United States Patent [19]

Trier et al.

[11] **3,734,017**

[45] **May 22, 1973**

[54] **MAGNETIC SUPPORT FOR FLEXIBLE PRINTING PLATE**

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[22] Filed: **May 20, 1971**

[21] Appl. No.: **145,433**

[52] **U.S. Cl.** .....**101/378**, 101/382 MV, 248/206 A

[51] **Int. Cl.** **B41f 27/02**

[58] **Field of Search** .....101/415.1, 378, 382 MV; 248/206 A; 40/142 A

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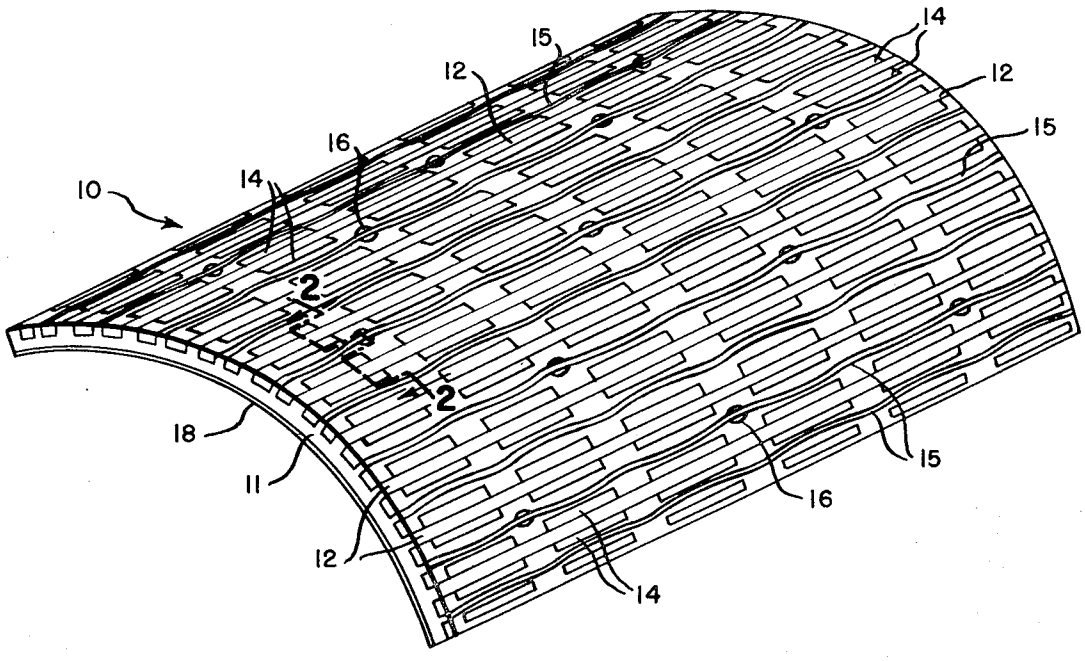
Attorney—Pennie, Edmonds, Morton, Taylor & Adams

[57] **ABSTRACT**

A curved support adapted to be mounted on a plate cylinder of a rotary printing machine for supporting thereon a flexible printing plate having a magnetizable metallic backing layer. The support has a metallic liner with magnetic elements thereon for holding a printing plate thereto. Circumferentially spaced metal bars extend over the length of the support and the spaces between the bars and magnetic elements are filled with a combination of a plastic resin and a hardener to envelope the liner, magnetic elements and the metal bars.

A method of making a support having a metallic liner therein utilized in holding a flexible printing plate to a printing cylinder involving the steps of affixing a plurality of first metal bars to the liner, positioning magnetic elements on the liner, positioning a plurality of second metal bars on the liner, and casting a plastic resin onto the liner to encase the magnetic elements and the metal bars.

