March 27, 1962 H. W. FAEBER 3,026,842

SPREADING APPARATUS EMBODYING A BLADE CLAMPING INFLATABLE TUBE

Filed June 24, 1959 2 Sheets-Sheet 1

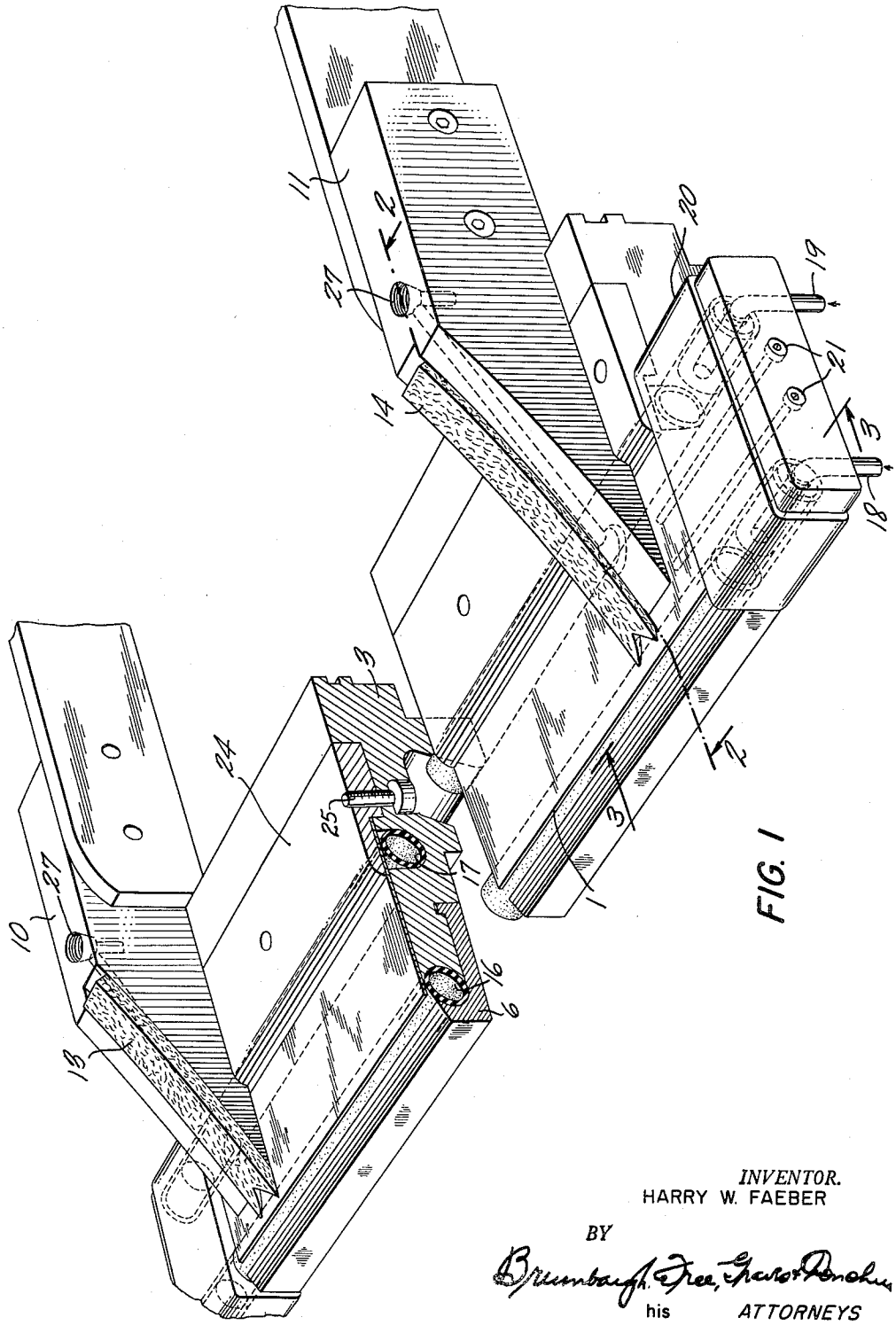


FIG. 1

INVENTOR.
HARRY W. FAEBER

BY

Brumbaugh, Free, Graves & Donohue

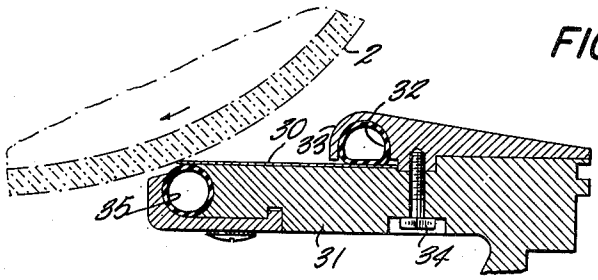
his ATTORNEYS

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FIG. 4



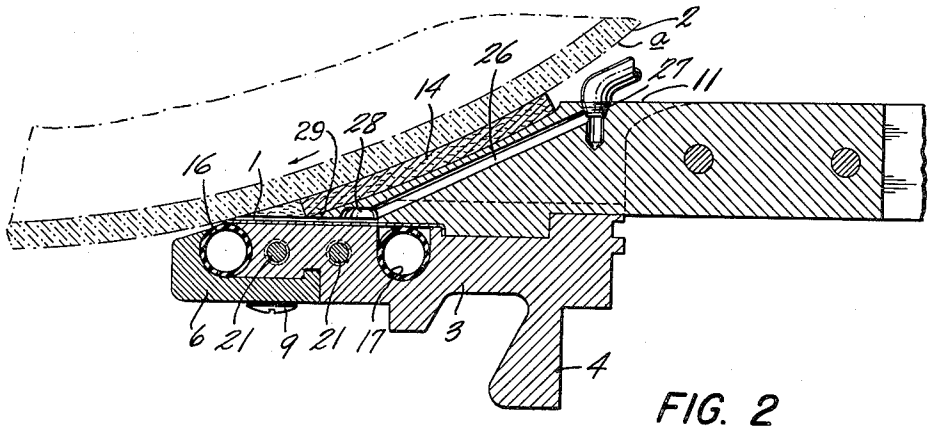


FIG. 2

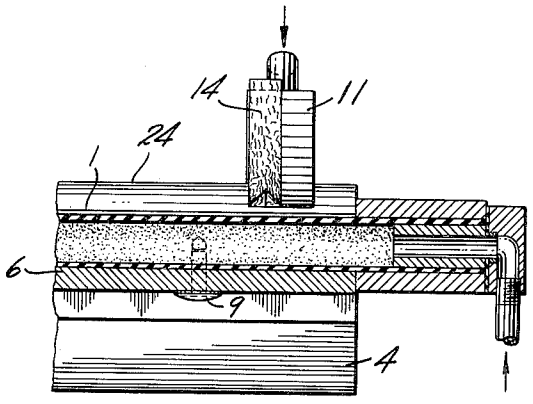


FIG. 3

INVENTOR.
HARRY W. FAEBER

BY

Brumbaugh, Graves, Donohue & Raymond

his ATTORNEYS

United States Patent Office 3,026,842 Patented Mar. 27, 1962

3,026,842
SPREADING APPARATUS EMBODYING A BLADE CLAMPING INFLATABLE TUBE

Harry W. Faeber, Larchmont, N.Y., assignor to Time, Incorporated, New York, N.Y., a corporation of New York

Filed June 24, 1959, Ser. No. 822,490
3 Claims. (Cl. 118—261)

This invention relates to a blade clamping apparatus for coating or printing machines, and in particular to an improved blade clamping apparatus in which the blade is locked in a blade holder by an inflatable tube which grips the blade uniformly along its length.

In coating and printing machines, the effective lockup of the wiping blade in the blade holder is important to the proper operation of the machine. Any displacement of the blade relative to the holder or relative to the surface of the rotatable cylinder with which the blade cooperates will change the character of the wiping action and may require stoppage of the machine and resetting of the blade. Heretofore, it has been the practice to lock the wiping blade in the blade holder against a blade supporting surface of the holder by a clamp, thereby providing face-to-face frictional contact between the blade and the supporting surface on the one hand, and between the blade and the clamp on the other hand, which prevents displacement of the blade relative to the holder. However, even though care is used in finishing the surfaces of the holder, the clamp and the blade, it is very difficult to obtain a truly uniform clamping action along the entire length of the blade with this conventional type of blade clamping apparatus.

The present invention provides an improved blade clamping apparatus in which a continuous inflatable tube is accommodated within a recess adjacent the blade along substantially the entire length of the blade remote from the wiping edge. This inflatable tube is in communication with a source of fluid under pressure and the fluid pressure inflates the tube against the surface of the blade to provide a substantially uniform, vibration-free clamping action along the entire length of the blade.

