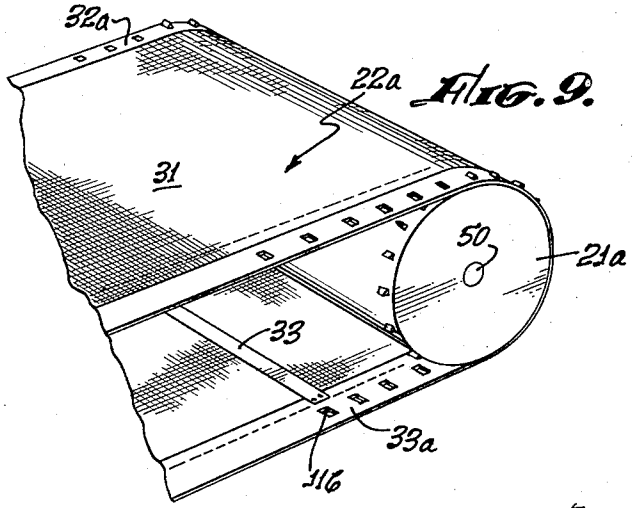


FIG. 9.

INVENTOR
MAURICE H. SHERMAN

BY Fulwider Mattingly & Hunttley
ATTORNEYS

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3,102,469

SCREEN PRINTING APPARATUS

Maurice H. Sherman, 278 Keller St., Monterey Park, Calif.

Filed July 20, 1959, Ser. No. 828,259
6 Claims. (Cl. 101—122)

The present invention relates generally to screen printing, and more particularly to screen printing in which the screen is arranged in an endless-belt configuration to continuously transfer the ink or other printing medium to material passing thereunder.

An object of my invention is to provide a screen printing apparatus, employing silk or other mesh materials in the printing screen, of the type in which the printing screen is arranged in an endless flexible belt, as contrasted to printing screens utilizing flat rigid frames.

Another object of the invention is to provide an endless-belt printing screen apparatus which subjects the screen to uniform tension, both laterally and longitudinally, throughout its service life.

It is also an object of the invention to provide a method and means for effecting the transformation of a printing screen from its flat configuration, as received in a frame from the artist or workman who has imparted the desired design to the stencil material of the screen, into the endless-belt configuration suitable for mounting on the rollers of a high-speed printing apparatus, while preserving in the endless belt the uniformity of tension imposed on the screen in its flat configuration. The possibility of distortion of the work of the artist is thereby avoided and faithful reproduction thereof assured. In addition, the endless-belt printing screen can be preserved for re-use, inasmuch as tension is maintained on the screen during storage of the belt, as well as so long as the belt is mounted in the printing apparatus.

A further object of the invention is to provide an endless-belt screen printing apparatus for economically producing high-speed short runs of printed web material by the use of endless-belt printing screens of a disposable nature which are quickly and economically made from the flat framed screen prepared by the artist. Apparatus embodying my invention also provides means for readily acomplishing a change in setup from one disposable belt to another and includes belt-driving and tensioning means of a permanent nature to which a belt can be connected and disconnected quickly.

Yet another object of the invention is to provide a screen printing apparatus utilizing an endless-belt printing screen mounted in longitudinal tension on rollers, the opposite sides of the belt including flexible metal bands which carry bearings guided in yokes or tracks and adapted to laterally tension the screen.

A still further object of the invention is to provide an endless-belt screen printing apparatus including flexible metal side bands having a positive drive connection with the rollers on which the endless-belt printing screen is mounted to maintain accurate registry of the stencil with the web being printed, particularly in multi-color apparatus.

These and other objects and advantages of my invention will be apparent from the following description when taken in conjunction with the annexed drawings in which:

FIGURE 1 is a perspective view of a printing head embodying my invention;

FIGURE 2 is a schematic longitudinal sectional view on the line 2—2 of FIGURE 1 and additionally showing a feed-belt mechanism for a web of material to be printed by the printing head;

FIGURE 3 is a vertical sectional view taken through the axis of one of the screen-supporting rollers of the printing head as viewed on the line 3—3 of FIGURE 2;

FIGURE 4 is a vertical sectional view on the line 4—4 of FIGURE 2 showing the manner in which the printing head can be opened up for the replacement of a printing screen;

FIGURE 5 is a fragmentary elevational view, partly in section, of the lateral tensioning means for the printing screen and also showing the details of the connection of the printing screen to the lateral tensioning means;

FIGURE 6 is a fragmentary perspective view showing some of the parts of FIGURE 5 in exploded relationship;

FIGURE 7 is a perspective view illustrating one step in the fabrication of an endless printing screen according to my invention;

FIGURE 8 is a perspective view showing another step in the fabrication of the endless printing screen;

FIGURE 9 is a partial perspective view showing another embodiment of the invention; and

FIGURE 10 is a partial elevational view, with portions in cross section, of yet another embodiment of my invention.

