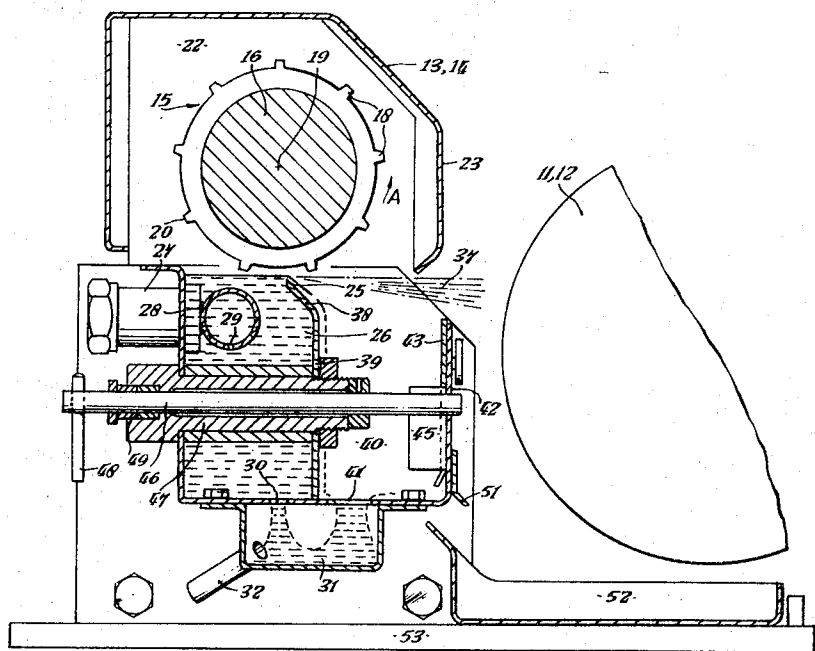


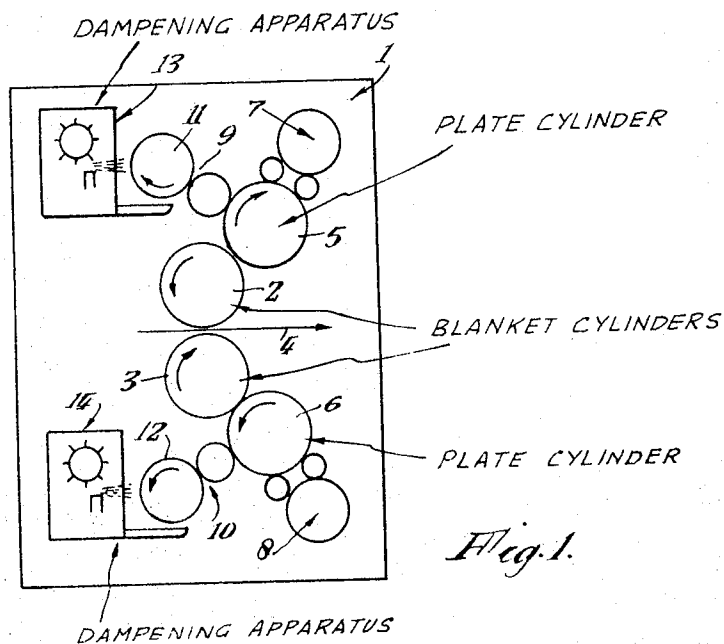
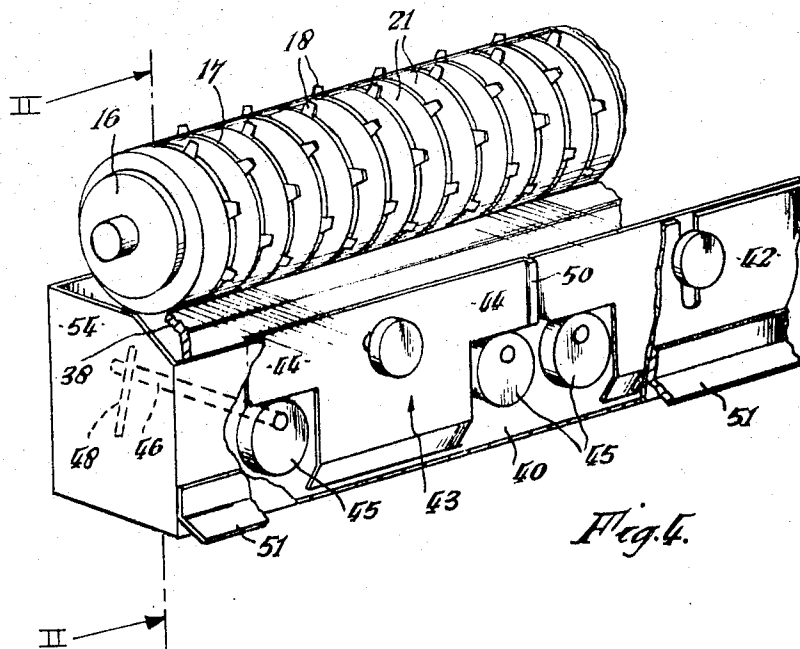
- [54] **DAMPENING APPARATUS WITH ROTOR FOR PROJECTING SPRAY**
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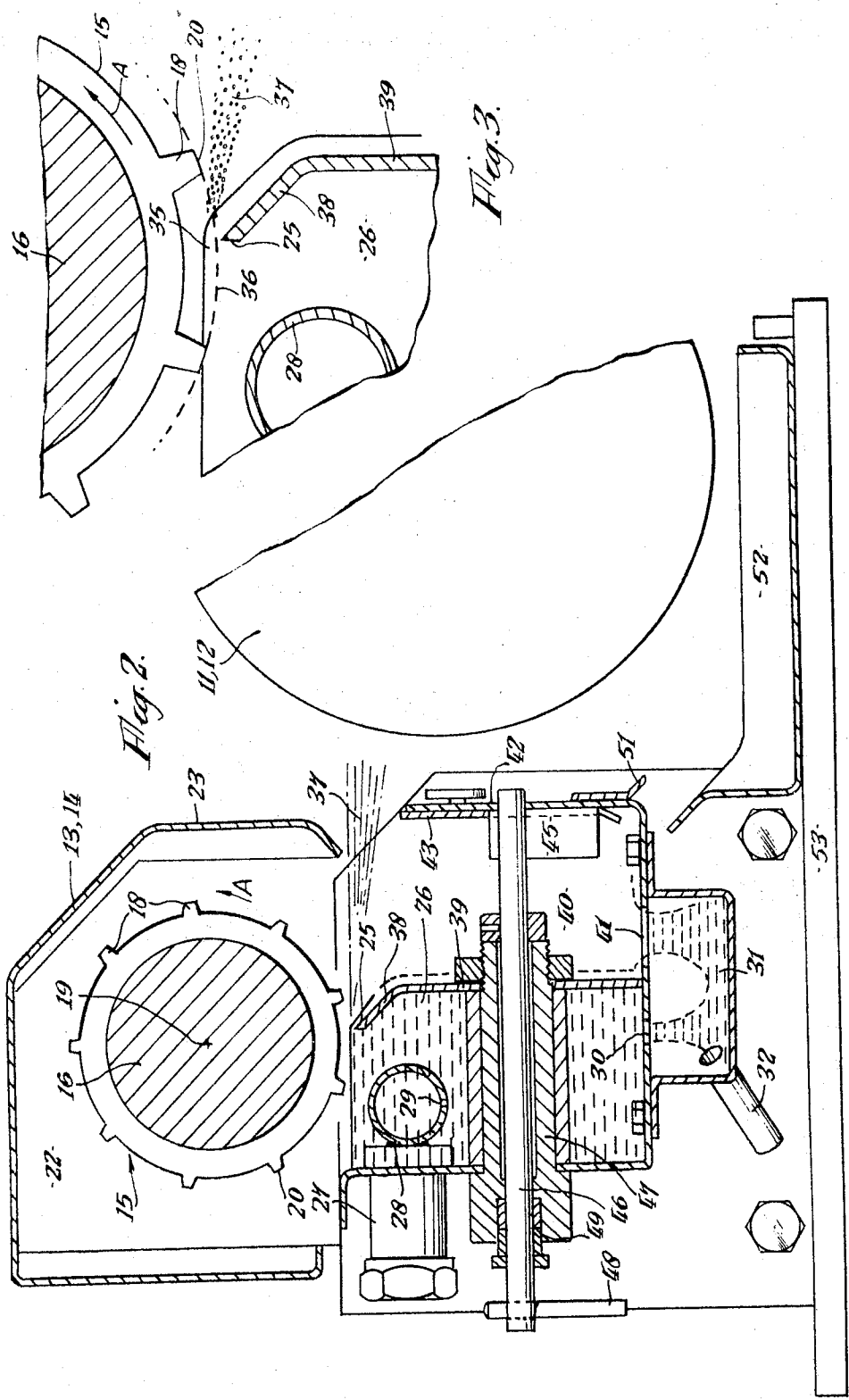
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- [57] **ABSTRACT**
A plate-dampening apparatus for a printing press projects a spray of dampening liquid onto a transfer roll. The apparatus includes a weir over which dampening liquid continuously spills, and a rotor having projections which are moved at speed to cut through the thickness of the liquid, without striking the weir, as the liquid spills over the wier and project a spray from it.
- 6 Claims, 4 Drawing Figures**