As a further feature of this blade clamping apparatus, provision is also made for another inflatable tube which acts against the surface of the blade across substantially its entire length to deflect the free or wiping edge of the blade against the rotatable cylinder to apply a controlled pressure engagement between the blade and the cylinder.

For a complete understanding of the present invention, reference may be made to the detailed description which follows, and to the accompanying drawings, in which:

FIG. 1 is a perspective view of the blade clamping apparatus of the present invention with a portion thereof broken away so as to afford a cross-sectional view;

FIG. 2 is a side cross-sectional view of the blade clamping apparatus in operative position with respect to a rotatable cylinder taken substantially along the line 2—2 of FIG. 1 looking in the direction of the arrows;

FIG. 3 is a fragmentary cross-sectional view taken along the line 3—3 of FIG. 1 looking in the direction of the arrows; and

FIG. 4 is a cross-sectional view showing an alternative embodiment of the blade clamping apparatus.

The clamping apparatus shown in FIGS. 1 to 3 of the drawings is applicable to a coating machine, for example, of the type described in the copending application of Harry W. Faeber, Serial No. 676,553, filed August 6, 1957. In this coating material is applied to and spread evenly on the surface of a web or sheet *a* by a coating blade 1 as the web or sheet passes between the blade and a rotatable cylinder 2 (see FIG. 2). The

coating blade 1 is supported by a blade holder assembly which includes a support member 3 having a depending leg 4 formed integrally therewith by means of which the blade holder assembly is locked to a pivotal frame (not shown) of the coating machine.

The support member 3 has affixed thereto along the edge nearest the cylinder 2 an interlocking piece 6. The piece 6 is locked to the support member 3 by screws 9. For all practical purposes, the interlocking piece 6 when thus assembled is an integral part of the blade holder assembly.

The blade holder assembly also includes a pair of spaced-apart side walls 10 and 11 which cooperate to guide the flow of the coating material to the coating blade 1 for application to a web or sheet in contact with the rotatable cylinder 2. The upper forward edges of the side walls 10 and 11 are concavely curved in substantially complementary fashion to the curvature of the cylinder 2. An effective seal is provided between the side walls and the cylinder by the felt pads 13 and 14, which are attached to the curved edges of the end walls 10 and 11, respectively.

The coating blade 1 is supported above the flat upper surface of the support member 3. When the blade is properly positioned upon the blade supporting surface, the coating edge thereof extends beyond the supporting surface so as to overlie a recess containing an inflatable tube 16. This recess is defined by opposed concave surfaces of the support member 3 and the interlocking piece 6. The rear or clamped portion of the coating blade, that is, the region adjacent the edge which is opposite the coating edge, overlies another recess in the upper surface of the blade holder 3 which accommodates an inflatable tube 17. The inflatable tubes 16 and 17 extend substantially the entire length of the blade holder assembly, beyond the ends of the coating blade.

The inflatable tubes are each closed at one end and communicate with a source of fluid under pressure at the opposite end. More specifically, the inflatable tubes 16 and 17 are connected to the conduits 18 and 19, respectively, through passages in a block 20 which is affixed by screws 21 to the end of the blade holder assembly. Although not shown in the drawings, separate provision is made for regulating the fluid pressure within each of the conduits 18 and 19.

A clamp 24, affixed by a series of screws 25 to the member 3 of the blade holder assembly, overlies the upper surface of the rear portion of the blade 1, frictionally locking the blade to the blade holder assembly. The clamp 24 is recessed within a groove to the blade holder assembly so that the upper surface of the clamp 24 forms a continuation of the surface of the blade holder assembly over which the coating material flows. The forward edge of the clamp 24 extends beyond the front wall of the recess which accommodates the inflatable tube 17 so that when the pressure within the inflatable tube 17 is increased the tube will tend to deform by flattening itself against the underside of the blade 1. This pressure urges the blade against the underside of the clamp 24. Since the tube 17 is in contact with the underside of the blade 1 throughout the entire length of the blade, it exerts a relatively uniform clamping action along the entire length of the blade.

Similarly, the pressure introduced into the inflatable tube 16 deflects the unclamped coating edge of the blade upwardly toward the rotatable cylinder 2 to apply a controlled pressure engagement of the coating blade against the surface to be coated.