For clarity, the drawings illustrate but one printing head embodying my invention, but it is to be understood that the invention is adapted for and, in fact, has particular advantages in multi-color printing apparatus utilizing a plurality of printing heads; it will be apparent from the following description that the stencils of the several endless printing screens are precisely maintained in accurate synchronization with one another for precise hairline registration with the pattern or design to be imprinted on the web passing through the apparatus. It will also be appreciated that the material onto which the design is transferred is not necessarily a fabric, the screen may be made of other materials than silk, and also that the medium transferred through the screen can be something other than ink.

In general, each printing head comprises a rigid framework **20** mounting a pair of parallel rolls **21** at opposite ends thereof. An endless printing screen belt assembly **22** is sleeved around both rolls **21** to be suported thereby and at least one of the rolls is adjustable towards and away from the other of the rolls to impose a longitudinal tension on the belt assembly **22**.

An endless feed belt **25** is mounted directly beneath the framework **20** on three supporting rolls **26**. The two end rolls **26** have their axes disposed in a plane which is offset beneath the axis of the central roll **26**. A web **27** of material to be printed is fed into one end of the apparatus onto the feed-belt **25** and in its passage over the central roll **26** is brought into contact with the endless printing screen belt assembly **22**. The framefork **20** mounts a squeegee **28** which is positioned between the rolls **21** in a position to force ink from a supply means **29** through the bottom flight of the belt assembly **22**. The rolls **21** and rolls **26** are synchronously driven, preferably by a positive drive connection so that the speeds of the belt assembly **22**, feed-belt **25** and web **27** are the same. The squeegee **28** is positioned immediately above or slightly downstream of the zenith of the central roll **26** so that the web **27** is nipped along a line of contact extending laterally across the screen belt assembly **22**, the web thereafter being guided outwardly in a plane which immediately separates from the plane of the lower flight of the belt assembly **22**. Conventional doctor blades (not shown) are mounted in operative association with the rolls **21** to maintain them in a clean condition.

More specifically, the belt assembly **22** has the configuration seen in FIGURE 8 when mounted in the printing apparatus and consists of a sheet of silk **31** framed by a pair of side bands **32** and at least one lateral band **33**. In addition to the belt assembly **22**, FIGURE 8 also shows a pair of endless drive bands **34**, each of which

is connected along one continuous edge to an edge of one of the side bands 32.

In making a stencil it is customary for the artist or designer to stretch the sheet of silk 31 in a rigid rectangular frame 36 such as is shown in FIGURE 7, care being taken not to distort the warp and woof of the mesh material. The stencil material is then affixed to the mesh by any of the conventional means known to the art, care being taken, however, to keep the design within predetermined limits of the area of the sheet of silk 31. After the design or stencil has been completed the screen 31 and frame 36 are delivered as an integral unit to the user.

The design area of the silk 31 is conventionally of predetermined dimensions according to the nature of the material to be printed and this is particularly true of the repeat dimension. According to my invention this predetermined area is provided with an auxiliary framework of very thin metal bands applied to the screen 31 while the screen is yet in its prestressed condition within the frame 36. These bands are fastened to the screen 31 and to each other to provide a semi-rigid auxiliary framework adapted to prevent relaxation of the stressed silk screen 31 after being cut out of the frame 36.

In making the belt assembly 22 a perfectly rectangular framework is first made up of a pair of the side bands 32 and a pair of lateral or end bands 33. All of these bands are made of a very thin sheet metal material, preferably a spring steel, and are fastened together at the corners with rivets or other suitable fastening means. One side of the rectangular framework thus formed is then coated with a suitable adhesive and the framework then placed on the tautly stretched screen 31 within the frame 36 in a manner to contain the stencil.