9 Claims, 5 Drawing Figures



PATENTED MAY 22 1973

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SHEET 1 OF 2

FIG. 1

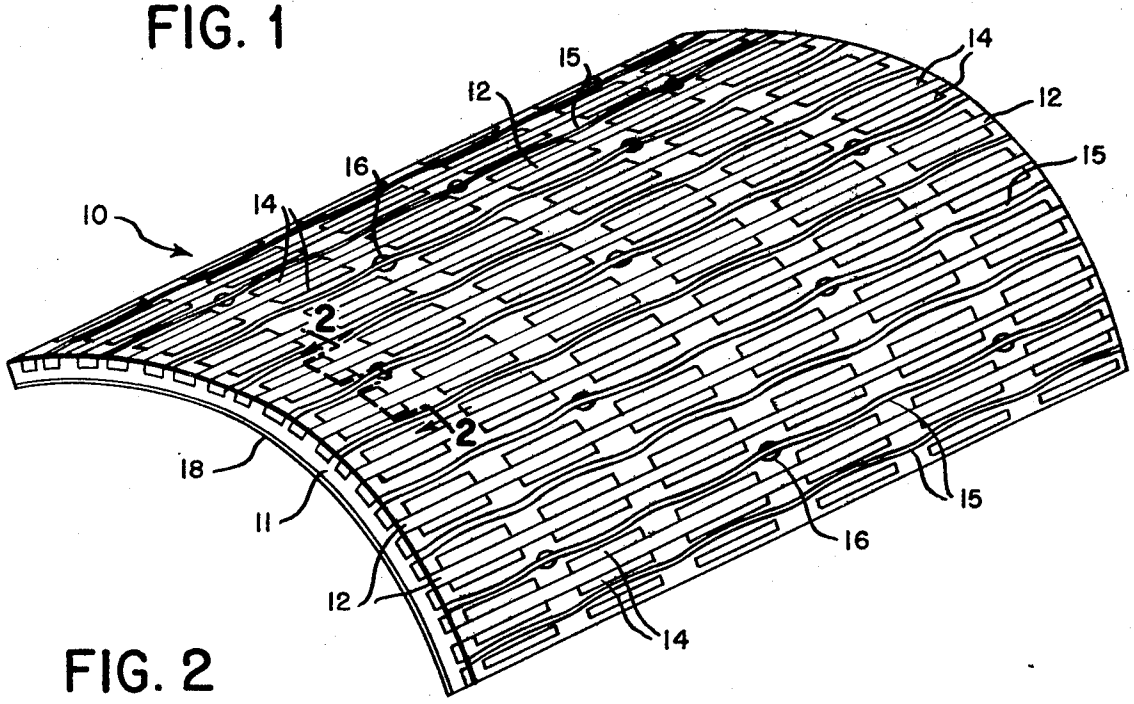


FIG. 2

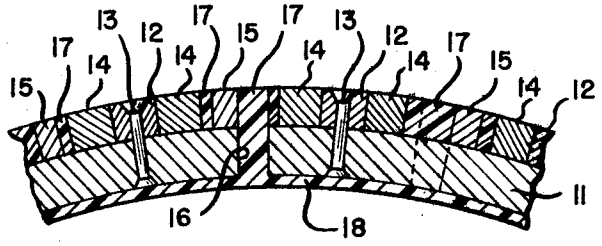


FIG. 4

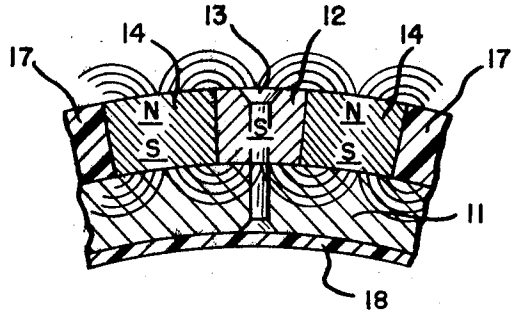
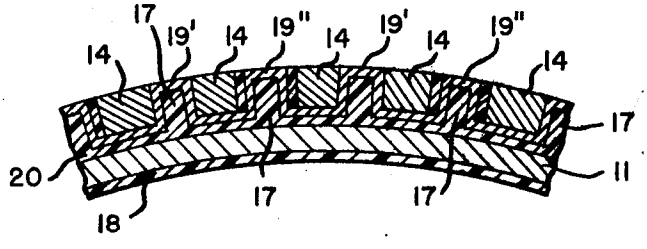
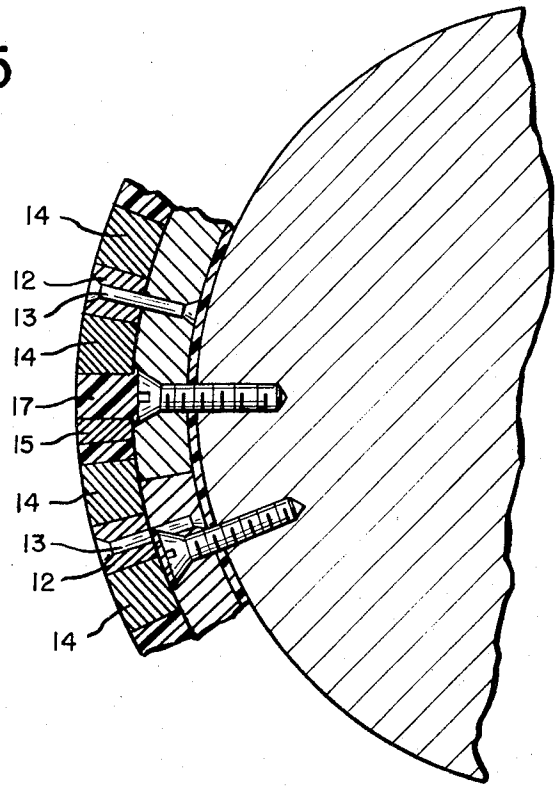


