United States Patent [19]

Mitter

[11] **3,735,730**

[45] **May 29, 1973**

[54] **APPARATUS FOR APPLYING A FLOWABLE MEDIUM TO A CARRIER**

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[22] Filed: **Dec. 21, 1970**

[21] Appl. No.: **99,771**

[30] **Foreign Application Priority Data**

Dec. 22, 1969 Germany ..... P 19 64 182.8

[52] **U.S. Cl.** **118/205**, 118/213, 101/119, 101/120, 68/200

[51] **Int. Cl.** **B05c 1/00**, B41j 13/00, B41f 15/42

[58] **Field of Search** 118/213, 205; 101/116, 119, 120; 68/200

[56] **References Cited**

UNITED STATES PATENTS

3,638,459	2/1972	Zimmer	68/200
2,419,695	4/1947	Shuttleworth et al.	101/119
3,198,109	8/1965	Dwyer et al.	101/119 X
3,605,616	9/1971	Pannier	118/205
3,566,784	3/1971	Mitter	101/120
3,592,132	7/1971	Weber	101/119
2,511,511	6/1950	Murphy	101/120
1,675,442	7/1928	Zeitinger	101/120
2,056,273	10/1936	Holdsworth	118/213 X
2,424,949	7/1947	White	101/120 X

FOREIGN PATENTS OR APPLICATIONS

266,024	11/1968	Austria	101/120
467,160	2/1969	Switzerland	101/120

OTHER PUBLICATIONS

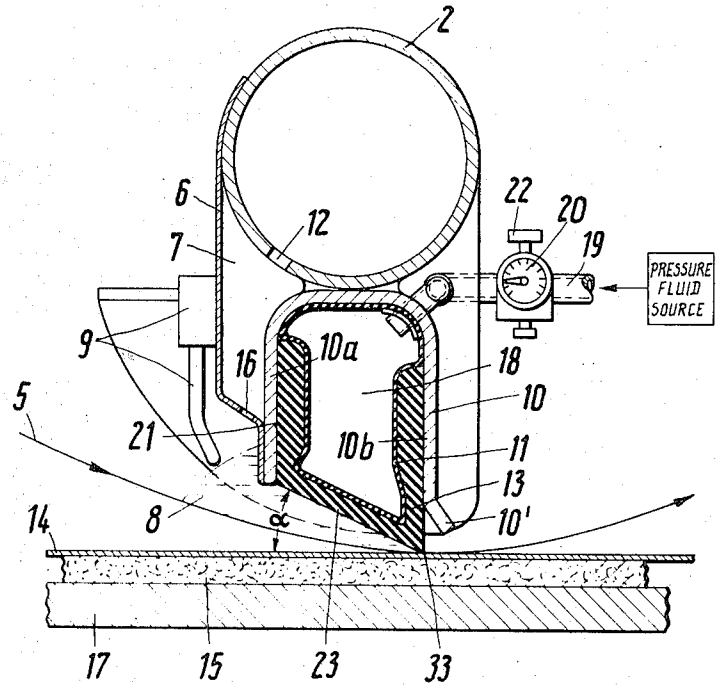
1,267,231 5/1968 German Application (Weber)

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[57] **ABSTRACT**

A flowable medium is to be supplied to an exposed surface of a carrier, for instance a web which is to be printed. A supply arrangement supplies the flowable medium to the vicinity of the exposed surface and an applicator arrangement is provided for applying it to the exposed surface. The applicator includes a hollow spreading element of elastically distendable material which engages either the exposed surface directly, or engages a portion of the applicator arrangement which is operatively associated with the exposed surface, and admitting means is provided for admitting requisite quantities of pressurized fluid to the interior of the hollow spreading element whereby to distend the latter to various extents and thus vary its engaging pressure.