After the adhesive has set, the material of the screen 31 is cut along the outer edges of the bands 32 and 33. In removing the rectangular metal frame and the screen 31 framed therein from the original piece of screen it is preferable to commence cutting first along one end band 33 and then along both side bands 32, at the same time rolling the assembly into tubular configuration. Thus, as the assembly 22 is detached from the frame 36 along the remaining or other end band 33 the assembly 22 is already in tubular configuration whereby any buckling tendency of the bands 32 and 33 is avoided and the screen 31 is maintained in the prestressed condition which it had in the frame 36, and the stencil material will also reinforce the silk or other mesh against buckling. As used herein, a pre-stressed screen shall be understood to mean a screen assembly in which the side bands and at least one lateral band shall have been affixed to the screen when the screen is stretched, as in the frame 36, while the warp and woof elements are tensilely stressed.

The two end bands 33 can then be superposed and fastened together by rivets. Alternatively, the two end bands 33 can be placed alongside one another with their innermost edges in abutment and an adhesive applied to the innermost end band through the covering layer of screen material. After the adhesive has set, the other or outermost end band is cut away from the assembly along its innermost edge whereby opposite ends of the screen 31 are both adhesively affixed to the remaining end band 33. This latter procedure has the advantage of providing a seam of minimum thickness. According to either method of forming the belt assembly 22 the assembly is rolled into tubular or endless-belt configuration with the screen 31 on the outwardly facing sides or surfaces of the side bands 32.

One of the rolls 21 mounted in the framework 20 is adjustable towards and away from the other roll 21 so that after the assembly 22 is sleeved thereover a proper longitudinal tension can be maintained on the assembly. In addition, the framework 20 supports a laterally adjustable harness or yoke designated generally by the numeral 40, and a laterally immovable yoke designated

generally at 41. These yokes extend longitudinally of the framework 20 on opposite sides of the belt assembly 22 and each of the drive bands 34 is provided with a plurality of roller assemblies 42 engageable with the yokes and adapted to laterally tension the belt assembly 22.

The framework 20 on one side comprises a pair of horizontally extending upper and lower channels 44 and 45, respectively, interconnected at their opposite ends by a pair of vertically extending plates 46. The other side of the framework 20 comprises a horizontally extending relatively wide side plate 47 and the opposite sides of the framework 20 are interconnected by suitable cross-braces 48. The vertical spacing between the pair of channels 44 and 45 is sufficiently great to conveniently permit sleeving the belt assembly 22 over the rolls 21, and the spacing between the end plates 46 is sufficiently long to permit spacing-apart of the rolls 21 for accommodating belt assembles 22 of various lengths.

Each of the rolls 21 is mounted on a shaft 50 which is provided with a removable bearing support at its end in the open side of the framework 20 whereby the bearing support can be swung out of the way to permit sleeving of the assembly 22 over the rolls. Thus, the far roll 21 (as viewed in FIGURE 1) has the removable end of its shaft 50 supported in a pillow block 51 that is mounted on top of a bracket 52. This bracket is in turn hingedly connected as at 53 to a support block 54, which in turn is mounted for longitudinal adjustment on the bottom channel 45 of the open side of the framework 20.

The pillow block 51 includes a self-aligning bearing 56 swivelly mounted therein whereby the adjacent end of the shaft 50 can be slipped into or out of the bearing 56 upon pivotal movement of the bracket 52. To maintain the bearing in erect, operative position, a suitable fastener 57 is provided for rigidly securing the bracket 52 to the support block 54, and this fastener can be released or engaged through a suitable aperture 58 formed in the wall of the bracket 52. A pair of set screws 55 are provided in the support block 54 for releasable engagement with the bottom channel 45 in order to maintain the bearing assembly in the desired position.

The bearings for the other ends of the shafts 50 are supported in the side plate or channel 47 and FIGURE 3 best illustrates the manner of mounting the shaft 50 of the far roll 21. The side plate 47 is formed with a longitudinally extending central slot 60 whose opposite horizontally extending edges slidably support complementary shoulders of a clamping block 62, disposed on the inside of the side plate 47. The clamping block 62 is provided with a central bore adapted to receive a bearing housing 63 that is provided with a flange 64 adapted to engage the outer surface of the side plate 47. A plurality of bolts 65 are passed through the flange 64 for threaded engagement with the clamping block 62 so that the bearing assembly can be clamped into the desired position within the slot 60. The housing 63 encloses a suitable bearing 66 of relatively great axial length so that sufficiently firm support will be provided for the shaft 50 and the roll 21 thereon when the removable bearing assembly at the other end of the shaft is detached from the shaft.