FIG. 3



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FIG. 5



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MAGNETIC SUPPORT FOR FLEXIBLE PRINTING PLATE

BACKGROUND OF THE INVENTION

The invention relates generally to rotary printing machines and more particularly to support structure whereby a thin flexible printing plate may be held by magnetic forces onto the plate cylinder of the printing machine and to a method for making the support structure.

Supporting means for holding and supporting thin flexible printing plates on plate cylinders of rotary printing machines are known, such as for example, supporting saddles adapted to be clamped onto the outer periphery of a plate cylinder, or mechanical clamping structure for attaching a flexible printing plate directly to the outer periphery of a plate cylinder. Structure is also known for supporting and holding a flexible printing plate on a saddle or onto a plate cylinder utilizing magnetic forces, such as for example that disclosed in copending application Ser. No. 29,148, filed Apr. 16, 1970, or as disclosed in U.S. Pat. No. 3,496,866. An object of the present invention is to provide a structure utilizing magnetic forces for holding a thin printing plate onto a saddle or cylinder whereby the magnetic attraction between the plate and the saddle or a plate and the printing cylinder is increased over that as disclosed in the prior art devices.

It is a further object of the invention to provide a saddle for supporting a flexible printing plate where the saddle has high dimensional stability and sufficient bending elasticity to be firmly mounted on the outer periphery of a plate cylinder.

It is a further object to provide a method for making a support structure for holding a flexible printing plate utilizing the steps of positioning magnetic elements and metal bars on a metallic liner and casting plastic onto the liner to encase the liner, magnetic elements and metal bars.

SUMMARY OF THE INVENTION

Broadly, the invention comprises a curved support member which may take the form of a saddle which may be detachably mounted onto the outer periphery of a plate cylinder or the form of a jacket affixed permanently to a plate cylinder. The support utilizes a curved inner metallic liner of a magnetizable material onto which are placed a plurality of permanent magnets extending longitudinally of the curved support, a plurality of longitudinally extending first metal bars affixed to the support and contacting the magnets and a plurality of circumferentially spaced second bars positioned on the liner and extending longitudinally over the length thereof between adjacent rows of the permanent magnets with a plastic resin compound filling the circumferential spaces between the second bars and the first bars and magnets.

Preferably the magnets are so positioned that the north poles are directed away from the liner while the south poles contact the liner and where the first and second bars contact the liner such that they carry a south polarity although of course the magnets may be positioned such that the north poles are directed towards the liner. In this manner, the magnetic lines of force extend in a radial direction such that they may act with a metallic backing on a flexible printing plate to assure that the plate will be magnetically attracted to the support.