The side walls 10 and 11 are affixed to and carried by opposite ends of the clamp 24. Accordingly, the extreme ends of the blade lie underneath the forward

ends of the side walls **10** and **11**, with the result that a slight clearance may result between the undersides of the side walls and the upper surface of the blade. To prevent seepage of the coating material through this clearance, fluid seals are established by introducing a fluid under pressure therein. Toward this end, each of the side walls **10** and **11** are provided with a passage **26** (see FIG. 2) having an inlet port **27** in the upper edge of each of the side walls and a discharge opening **28** at the lower end which communicates with the space **29** between the upper surface of the blade and the underside of the forward end of the respective side wall. The inlet port is connected to a fluid under pressure, and this fluid is supplied to the space **29** to keep the space free of coating material. In effect, the fluid pressure serves as a fluid barrier or end dam for the coating material. The fluid supplied to this space may be a relatively viscous liquid, such as a heavy grease, or it may be a gaseous phase fluid, such as air.

The coating blade **1** is preferably made of a highly resilient steel to permit the blade to be deflected readily under relatively small changes of pressure within the inflatable tube **16**. Neoprene is a suitable material for both the tubes **16** and **17**.

In operation, the blade is positioned on the supporting surface of the blade holder assembly with the edge to be located interposed beneath the clamp. The clamp is then locked in place by tightening the screws **25**. Thereafter fluid under pressure is introduced into the inflatable tube **17**, causing the tube to expand and deform, flattening itself against the underside of the blade. Thus, the blade is effectively gripped between the clamp **24** and the inflated tube **17** throughout its entire length. The inflation of the tube **16** provides the desired deflection of the unclamped coating edge of the blade, the pressure engagement of the blade with the web or sheet to be coated being determined by the pressure within the tube **16**.

With the blade thus locked in position, the fluid flows by gravity across the upper surface of the clamp **24** and the coating blade **1** and between the side walls **10** and **11** into the trough defined between the coating blade and the web or sheet in engagement with the rotatable cylinder **2**. The rotation of the cylinder and the consequent movement of the web or sheet carries the exposed surface of the web or sheet in contact with the coating material within this trough, and the thickness of the coating film which remains on the web or sheet is controlled by the pressure engagement of the coating blade therewith.

An alternative embodiment of the present invention is illustrated in FIG. 4. In this embodiment, the coating blade **30** is locked against the upper surface of a blade holder **31** by an inflatable tube **32** which is adjacent

the upper surface of the blade. The inflatable tube **32** is accommodated within a recess of a clamp **33** which is affixed by screws **34** to the blade holder. The inflation of the tube **32** deforms the tube, causing it to flatten against the upper surface of the blade **30** to produce a substantially uniform pressure across the entire length of the blade. The unclamped coating edge of the blade overlies a recess containing an inflatable tube **35** which, as the pressure is increased therein, increases the deflection of the blade **30** against the web or sheet *a* in contact with the surface of the rotatable cylinder **2**.

The invention has been shown in preferred forms only and by way of example, and obviously many modifications and variations may be made therein without departing from the spirit of the invention. The invention, therefore, is not to be limited to any specified form or embodiment except insofar as such limitations are expressly set forth in the appended claims.

I claim:

1. A spreading apparatus which co-operates with a rotatable cylinder comprising a holder having a blade supporting surface, a clamp element affixed to said holder to grip the blade therebetween, a blade carried between the holder and the clamp element, said blade having a spreading edge in pressure engagement with the rotatable cylinder, said holder and clamp element providing a recess adjacent one side of the blade and extending lengthwise of the blade and a backing surface adjacent the side of the blade opposite the recess, and an inflatable tube accommodated within the recess and in communication with a source of fluid under pressure, said tube extending substantially the entire length of said blade so that when inflated the tube flattens against one side of the blade to produce a uniform clamping action thereon.

2. A spreading apparatus as set forth in claim 1 including means defining a recess within the holder in proximity to the spreading edge of the blade, and an inflatable tube within the recess in proximity to the operative edge of the blade and extending substantially the entire length of the blade so that upon inflation the unclamped edge of the blade is deflected by an amount determined by the pressure within the tube.

3. A spreading apparatus as set forth in claim 1 including sidewalls carried by opposite ends of the clamp element, said sidewalls co-operating to guide the flow of fluent materials to the blade over the top of said clamp element and between said sidewalls.

References Cited in the file of this patent

UNITED STATES PATENTS

2,328,183	Barrett	Aug. 31, 1943
2,914,788	Smith et al.	Dec. 1, 1959