The shaft 50 of the near roll 21 can be supported by a similar bearing arrangement; however, in order to provide a means for finely adjusting the longitudinal tension imposed on the belt assembly 22 I have provided another type of bearing support for the front roll 21. Conversely, both rolls 21 can be supported by the bearing means presently to be described.

The detachable bearing support for the near roll 21 includes another support block 54 adjustably slidably mounted on the lower channel 45 and securable in place by set screws 55. A bracket 70 is hingedly mounted as at 53 on top of the support block 54 and has a rectangular opening 71 extending laterally therethrough formed

with ways which slidably support a bearing block **72**. Beneath the opening **71** another opening **73** is formed in the bracket **70** to provide access to a fastener **57** by means of which the hinged bracket **70** can be secured in upright position to the support block **54**.

A crank **74** is rotatably mounted in the bracket **70** and extends through the bearing block **72**, to which it is threadedly engaged. As is apparent, rotation of the crank **74** permits adjustment of the position of the bearing block **72** in a direction longitudinally of the framework **20**. The bearing block **72** on its inner face mounts a self-aligning bearing unit **75**, which is of the flanged type, suitable fasteners passing through the flanges for connection of the bearing unit to the bearing block **72**. The bearing assembly can thus be engaged and disengaged from the adjacent end of the shaft **50** and the near roll **21** finally adjusted with respect to the far roll **21** by suitable rotation of the crank **74**. In order to maintain the bearing block **72** in initially adjusted position, the bracket **70** is provided with a pair of set screws **76** adapted to bear against the block **72** in the ways of the bracket **70**.

As is shown in FIGURE 4, the other end of the near shaft **50** is rotatably supported in the side plate **47** in somewhat the same manner as the corresponding end of the other shaft **50**. However, a like screw adjustment means is provided for the bearing housing **63** to shift the housing relative to a clamping block **63***a*, which is adapted for this purpose.

Each printing screen belt assembly **22** is of a disposable nature. The drive belts **34**, however, are permanent portions of the printing apparatus and each apparatus is provided with a number of sets of drive belts, the sets having lengths corresponding to the conventional lengths of repeats.

In mounting an assembly **22** in the printing apparatus a pair of drive belts **34** of appropriate length are selected and one first mounted in the adjustable yoke **40**. The other drive belt **34** is attached to one side of the assembly **22** and the assembled parts then sleeved over the rolls **21** for connection of the other side of the assembly to the first-mentioned drive belt **34**.

In order to permit connection and disconnection of the drive belts **34** and assembly **22** in this fashion the drive belts are constructed with the fastening means best seen in FIGURES 5 and 6. Each drive band is made of a thin strip of sheet metal, preferably spring steel, and mounts a plurality of inwardly extending tabs **77**. Each of these tabs is provided with a pair of downwardly protruding studs **78** adapted for registration with one of a plurality of pairs of apertures **79** formed in the side bands **32** of the assembly **22**. As is shown in FIGURE 5, each of the studs **78** at its tip is formed with a lip **80** and the side-band apertures **79** are slightly elongated in a direction transversely of the side band **32**. To interconnect the side band **32** to the drive band **34** the several pairs of studs **78** are aligned with the several pairs of apertures **79** and pass therethrough, after which the stud lips **80** can be moved into engagement with the inside of the side band **32**. As is apparent, so long as the pair of drive bands **34** pull oppositely on the pair of side bands **32** the studs **78** will remain securely locked into the apertures **79**.

In the apparatus of FIGURE 1 the near roll **21** is driven from a source of power through the medium of a gear head **82** formed on the end of the shaft **50** outwardly of the side plate **47**, while the far roll **21** acts as an idler. The gear head **81** is run synchronously through a positive drive mechanism or the like with other printing heads for multi-color operation, and the feed-belt rolls **26** are also synchronously driven with the gear head **81**. Both the feed belt **25** and the drive belts **34** are provided with a gear means for translating rotation of the rolls into movement of the feed belt **25** and belt assembly **22**,

respectively, which means will be described only with reference to the drive-band mechanism.