The support is made by a method which comprises the steps of bending a metal liner to substantially the same degree of curvature as to the plate cylinder to which it is to be applied, fixing a plurality of first steel bars on the outer periphery of the lines and over the length thereof, placing a plurality of magnets adjacent the first steel bars and placing a plurality of second steel bars on the outer periphery of the liner which are spaced from the magnets. A plastic is then cast onto the liner to encase the magnets and bars.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the drawings in which three embodiments of the invention are illustrated:

FIG. 1 is an isometric view of a saddle constructed according to the invention adapted to be mounted on a plate cylinder and to support thereon a thin flexible wrap-around printing plate;

FIG. 2 is a section of a portion of FIG. 1 in enlarged scale taken along line 2—2;

FIG. 3 is a sectional view similar to FIG. 2 of a second embodiment;

FIG. 4 is an enlarged portion of a section of FIG. 2; and

FIG. 5 is a cross-sectional view of a portion of a support shown affixed to a plate cylinder.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings in greater detail, and in particular to FIG. 1, there is illustrated a saddle 10 which is curved to substantially the same degree as to the printing plate cylinder to which it may be mounted by any one of conventional known plate locking devices. Saddle 10 comprises an inner lining 11 comprising a magnetizable metallic material which is bent to a desired curvature, usually slightly less than that of the plate cylinder, in order to provide the necessary "snap" of the saddle when it is mounted onto the plate cylinder. A plurality of longitudinally extending first metal bars 12 of a ferrous material and having a substantially square cross section are affixed to the upper surface of the lining 11 by means of rivets 13. A plurality of permanent magnets 14 are positioned on the liner on either side of the bars 12 and are spaced apart in the axial direction at intervals as shown in FIG. 1. A plurality of second longitudinally extending metal bars 15 are placed on the liner in the spaces between adjacent magnets 14 and so they do not contact the magnets. Preferably the bars 15 are bent in a sinuous shape in order to provide, as explained hereafter, greater holding area to a plastic. The liner in addition is provided with a plurality of perforations 16 which are spaced throughout the liner.

The support structure comprising the lining 11, bars 12 and 15 and magnets 14 is embedded in a hard polymer plastic 17 so that a thin non-magnetic coating 18 is included on the inner periphery of the liner 11. The coating 18 is locked to the liner by the plastic extending through the perforations 16 while the plastic material serves to anchor the magnets 14 and bars 15 onto the liner. The sinuous shape of the bar 15 provides a greater contact area with the plastic than if the bar were straight and further provides additional anchor-

age against having the bar displaced from the liner in an axial direction.

Referring to FIG. 3, there is illustrated a further embodiment of the support structure wherein the bars 12 and 15 are replaced with a relatively thin structural element 19 which is formed from a corrugated steel sheet. As shown, magnets 14 are located on both sides of alternate corrugations 19' whereas steel bars 15 are replaced by corrugations 19'' between adjacent magnets. As in the embodiment of FIG. 2, the entire structure is embedded in a hard plastic 17 which provides in this instance a magnetically insulating layer 20 between the liner 11 and the corrugated sheet element 19 with the result that the lines of magnetic forces formed by the magnets 14 extend only through element 19 and are not dissipated through the lining 11 and the plate cylinder (not shown) on which the saddle is to be clamped.

In some instances where separate saddles are not required, it may be desirable to mount the support directly to a plate cylinder such that the support in effect becomes a part of the plate cylinder. This construction is shown in FIG. 5 wherein the modified cylinder 23 has metal jackets 21 attached to the cylinder by means of non-magnetic screws 22. The jackets 21, which correspond generally to the liner 11 of FIG. 2, has plastic cast around the parts to encase the liner, magnets and bars in a manner similar to that shown in FIG. 2 and so as to affix the magnets 14 and bars 15 to the jackets.

Reference is made to FIG. 4 which illustrates the positioning of the magnets and the lines of force exerted thereby. It has been found that the preferred positioning of the magnets is such that the north poles of the magnets are positioned away from the liner while the south poles contact the liner. When the magnets are so positioned, the liner 11 will take on a south polarity and because the bars 12 and 15 contact the liner, they will also take on a south polarity. This results in magnetic lines of force which extend generally radially with respect to the plate cylinder and to the plate, not shown, which is to be mounted to the support. This arrangement of the magnets provides a maximum of magnetic holding force to hold a printing plate in its proper position on the saddle so as to insure proper register of the plate and to minimize any slippage of the plate circumferentially of the saddle during a printing operation because of any pulling force exerted by inking rollers contacting the plate. This particular arrangement of the magnets and bars in addition provides a large area of the saddle, on the order of 75 – 85 percent, available for magnetic attraction. If on the other hand a small area of the saddle were used for providing the magnetic attraction and the strength of the magnets were increased to compensate for the smaller area, there is the danger the smaller area might become locally saturated with the magnetic lines of force thus decreasing the holding force of the plate onto the saddle.