20 Claims, 14 Drawing Figures



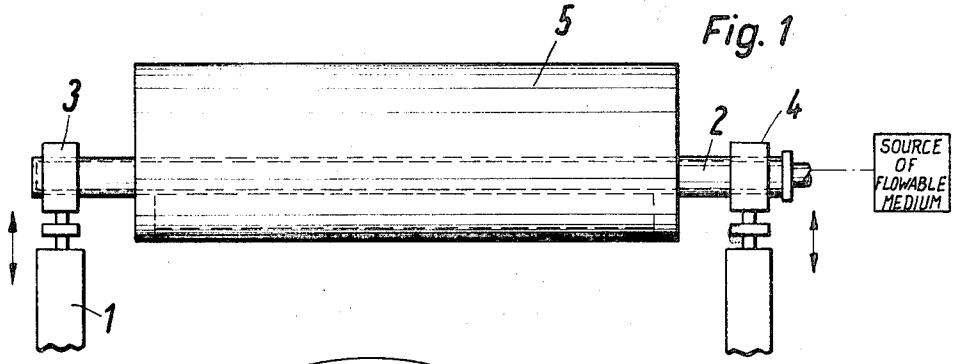


Fig. 1

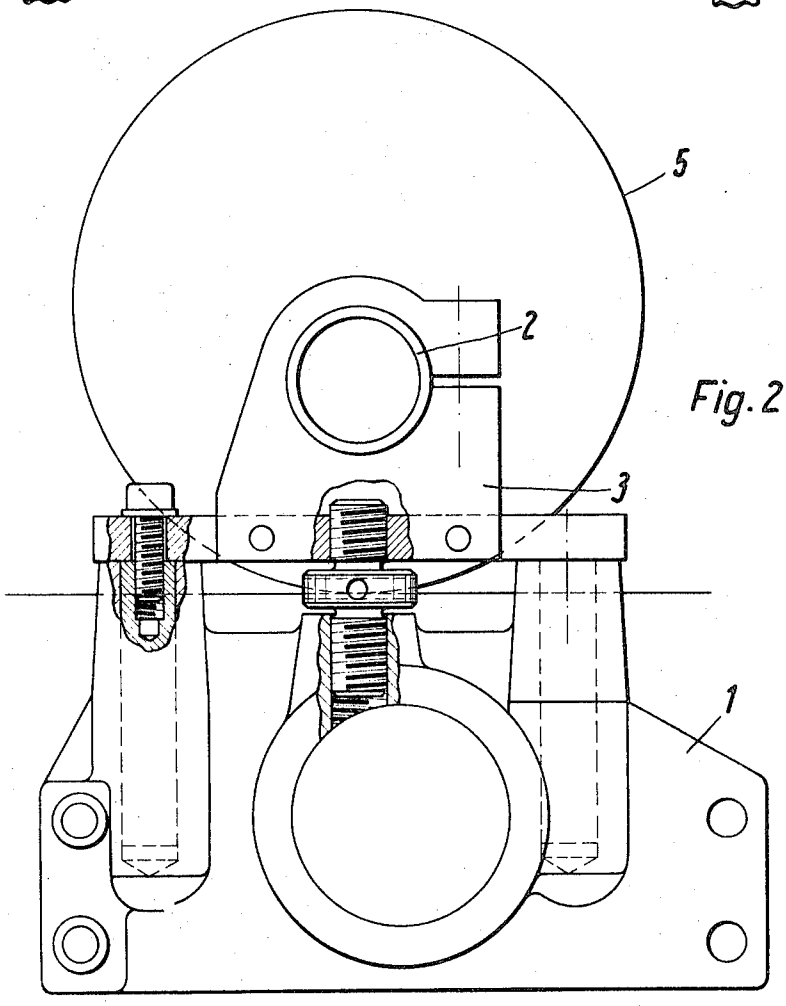
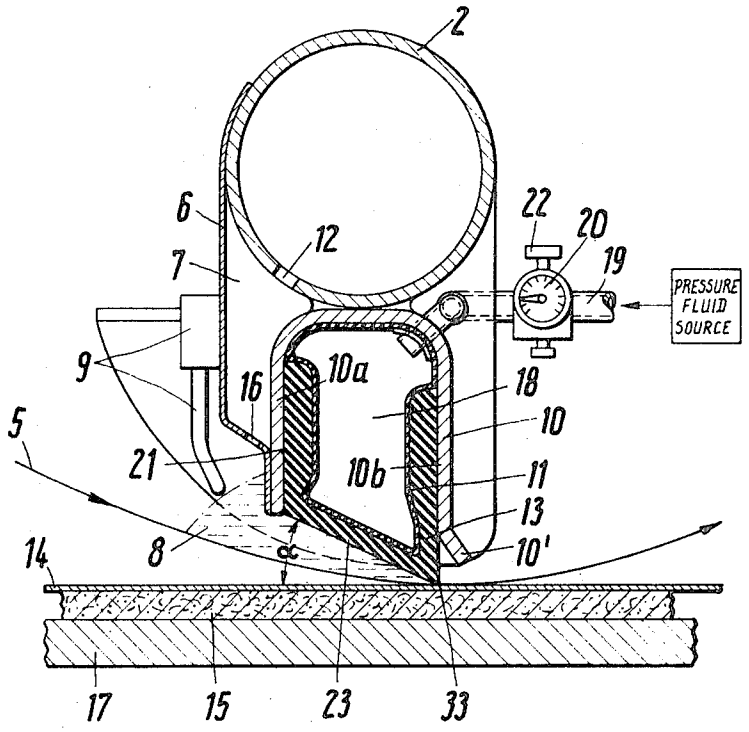


Fig. 2

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Fig. 3



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Fig. 4

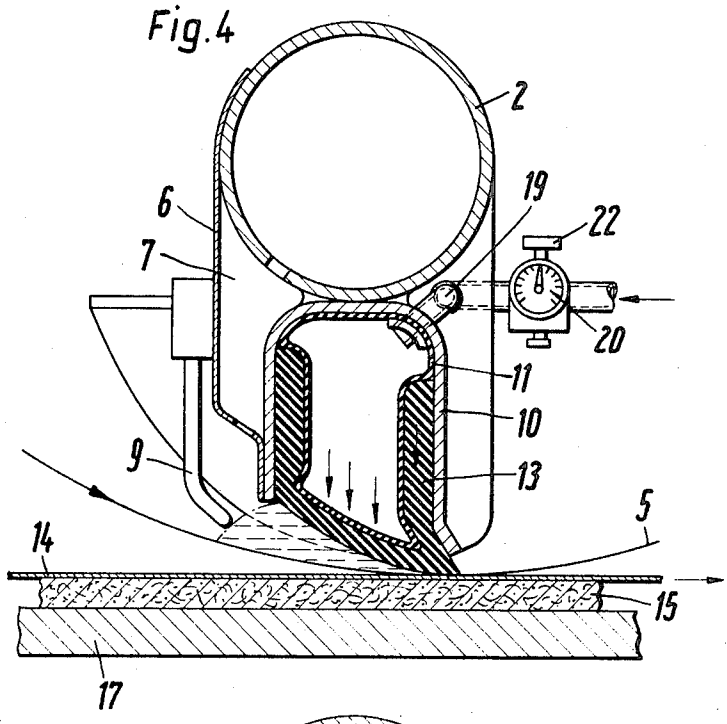


Fig. 5

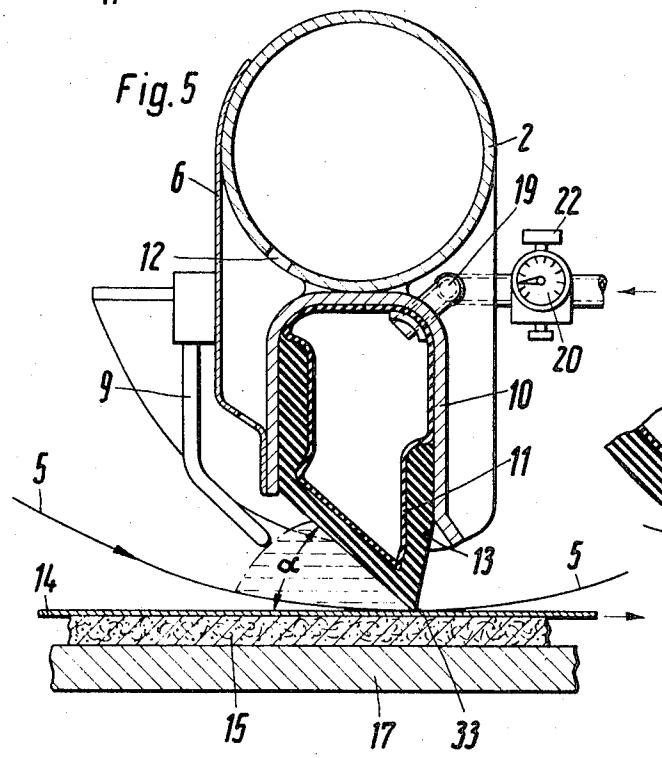


Fig. 6

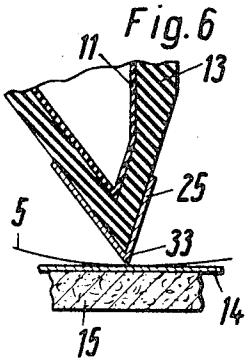
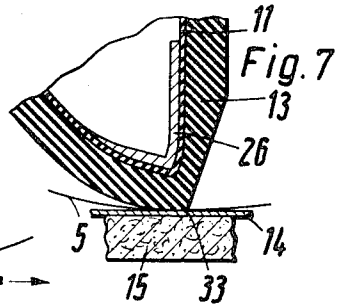