Each of the rolls **21** has gear teeth **83** formed at the opposite ends thereof which have an addendum diameter which is the same as the diameter of the roll. Each of the drive bands **34** on its inward face is provided with a plurality of complementary gear teeth or cleats **84** that are adapted to mesh with the gear teeth **83**. These cleats may take the form of separate members of metal fused to the drive band **34** or they may be formed from an elastomeric or plastic material adhesively fastened to the band.

Both of the yoke assemblies **40** and **41** include a pair of horizontally extending, opposed, generally channel-shaped members **86** and a pair of arcuately configured, opposed, channel-shaped members **87**. The straight channels **86** of the yoke **40** are rigidly interconnected at their opposite ends by a pair of straps **88**, as portions of a rigid rectangular framework which is adjustable laterally of the framework **20**. The straight channels **86** of the other yoke **41**, which is laterally immovable, are interconnected as opposite sides of a parallelogram linkage by a pair of link bars **89**, each bar being pivotally connected at its opposite ends to opposite ones of the channels **86**.

The two yokes **40** and **41** are interconnected at their opposite ends by a pair of parallel shafts **91**, each of which is fastened at one end in one of the end plates **46** and with its other end fastened in the side plate **47**. Adjacent one end, each shaft is mounted through the center of one of the link bars **89**. Adjacent its other end, each shaft along the portion thereof extending through a strap **88** carries a threaded collar **92**, which in turn mounts a take-up nut **93**, inwardly of the strap **88**. A lock nut (not shown) is mounted on the collar **92** on the opposite side of the strap **88**, in order to maintain the strap **88** and, accordingly, the corresponding end of the yoke **40** in an adjusted position spaced apart from the laterally immovable yoke **41**. A lock nut **94** threadedly engages each shaft **91** just inwardly of each link bar **89** to releasably hold the yoke **41** in closed condition.

Referring now to FIGURE 5, it will be noted that each straight channel **86** has an inner wall **95** and an outer wall **96** that is of lesser depth than the inner wall. Each of the roller assemblies **42** of the drive bands **34** is adapted to move within the channels **86** and to impose a lateral tensioning force on the band assembly **22** in accordance with the spacing between the yokes **40** and **41**. The arcuate channels **87** have a cross-sectional configuration like that of the straight channels **86** and are mounted at opposite ends of the yokes **40** and **41** for adjustment longitudinally of the framework **20** into positions corresponding to the size of the particular band **22** being utilized in the apparatus.

Each roller assembly **42** includes a bolt **100** extending outwardly from a drive band **34**. On the opposite side of the drive band from the bolt head the bolt coaxially mounts a collar **101** surmounted by a roller **102**, which in turn is successively surmounted by a tubular spacer **103** and a smaller roller **104**, the entire assembly being held together by a nut **105**. It will be observed that the large roller **102** is adapted to bear only against the inner wall **95** while the small roller **104** is adapted to bear only on the outer wall **96**. These rollers may incude ball-bearing means in order to reduce drag and friction.

I have found that this arrangement is extremely well adapted to ensure a uniform lateral tension on the belt assembly **22** throughout its length. This is ensured first of all because of the use of the thin metal side bands **32** and at least one end band **33** which serve to maintain the originally pre-stressed condition of the screen **31**. When the belt assembly **22** is in movement over the rolls **21**, the yokes **40** and **41** and roller assemblies **42** prevent any

capsizing, buckling or twisting tendencies of the side bands **32**, and additionally ensure the maintenance of proper additional lateral tension on the screen **31**. It will particularly be noted that the rollers **102** and **104** of each roller assembly are adapted to provide a couple or, in effect, a lever arm fulcrumed about the contact of the large roller **102** with the inner wall **95**. This arrangement ensures that the bolt **100** will at all times throughout its travel be disposed normally to that portion of the drive band **34** supporting the bolt. The drive band **34**, being clamped between the collar **101** and the head of the bolt, is accordingly held against any distortion.

The arrangement just described is also of importance in preventing any localized tension stresses from being imposed on the material of the screen **31**. The screen **31** along every edge has each strand thereof fastened to the side bands **32** or an end band **33**. While localized lateral tensioning stresses are imposed on the drive bands **34** and on the side bands **32** at the aperture **79**, these tensioning stresses are uniformly distributed through the body of the side bands **32** so that each strand of the screen **31** is subjected to the same stress. As a result, no distortion of the stencil pattern on the screen **31** can occur even after long periods of use of the assembly **22**, so that a long service life and even repeated uses of the assembly **22** are possible.