An example of a plastic resin used is a mixture of:

Reichhold Resin ED1422 – 195 g
Reichhold Resin ED1423 – 200 g
Reichhold Resin ED1444 – 108 g
Reichhold Hardener ED1421 – 348 g

-- with a Reichhold catalyst (3 percent lead solution) — 1.5 ccm, which results in a reaction of the compound in 5 min. This compound does not soften at 170°, cures rapidly, is not brittle and has a tensile strength of approximately 6,000 psi which is desirable for minimizing any distortion of the saddle.

The invention also comprises a method of making the support as described above. The method comprises the steps of bending a metal liner or jacket to substantially the same degree of curvature as to the plate cylinder to which the support is to be applied. A plurality of first bars which extend over the length of the support are spaced circumferentially thereon and affixed thereto. A plurality of magnets are then placed on the liner or jacket adjacent the bars which have been previously fixed thereon and such that the south pole of each of the magnets contacts the liner or jacket. A plurality of second bars are then placed on the liner or jacket so as to extend over the length of the support and so that they are circumferentially spaced from the magnets. A plastic is then cast on the liner such that the plastic fills up the circumferential spaces between the bars and magnets to lock the same to the liner or jacket.

We claim:

1. A curved support for mounting and supporting a flexible wrap-around printing plate having a ferrous backing layer onto the outer periphery of a cylinder of a printing machine; said support comprising a curved inner metallic liner of a magnetizable soft ferrous material, a plurality of evenly spaced first bars of a ferrous material fixed on the outer periphery of said liner and extending longitudinally over the length thereof, a plurality of permanent magnets positioned on the outer periphery of said liner in longitudinally extending rows along each circumferential side of each said first bar, a plurality of second evenly spaced bars of a ferrous material positioned on the outer periphery of said liner and extending longitudinally over the length thereof between adjacent rows of said permanent magnets, and a plastic resin compound material filling the circumferential spaces between said second bars and said first bars and magnets.

2. A support according to claim 1 having in addition a magnetically insulating layer of said compound bonded to the inner periphery of said liner.

3. A support according to claim 1 wherein each said magnet is disposed with its north pole directed away from said liner and with its south pole contacting said liner, and where said first and second bars contact said liner whereby they carry a south polarity.

4. A support according to claim 1 wherein said magnets and said first and second bars extend over 75 – 85 percent of the outer periphery of said curved support.

5. A support according to claim 1 wherein said plastic resin compound comprises two different resins of low temperature curable polyurethane, a hardener and a catalyst.

6. A support according to claim 1 wherein said second bars are spaced from said magnets and have a sinuous shape.

7. A support according to claim 1 wherein said liner has bores therein through which non-metallic fastening means may secure said liner to the outer periphery of a printing cylinder and having said plastic compound bonded to the under surface of said liner to form a magnetically insulating layer between said liner and said cylinder.

8. A curved saddle for supporting and mounting a flexible printing plate having a ferrous backing layer on to a cylinder of a printing machine, said saddle comprising an inner metallic liner, a magnatizable element in the form of a relatively thin steel sheet having a plurality of corrugations extending axially of said liner, a

plurality of permanent magnets disposed in an axially extending row in alternate ones of said corrugations, and a plastic resin compound bonded to the inner and outer surfaces of said liner to form a magnetically insulating layer and enveloping said magnets and said element.

9. A curved saddle for supporting and mounting a flexible printing plate having a ferrous backing layer on to a cylinder of a printing machine, said saddle comprising a curved inner metallic liner having an inner concave surface and an outer convex surface, a magnetizable element in the form of a curved relatively thin steel sheet having a plurality of corrugations extending axially of said liner, a plurality of permanent magnets disposed in an axially extending row in alternate ones of said corrugations where the cross sectional area of each said magnet is less than the cross sectional area of the corrugation in which said magnet is disposed, and a plastic resin compound filling the remainder of said corrugations containing said magnets and enveloping said liner, said element and said magnets.

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