Fig. 7



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Fig. 8

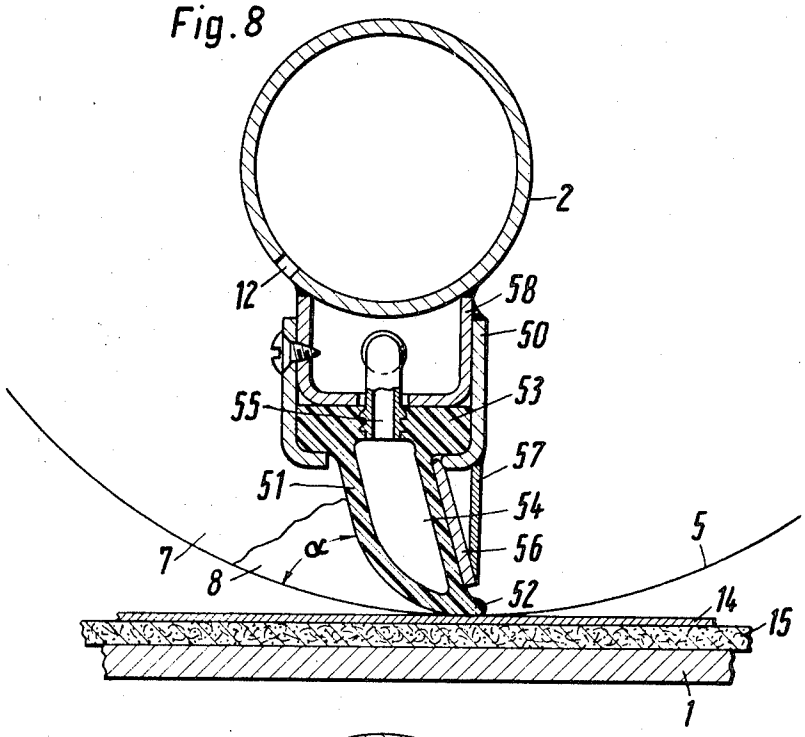
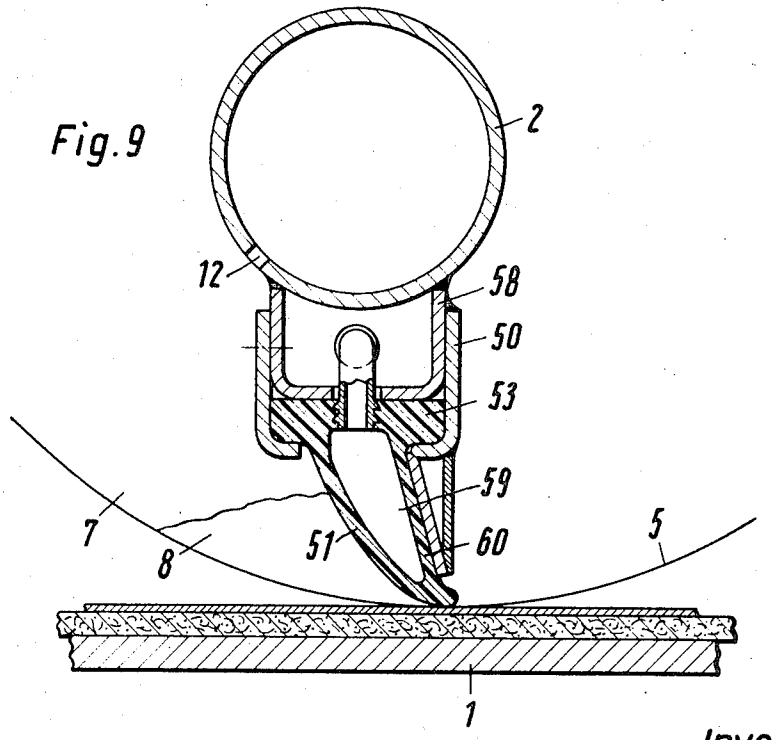