For adjustment of the arcuate channels **87** a pair of tabs **107** are affixed to each of the opposite ends thereof in positions adapted to slidably support the channel along the opposite walls of the pair of straight channels **86** of each yoke. Each arcuate channel **87** is secured in adjusted position by a fastening means on a flap **108**. On the open side of the framework **20** a pair of flaps **108** are each hingedly secured to one of the end plates **46**. Although not shown, it will be understood that similar flaps **108** are similarly attached to the side plate **47**. Each arcuate channel **87** is provided with an outwardly extending stud bolt **109** adapted to protrude through a slot **110** extending longitudinally of each flap **108**. After being moved to adjusted position each channel **87** is held in place by a nut **111** on the stud **109** which is run up against the flap **108**.

FIGURE 9 illustrates an alternative form of construction for the printing screen belt assembly and the supporting rolls therefor. In this arrangement a belt assembly **22***a* is provided that consists of a screen **31**, at least one end band **33**, and a pair of side bands **32***a*. These parts are assembled in the same manner as the corresponding parts of the previously described belt assembly **22**. The belt assembly **22***a* is supported on rolls **21***a* which, in lieu of the gear teeth **83**, in this instance are provided at each end with radially outwardly protruding sprocket teeth **115**, adapted for engagement with a plurality of sprocket holes **116** formed in each of the side bands **32***a*.

The alternative arrangement just described is utilized in a printing apparatus substantially similar to that described previously. In this embodiment of the invention the longitudinal tensioning of the assembly **22***a* is accomplished, as before, by the spacing of the pair of rolls **21***a*. The side bands **32***a* are supported throughout their widths on the rolls **21***a*. Thus, when the belt assembly **22***a* is suitably tensioned in the longitudinal dimension the side bands **32***a* are supported against flexure and are adapted to maintain the laterally pre-stressed condition of the screen **31**.

Another alternative embodiment of the invention is shown in FIGURE 10. This arrangement has a belt assembly **22***b* consisting of a screen **31**, at least one end band **33** (not shown), and a pair of side bands **32***b*, the assembly **22***b* being made in the manner previously described. The assembly **22***b* is supported on a pair of perfectly smooth rolls **21***b*.

The printing apparatus includes a yoke along both sides of the assembly **22***b* comprising an outer plate **120** and an inner plate **121** disposed (by means not shown) in the same plane with the outer plate **120**. The outer plate **120** is formed with a longitudinally extending central opening whose edge is congruent to the path or locus of the pitch line of the travel of the side bands **32***b* and the inner plate **121** is adapted to fit within this opening, the two plates thus defining a continuous slot **122** complementary to the path of the endless-belt assembly **22***b* and adapted to receive a side band **32***b* therethrough.

A plurality of roller assemblies **42***b* are mounted on each side band **32***b* just outwardly of the plates **120** and **121**. Each roller assembly comprises a bolt **124** extending through a bore formed in the side band **32***b* and coaxially mounting on opposite sides of the side band a pair of spacers **125** and a pair of rollers **126**. A nut **127** is threadedly engaged with one end of the bolt **124** to hold the assembly together. The pair of rollers **126** are adapted to bear against the outer surfaces of the plates **120** and **121** and at least one set of plates is adapted to be laterally adjusted for imparting the desired lateral tension on the screen **31**.

For driving the assembly **22***b* a continuous roller chain in driven engagement with a driving sprocket (not shown) is mounted for travel along the pitch line of the assembly **22***b* and at least one link thereof is provided with a pin **129** that is drivingly engaged to a connector **130** which in turn is drivingly fastened to one edge of one of the bands **32***b*.

It will be appreciated that the alternative arrangements just described can be utilized in the apparatus of FIGURE 2 in lieu of the presently preferred embodiment. In any event, the web **27** is temporarily secured to the feed belt **25** in a conventional manner, as by a suitable adhesive or tape, to be driven through the apparatus. The feed belt may carry the web **27** under several synchronized printing heads and it is preferred that at each printing head the feed rolls be adapted to define a pair of flights whose planes are angularly related. Thus, as indicated in FIGURE 2, an approach flight **25***a* carries the web **27** into linear contact with the screen assembly **22** over a longitudinal trace of the central feed roll **26**. The squeegee **28** rides on the screen **31** over this longitudinal trace to force ink or the like through the screen onto the web **27** during such linear contact. The printed web is then carried on a receding flight **25***r* out of contact with the screen, immediately after printing to avoid any possibility of smudging, and clear definition of the printed pattern is maintained.