Fig. 9



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Fig. 10

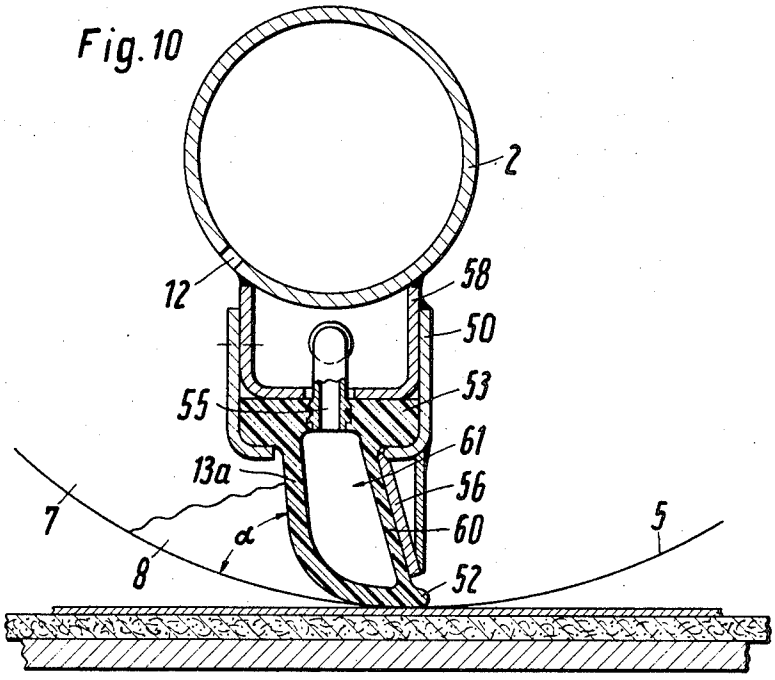
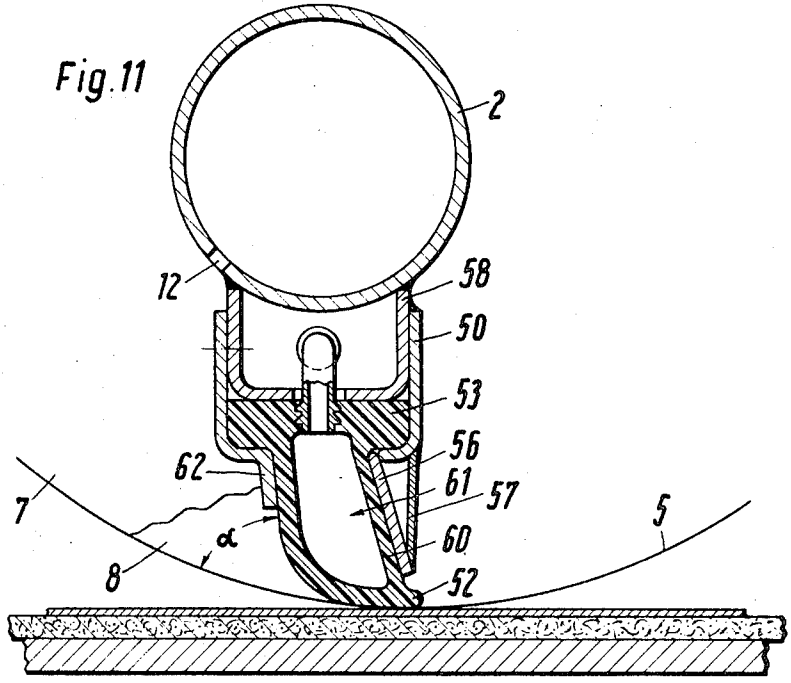


Fig. 11



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Fig. 12

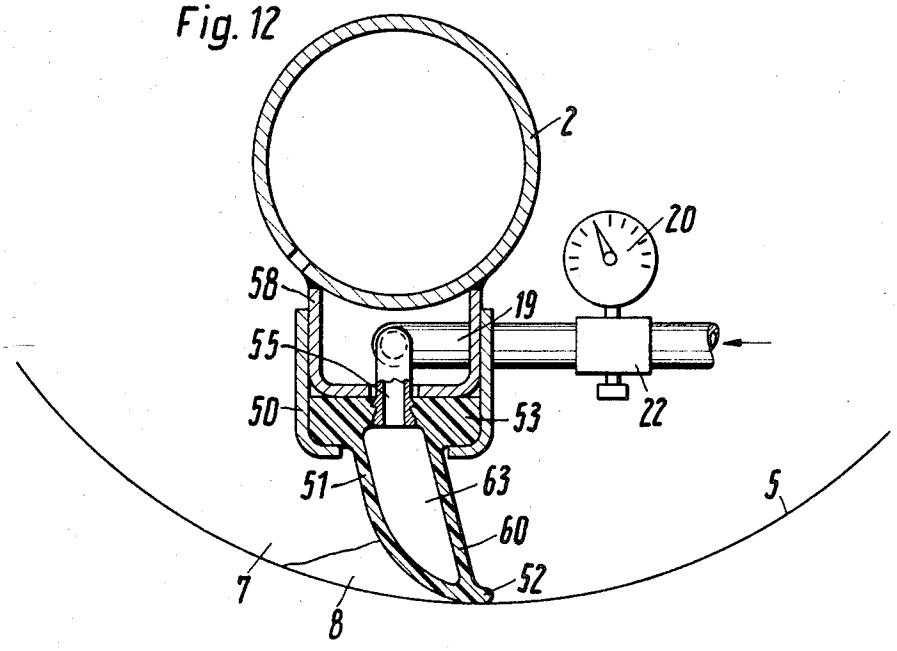


Fig. 13

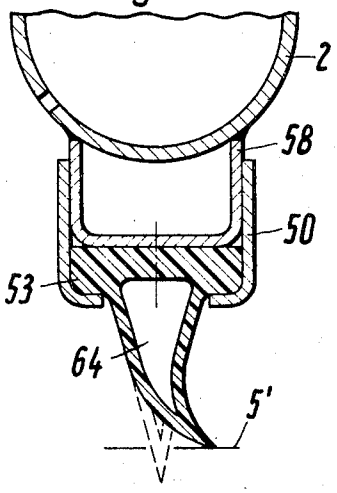
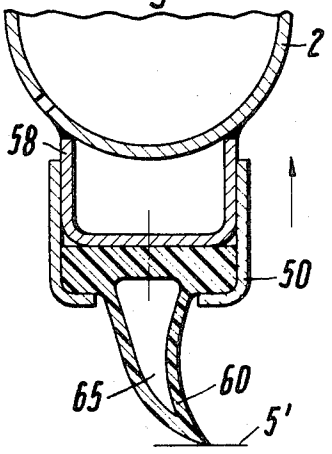


Fig. 14



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APPARATUS FOR APPLYING A FLOWABLE MEDIUM TO A CARRIER

BACKGROUND OF THE INVENTION

The present invention is generally concerned with an apparatus for applying a flowable medium to a carrier, and more particularly with an apparatus for applying liquids, pastes and similar media to an exposed surface of such a carrier.

Apparatus of this type finds a wide range of different applications and it is to be understood that the invention is applicable to apparatus suitable for this purpose, irrespective of the particular application to which the apparatus is put. However, purely by way of example it is pointed out that such apparatus may for instance be in the form of rotary printing machines, litho printing machines or the like, and that the flowable media to be applied may include printer's ink, ink or paint in general, adhesives or various coating materials.

From the printing art, for instance, it is known to provide rotary printing presses with rotating foil drums which cooperate with spreading elements serving to spread the supplied flowable medium onto an exposed surface of a carrier adjacent the drum. The spreading elements are rigid and have spreading edges which are usually formed by grinding. The spreading element is arranged with reference to the surface on which the flowable medium is to be spread, in a predetermined orientation, and the spreading edge is ground so as to be inclined at a specific angle to the surface when the spreading element is so oriented. For different types of flowable medium, and also for different densities and the like of the flowable medium, spreading elements with differently ground spreading edges are required, and also it is usually necessary that the spreading elements themselves have various different hardnesses.

The prior art presents a problem in that for instance in the application of printer's ink it is never clear from the beginning how strongly the ink is to be applied and therefore precisely which of various different spreading elements is to be employed. This becomes clear only after the first several yards of material have been printed, at which time a determination can be correctly made which particular spreading element to use. Of course, if by chance the proper spreading element has been employed to begin with, then there is no problem; however, if the spreading element is not suitable because it spreads too little or too much printer's ink, for instance, then it is necessary to stop the printing press, remove the spreading element in it and install a different suitable spreading element. This is not only disadvantageous in terms of time lost, but also in terms of material lost, it being evident that the initially printed material will be wasted and that further losses accrue for instance from the loss of printer's ink during the down-time of the machine.

The known spreading elements are possessed of additional advantages. Thus, they are secured at their opposite longitudinally spaced ends and pressure which is applied to them in order to vary the degree of pressure with which they engage the surface on which the flowable medium is to be spread, is applied at these ends. Evidently, and keeping in mind that the spreading elements extend across the width of the printing machine, that is the width of the material to be printed or otherwise provided with a flowable medium, it is clear that the broader the machine will be the longer will be the spreading element, and the more the spreading element will have a tendency to bend in its center region as a result of pressure applied to it at its opposite ends. This, of course, results in the uneven spreading of the flowable medium onto the exposed surface of a carrier, such as the material to be printed, in the center region and in the end regions of the spreading element. Increasing the pressure at the ends will not remedy this condition because the proportional difference of pressure in the center region and at the ends, that is pressure exerted by the spreading element upon the material on which the flowable medium is to be spread, will not vary as a result of such adjustments.

An attempt to overcome these problems is to be found in another concept of the art, utilizing so-called magnet rollers as the spreading element. These are rollers of magnetic or magnetizable material which contact the surface on which the flowable medium is to be spread, and which cooperate with magnetizable or magnetic counter-elements located beneath the material and which attract the roller with equal force over the entire length thereof against the exposed surface, whereby even spreading of the flowable medium is obtained. The density of the layer of flowable medium which is applied can also be regulated, by regulating the magnetic field with a resultant change in the pressure with which the roller is attracted to the exposed surface.

However, in this prior-art approach there are also inherent certain disadvantages. In particular, the quantity of flowable medium which is applied and spread is regulated by using rollers of different diameter. This necessitates that if before start-up of the machine a roller of improper diameter has been selected—a fact which will become evidently only after the first few yards of material have been printed or coated, it is again necessary to stop the machine, remove the roller and install a roller of different and more suitable diameter. Evidently, this will then bring with it the aforementioned disadvantages in terms of down-time and losses of material.

SUMMARY OF THE INVENTION

It is, accordingly, an object of the present invention to overcome the aforementioned disadvantages.

More particularly it is an object of the invention to provide an improved apparatus for applying a flowable medium to a carrier, an apparatus which is not possessed of the disadvantages outlined above.

A concomitant object of the invention is to provide such an apparatus which is provided with a spreading element which not only will apply the flowable medium evenly at all points, but whose pressure upon the exposed surface and whose density of application of the flowable medium can be varied continuously during the operation of a machine provided with it.

In pursuance of the above objects, and others which will become apparent hereafter, I provide in an apparatus for applying a flowable medium to a carrier, a combination which briefly stated comprises carrier means having an exposed surface, and a supply arrangement for supplying a flowable medium to the vicinity of this exposed surface. I further provide applying means mounted proximal to the carrier means with at least one of these means being mounted at least in part for travel with reference to the other. The applying means comprises an at least partially hollow spreading ele-

ment of elastically distendable material having a contact face proximal to the exposed surface for spreading the flowable medium on the latter. The applying means further comprises distending means which acts interiorly of the spreading element for the purpose of distending the material of the same to a selectable extent, whereby to change the orientation and proximity of the contact face with reference to the exposed surface.

By resorting to my invention, there is provided an apparatus of the character in question which is particularly suitable for use in modern high-speed, high-precision machinery, especially but not exclusively in rotary printing presses. My invention makes it possible to not only continuously vary the pressure with which the spreading element engages a surface with which it cooperates, but also to continuously vary its configuration and thereby the configuration of its contact face which contacts a cooperating surface and spreads the flowable medium thereon. In this manner the depth of penetration on on the one hand, and on the other hand the quantity of applied flowable medium can be continuously varied and an extremely fine regulation of the application of the flowable medium is assured. As pointed out before, this is particularly important in printing presses, including those which operate on the screen-printing principles, because the application in screen-printing presse depends on the one hand upon the type of spreading element employed, on the other hand upon the viscosity of the flowable medium (in this case printer's ink) which is utilized, and finally upon the rate of permeability of the screen itself. In the known apparatuses these three factors must be coordinated with one another prior to beginning of the printing operation and can be varied with reference to each other only within a very narrow range of possibilities. If one of the factors deviates substantially, the machine must be stopped and the necessary adjustments must be made as by exchanging one spreading element for another in the manner and for the reasons outlined earlier.

All of these problems are overcome with the present invention which permits adjustments not only continuously but also during the operation of the machine provided with the invention.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a somewhat diagrammatic fragmentary end-elevational view of an apparatus provided with one embodiment of the invention;

FIG. 2 is a somewhat diagrammatic side-elevational view, on an enlarged scale, of the apparatus shown in FIG. 1;

FIG. 3 is a fragmentary transverse sectional elevation through the apparatus of FIGS. 1 and 2 showing one condition of adjustment of the apparatus;

FIG. 4 is a view similar to FIG. 3 but showing a different condition of adjustment of the same apparatus;

FIG. 5 is a view similar to FIGS. 3 and 4 showing still a third condition of adjustment of the same apparatus;

FIG. 6 is a fragmentary detail view illustrating a further embodiment of the invention;

FIG. 7 is a view similar to FIG. 6 illustrating an additional embodiment of the invention;

FIG. 8 is a view similar to FIG. 3 illustrating another embodiment of the invention;

FIG. 9 is a view similar to FIG. 8 showing a further embodiment of the invention;

FIG. 10 is a view similar to FIG. 9 showing a different embodiment of the invention;

FIG. 11 is a view similar to FIG. 10 but showing a modified embodiment of the invention;

FIG. 12 shows still another embodiment of the invention in a view similar to FIG. 11;