While I have shown and described several embodiments of my invention, I wish it to be understood that I do not means to be confined to the precise details of construction herein set forth by way of illustration. It is apparent that many changes and variations may be made, by those skilled in the art, without departing from the spirit of the invention or exceeding the scope of the appended claims.

I claim:

1. In a screen printing apparatus the combination comprising: a plurality of rolls; a screen maintained in endless configuration by at least one lateral band interconnecting opposite ends of said screen and having a pair of continuous side bands continuously fastened along the continuous opposite edges of said endless screen, said screen and side bands being trained around said rolls; a framework for said apparatus mounting a pair of yokes along opposite sides of said screen; a pair of continuous drive bands trained around opposite ends of said rolls and drivably engaged by said rolls, each of which is detachable and drivingly connected to one of said side bands as a coplanar extension of said side band; and a plurality of rollers carried by each of said drive bands adapted to be guided by said yokes for laterally stressing said side bands in the plane of said side bands, said rollers and pair of yokes being adapted to constrain said drive bands into substantially coplanar relationship with said screen and said yokes having a constant lateral spacing adapted to laterally tension said drive bands, side bands and screen.

2. An apparatus as set forth in claim 1 in which each of said yokes includes a pair of confronting walls and each of said drive bands carries a plurality of pairs of said rollers on a common shaft that is disposed normally to the plane of that portion of the drive band to which said shaft is attached, each roller of said pair bearing against one only of said confronting walls and said pair of rollers being adapted to provide a couple resisting lateral tension stresses in said screen.

3. An apparatus as set forth in claim 1 in which the lateral spacing between said yokes is adjustable to a dimension less than that required to maintain lateral tension on said screen, and said drive bands and side bands have a fastening means adapted for separation of said bands upon slackening of said lateral tension.

4. An apparatus as set forth in claim 1 in which said framework is open on one side to permit sleeving said screen over said rolls through said open side, said rolls at their ends in said open side of said framework having detachable bearings normally obstructing said open side that are adapted for movement out of said open side upon being detached from said rolls.

5. An apparatus as set forth in claim 1 in which said framework is open on one side to permit sleeving said screen over said rolls through said open side, said rolls at their ends in said open side of said framework having detachable bearings normally obstructing said open side that are adapted for movement out of said open side upon being detached from said rolls, the one of said yokes adjacent the open side of said framework being expandable to release said rollers for removal of the corresponding drive band along with said screen.

6. In a screen printing apparatus the combination comprising: a plurality of rolls; a screen maintained in endless configuration by at least one lateral band interconnecting opposite ends of said screen and having a pair of continuous side bands continuously fastened along the continuous opposite edges of said endless screen, said screen and side bands being trained around said rolls; means to vary the spacing between said rolls to longitudinally tension said screen; a framework for said apparatus including a pair of yokes on opposite sides of said screen each of which continuously parallels the flight of said screen around said rolls; a pair of continuous drive bands drivably trained around opposite ends of said rolls; a plurality of fastener means interconnecting each of said drive bands to one of said side bands, said fasteners being adapted for disconnection of said side bands and drive bands upon opposite inward movement of said drive bands and adapted to laterally tension said side bands and screen upon opposite outward movement of said drive bands; a plurality of rollers carried on each of said drive bands that are guidedly engaged by said yokes, said rollers and yokes being cooperatively adapted to maintain a constant lateral spacing of said drive bands and side bands; means on said framework operatively associated with both said yokes to decrease and increase the lateral spacing between said yokes to selectively disconnect said fastener means or to laterally tension said screen, respectively; and a plurality of bearings for ends of said rolls in an open side of said framework, said open side being adapted to permit sleeving said screen around said rolls when said bearings are moved out of said open side, said bearings detachably supporting said ends of said rolls and being movably mounted on said framework for movement out of said open side, the one of said yokes adjacent said open side being expandable to release the rollers of the corresponding drive band to permit passage of said drive band through said open side.

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