FIG. 13 shows, in a somewhat simplified view analogous to FIG. 11, a further embodiment of the invention; and

FIG. 14 is a view similar to FIG. 13 showing yet another embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Discussing now the drawing in detail, and firstly the embodiment illustrated in FIGS. 1–5 thereof, it will be seen that reference numeral 1 diagrammatically and fragmentarily identifies a support of an apparatus, for instance a frame, base or the like. The support may be made adjustable so that it can be raised and lowered if desired. How this can be done is not new and those conversant with this field will be aware of various possibilities. Mounted on the support 1 is a supply conduit 2 for a flowable medium, for instance printer's ink. Journals 3 and 4 mount the supply conduit 2 and the double-headed arrows in FIG. 1 indicate that in known manner the arrangement may be such that the conduit 2 can be raised and lowered with reference to the support 1. In fact, it is advantageous if the adjustment of the journals 3 and 4 can be carried out individually, so that by operating only one of the journals, or operating the journals 3 and 4 to different extents, the conduit 2 may be inclined axially if so desired.

In the embodiment of FIGS. 1–5 I have illustrated a drum 5 which rotates in the direction indicated by the arrowheads in FIGS. 3–5 (where the drum 5 is shown diagrammatically and fragmentarily only). Such a drum will usually be a film-printing drum of known construction, but details of the particular construction of the drum 5 are immaterial for an understanding of the invention.

The conduit 2 extends axially through the drum 5 which is mounted for rotation in known manner which is not separately illustrated. It is provided with apertures 12 (compare FIGS. 3–5) which are distributed evenly over its length, that is over that portion of the conduit 2 which is located within the confines of the drum 5. The diagrammatically illustrated source of flowable medium (compare FIG. 1) can be connected with the interior of conduit 2 so as to supply flowable medium to the latter from where it then escapes through the apertures 12 into a chamber 7 which is bounded by a sheet material wall 6. The wall 6 itself is also provided with apertures, identified with reference numeral 16 in FIG. 3, through which the flowable medium leaves the chamber 7 to flow onto the inner side of the drum 5 and to there merge with the quantity 8 which is already in position there. This assumes, of course, that the press is already in operation. If the

press is not in operation, then the flowable medium escaping through the apertures **16** will first form the supply **8** on the inner side as shown in FIG. **3.** The maximum build-up of the supply **8** is controlled in known manner by an electrode **9** which is connected electrically also in known manner with a non-illustrated pump supplying the flowable medium from the source, and which de-activates the pump as soon as a circuit is completed in response to contact with the tip of the electrode with the supply **8.** Of course, other possibilities for controlling the level of the supply **8** also exist, and it need not be the pump that is controlled but it could be a valve or the like.

It will be appreciated that printer's ink may constitute the flowable medium, but any other kind of viscous pasty medium can be supplied, and that in place of the rotary drum **5** a flat applying member—such as a flat screen—may be utilized. In the latter case it may be possible to dispense with the conduit **2** and to supply the flowable medium in another suitable manner, but then the spreading element according to the invention, which will be discussed presently must be so mounted that it can be moved with reference to the surface on which the flowable medium is to be spread. In fact, it is also possible to employ the spreading element according to the present invention without an intermediate applicator member, that is without the drum **5** or a flat screen or applicator in lieu of the drum **5.**

As shown in the embodiment of FIGS. **1–3,** and especially in FIGS. **3–5,** there is provided below an extending longitudinally of the conduit **2,** a substantially U-shaped holding element **10** which may consist of steel or another suitable material and whose open side faces in direction downwardly, namely towards the inner side of the drum **5** and thereby towards the exposed surface of the carrier **14** which is to be provided with the flowable medium. For purposes of the discussion it shall be assumed that the carrier **14** here is a sheet-material web. The holding element **10** carries the actual spreading element according to the present invention which in the embodiment of FIGS. **1–5** consists essentially of a hose portion **11** which is embraced from the open side of the element **10** by another substantially U-shaped member, a channel portion **13** which embraces the hose portion **11.** The hose portion **11** as well as the channel portion **13** are at least essentially composed of elastically distendable material, such as a suitable natural or synthetic elastomer which may be reinforced with a fabric or in another suitable manner.

The channel portion **13** is provided with a downwardly directed contact face **23** which is inclined with reference to the exposed surface of the carrier **14** at an acute angle α. The carrier **14** is disposed on a printer's blanket **15** which in turn is accommodated on a work table **17.**

The hollow interior of the spreading element composed of the portions and **13** is identified with reference numeral **18** and is in communication with a diagrammatically illustrated pressure fluid source (see FIG. **3**) via one or more conduits **19** in which there is advantageously installed a pressure-measuring instrument **20** so located that it can be observed by an operator.

Via the pressure fluid source and a suitable valve of which a regulating component **22** is illustrated in FIGS. **3–5,** the pressure in the interior **18** can be regulated whereby in dependence upon the prevailing pressure, the material of the portions **11** and **13** is outwardly distended through different extents, with a concomitant variation of the angle α. It is preferable that the valve **22** be of a type—known to those skilled in the art—which permits a continuous variation of the pressure in the space **18** so that a continuous variation of the angle α becomes possible.

It is of course normally desirable to avoid the possibility that the portions **11** and **13** might become dislodged from the element **10** during the operation of the apparatus, including distending of the portions **11** and **13** to different extents. In order to counteract such danger it is advantageous that a side wall portion of the portion **13** which trails or is located downstream with reference to the direction of movement of the drum **5,** be adhesively connected or otherwise suitably bonded to the arm **10***a* of the element **10.** The bonding is identified at **21.** On the other hand, the other side wall portion of the portion **13** simply frictionally but loosely abuts the inner side of the arm **10***b* so that it can move with reference to the same. The arm **10***b* extends closer towards the surface of the carrier **14** than the arm **10***a* and its lower marginal portion **10'** is bent over upwardly and in downstream direction of movement of the drum **5,** as illustrated in FIGS. **3–5.** The purpose is to permit flexing in downstream direction of the edge **33** formed at the juncture between the downstream wall portion and the portion provided with the surface **23,** of the portion **13.**

It is emphasized that it is immaterial what particular pressure fluid is employed for distending the inventive spreading element. Thus, air, steam, a liquid or any particular desired type of gas can be employed, but compressed air is advantageous in terms of economy.

As the pressure in the chamber **18** increases, and given the fact that the conduit **2** is fixed with the support **1** and that the drum **5** rotates in the indicated direction, the configuration of the spreading element will vary. This is evident from a comparison of FIGS. **3** and **4,** with a state of increased internal pressure being illustrated in the latter Figure.

It is clear that the greater the pressure in the space **18,** the smaller will become the angle α and the stronger will be the application of flowable medium. Also, the increased pressure in the space **18** with a consequent flattening-out of the edge portion **33,** causes the quantity of medium which is pressed through the apertures of the drum **5** to be increased and thereby to increase the quantity of such flowable medium which is applied to the carrier **14.** Evidently, these factors can be continuously varied by simply varying via the valve **22** the quantity of pressure fluid which is admitted into the space **18,** and thereby to vary the pressure in the latter, so that the results in terms of flowable medium applied to the exposed surface of the carrier **14** can be precisely accommodated to any given requirement without having at any time to exchange or replace components of the apparatus.

Because of the possibility which is illustrated in FIG. **1** by the double-headed arrows, of adjusting the position of the conduit **2** upward and downwardly, and thereby of the hollow spreading element which is carried by it via the element **10,** further variations in the action of the spreading element can be obtained. If the increased pressure is applied as in FIG. **4,** then the entire assembly of the components **2, 10, 11** and **13** is raised by raising the conduit **2** in the manner suggested

with reference to FIG. 1, then a larger angle α will be obtained as illustrated in FIG. 5, and the edge portion 33 will contact the inner side of the drum 5 along a smaller surface, whereby much finer applications of the flowable medium can be achieved. To obtain still finer applications the edge portion 33 may be exteriorly armored by an angle substantially L-shaped elongated element 25 as illustrated in FIG. 6, with such element preferably consisting of sheet steel. This further resists deflection of the edge portion 33.

On the other hand it is also possible to provide an interior armoring element of again substantially L-shaped configuration, identified with reference numeral 26 in FIG. 7. This immediately provides for a small angle α and for a rather flat edge portion 3 so that the surface contact of the portion 33 with the inner side of the drum 5 is larger than for instance in FIG. 3 even before internal pressure is applied. The element 26 may be located in the interior of the hose portion 11 as shown, or it may be located between the exterior of the hose portion 11 and the interior of the channel portion 13.

Naturally, the cross-sectional configuration of the element 10 may also be varied from what has been illustrated. It is advantageous if the arm 10b is longer that the arm 10*a*, meaning that it extends closer towards the inner side of the drum 5 than the arm 10*a*, as illustrated in FIGS. 3–5. The angling of the margin 10′ of the arm 10*b* provides for an abutment of the edge portion 33 when the same is deflected by the rotating drum as illustrated in FIG. 4. Similarly, the configuration of the hose portion 11 and/or that of the channel portion 13 may be varied.

In FIGS. 8–14 I have illustrated further embodiments of the invention. Here the hollow spreading element is preferably of substantially T-shaped cross-section and composed of two preferably but not necessarily unitary portions one of which is identified with reference numeral 53 and constitutes the crosspiece of the T, and the other of which is hollow, relatively tall and of substantially or completely acute-angular configuration. The portion is identified with reference numeral 60 and is engaged by a holding element 50 which may have the illustrated shape and which in turn is connected with a bracket 58 secured to the conduit 2, in FIG. 8 by means of the illustrated screw connection. The portion 53 can be inserted endwise into an open end of the element 50 and can similarly be removed.

In the embodiments of FIGS. 13 and 14 I have illustrated the possibility of using the present invention with a planar or flat applicator or screen 5′ instead of the drum 5. Of course, if as is possible the flowable medium is supplied in a manner other than via the conduit 2 so that the latter is omitted, then the spreading element must be mounted on a carriage which is capable of traversing the applicator 5′. How this can be done is well known to those skilled in the art, for instance screw spindles may be provided on which the carriage is mounted and which make it movable.

In FIGS. 8–12 I have illustrated a cross-sectional configuration of the applicator element wherein the element is of substantially acute-angular outline with a contact portion 52 which is outwardly curved and with a trailing wall portion 51 which is convex in upstream direction. Of course, the cross-sectional configuration of the spreading elements in these Figures can be varied, as can be that of the holding element 50 in each embodiment. It is only essential that the spreading element be reliably connected with the element 50 and that the inner space to be pressurized, identified with reference numerals 54, 59 or 63–65 in the embodiments of FIGS. 8–12, be of relatively tall or high cross-section as shown.

Again, the pressure can be varied in these interior spaces whereby the angle α can be changed accordingly, this being accomplished in the same manner as discussed with reference to the preceding embodiment, and as also illustrated in FIG. 12 via the valve 22 and the pressure-indicating device 20. The variation in the configuration of the spreading element can be made continuously in this manner.

It is clear that thus the purposes of the present invention are achieved with these embodiments also. It is parenthetically pointed out that in FIG. 13 the configuration of the portion of the spreading element which is provided with the internal space 64, is shown in broken lines as it will be if it is retracted sufficiently so that it does not contact the applicator element 5′. The full-line position will be assumed when contact is made and relative movement occurs.

The pressure of the spreading element against the drum 5 or the applicator element 5′, but not its elasticity and stability, can be varied in known manner by adjusting the spacing of the support—that is in most instances the conduit 2 carrying the spreading element—with reference to the surface of the carrier 14 which has been omitted in several of the latter embodiments. This adjustment can also be made continuous.

When pressure is admitted into the interior spaces, the configuration in cross-section of these interior spaces would tend to round out, rather than to keep its vertically elongated shape. To overcome this FIGS. 8 to 11 show a reinforcing or supporting abutment 56 which may be configurated to be of triangular shape by adding a portion 57. It extends downwardly towards the surface of the carrier 14 to such an extent that the edge 52 is still freely movable and can move beneath the lower free edge portion of the reinforcing abutment 56 when deflected by contact with the rotating drum, or with an analogous element.

The wall portion 51 is convex in upstream direction. It may be reinforced by being made thicker than the opposite wall portion as illustrated for instance in FIG. 12, or it may be made of a material having a greater shore hardness than the remainder of the material of which the spreading element is made. In order to prevent further bellowing outwardly of the wall portion 51 when pressure develops in the interior of the pressure chamber, and more particularly to prevent such bellowing in the upper region near the juncture with the portion 53, FIG. 11 shows that an additional abutment 62 may be provided which prevents such displacement or bellowing, so that only the lower portion of the wall portion 51 can belly out further in response to development of internal pressure in the space 61, whereby the angle α varies accordingly as is illustrated in the different Figures. By decreasing the angle, making it smaller, the quantity of flowable medium applied can be increased as to the quantity which is made to pass through the applicator 5 or 5′ onto the exposed surface of the carrier 14. This variation of the angle can also be effected continuously as discussed before.

The embodiments in FIGS. 8–14 provide for an increased flexibility of adjustment as to the elasticity and stability of the spreading element, over the embodi-

ment of FIGS. 1–7. On the other hand, all the advantages of embodiments of FIGS. 1–7 are also provided in the embodiments of FIGS. 8–14.

It will be appreciated that it is immaterial whether it is the conduit 2 which is moved so as to move the abutting element towards and away from the exposed surface of the carrier 14, or whether for instance the work table 17 on which the carrier 14 is disposed is raised or lowered with respect to the conduit 2 and the spreading element. Either possibility will achieve the purposes and advantages which have been outlined with respect to such adjustment, and means for carrying out such adjustment are known in the art and require no detailed explanation to those conversant with this field. What is essential for purposes of the present invention is the mechanical adjustment by raising or lowering the table 17 or by raising or lowering the conduit 2 carrying the spreading element, and thereby the adjustment of the pressure of the spreading element against the associated surface, in combination with the variation in the cross-sectional configuration of the setting element by varying the internal pressure, and also the possibility of varying the elasticity and stability of the spreading element by changing the internal pressure, without having to shut down the apparatus, exchange components thereof, or the like.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in an apparatus for applying a flowable medium to a carrier, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended

1. In an apparatus for applying a flowable medium to a carrier, in combination, carrier means having an exposed surface; a supply arrangement for supplying a flowable medium to the vicinity of said exposed surface; applying means mounted proximal to said carrier means and having a contact face proximal to said exposed surface for spreading said flowable medium on the latter, said contact face including with said exposed surface an angle and at least one of said means being mounted at least in part for travel with reference to the other means, said applying means comprising an at least partially hollow tubular spreading element consisting at least partly of elastically distendable material associated with said contact face, and a holder for said spreading element; and varying means for varying the angle included between said contact face and said exposed surface at the will of an operator.

2. In an apparatus as defined in claim 1, wherein said applying means comprises a rotary drum permeable to said flowable medium mounted adjacent said carrier means and having an outer side proximal to said exposed surface and an inner side onto which said flowable medium is supplied; and wherein said hollow spreading element is mounted within said drum stationarily relative thereto, with said contact face engaging said inner side under pressure.

3. In an apparatus as defined in claim 2, wherein said varying means comprises a source of fluid under pressure, and admitting means communicating with said source and the interior of said spreading element for admitting into the latter a quantity of such fluid requisite for distending the material of said spreading element to a desired extent.

4. In an apparatus as defined in claim 3, said admitting means comprising valve means for continuously varying the admittance of fluid to the interior of said spreading element, whereby to continuously vary the distending of the material of the same.

5. In an apparatus as defined in claim 3, said supply arrangement including a supply conduit extending into said drum axially of the same; and further comprising holding means arranged in said drum below said supply conduit for holding said spreading element in requisite relationship with reference to said exposed surface.

6. In an apparatus as defined in claim 5, wherein said holding means in an elongated substantially U-shaped member having an open side, and wherein said spreading element comprises a distendable hose portion accommodated in and extending longitudinally of said U-shaped member, and a substantially U-shaped channel portion of elastically distendable material embracing said hose portion and in part extending outwardly through said open side, said channel portion being provided with said contact face.

7. In an apparatus as defined in claim 6, wherein said hose portion and said channel portion consist at least predominantly of elastomeric material.

8. In an apparatus as defined in claim 6, said U-shaped member having two lateral arms each extending axially of said drum, one of said arms being located upstream of the other arm with reference to the rotation of said drum; and wherein said channel member has a first lateral wall portion bonded to said one arm, a second lateral wall portion loosely abutting said other arm, and a bight wall portion provided with said contact face with the latter facing said exposed surface and including therewith a variable acute angle.

9. In an apparatus as defined in claim 8, said arms each having an inwardly directed side facing the interior of said U-shaped member; and wherein said first and second lateral wall portions each engage the inwardly directed sides of the respective arms.

10. In an apparatus as defined in claim 8, wherein said contact face is inclined towards said exposed surface in direction from said one arm towards said other arm.

11. In an apparatus as defined in claim 10, said arms each having a longitudinally extending free marginal zone; and wherein said marginal zone of said other arm is closer to said exposed surface than said marginal zone of said one arm and includes with the remainder of said other arm an obtuse angle in direction of rotation of said drum.

12. In an apparatus as defined in claim 6, said U-shaped member having a bight portion facing away from said open side and from said exposed surface; and

wherein said hose portion is connected with said U-shaped member in the region of said bight portion of the latter.

13. In an apparatus as defined in claim **5**; further comprising support means engaging said supply conduit, holding means and spreading element in the region of the opposite axial ends of said drum; and wherein said varying means are operative for continuously varying the distance of said supply conduit, holding means and spreading element from said exposed surface of said carrier means.

14. In an apparatus as defined in claim **13,** said support means comprising at least two supports, and said varying means comprising at least two varying arrangements each associated with one of said supports and operable independently of the other varying arrangement.

15. In an apparatus as defined in claim **4**; and further comprising a pressure-indicating device operatively associated with said valve means for indicating the pressure of fluid prevailing in the interior of said spreading element.

16. In an apparatus as defined in claim **8,** said channel portion having a pressure-exerting contact edge at the juncture of said bight wall portion with said second lateral wall portion; and further comprising a substantially L-shaped elongated reinforcing component for said contact edge exteriorly embracing said juncture and fast with said channel portion.

17. In an apparatus as defined in claim **16,** wherein said reinforcing component consists of sheet steel.

18. In an apparatus as defined in claim **8**; and further comprising an elongated internal reinforcing component of substantially L-shaped cross-section located interiorly of said channel portion.

19. In an apparatus as defined in claim **18,** wherein said internal reinforcing component is located within said hose portion.

20. In an apparatus as defined in claim **18,** wherein said internal reinforcing component is located intermediate and in contact with said hose portion and said channel portion.

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