DAMPENING APPARATUS WITH ROTOR FOR PROJECTING SPRAY

BACKGROUND OF THE INVENTION

The invention relates to dampening apparatus.

There is need in many fields for precisely controllable dampening. Particular examples are in the fields of paper handling, where the moisture content of a paper may need adjusting before some operation is performed on it, and in printing where particularly in litho work the printing plate has to be dampened before ink is applied to it.

The problems met with in previous dampening apparatus are illustrated best in connection with printing.

At first, dampening liquid (usually water with small amounts of additives) was transferred from a feed duct by a roll dipping into the duct. The surface of the roll was treated to try to give uniform and desired amounts of liquid transfer. The roll engaged a dampening train of rolls leading to the plate roll.

These surface treatments are difficult. However the main problem is the control of the rate of water transfer, and the prevention of emulsification due to ink returning through the dampening train of rolls from the printing plate. Further, a printing plate usually does not require uniform moisture distribution across it (because usually the print is not uniform across the plate and yet the ink/liquid balance must be substantially constant across it) and this form of control of this type of dampening apparatus, to give a desired non-uniform distribution, is extremely difficult.

Attempts have been made, see e.g. U. K. Pats. Nos. 965,439 and 1,125,213 to avoid contamination and emulsification of the liquid by isolating the source of the liquid from the printing plate. In these arrangements a brush is rotated against a surface over which liquid is flowing. Because the bristles of the brush are deflected by that surface, as they are driven past it they suddenly straighten and flick moisture which they have picked up off themselves onto a roll which transfers them to the plate.

In these arrangements there is substantially no contamination of the liquid, and control across the width of the brush can be achieved.

However these arrangements depend for their effectiveness on the brush bristles being continually and substantially flexed against the bearing surface, and undergo heavy wear. They also tend to collect dust and deposits out of the liquid itself, particularly if they are allowed to dry out when a press is not running.

SUMMARY OF THE INVENTION

Starting from this situation, the present invention has for object a dampening apparatus which projects a spray of dampening liquid, thus to conserve the advantages of control and low contamination mentioned above, but without using the flexing action of a brush for this purpose.

The invention provides apparatus which projects a spray by driving a projection on a rotor through the thickness of dampening liquid spilling over a weir. The projection does not hit the weir, but only passes through the liquid on it.

The rate at which a given liquid is sprayed in a given apparatus depends on the depth of cut into its thickness and the rate of rotation of the rotor.

The number, size and shape of the projections will, of course, determine the capacity of an apparatus to deliver liquid at a given range of rates.

The projections may cut into the liquid in front of, directly on, or beyond, the weir in the direction of flow of the liquid, and may act to project a spray at a wide range of angles to the horizontal.

Control as to non-uniformity across the plate can be achieved by shutters partially or wholly intercepting the projected spray by different amounts across the axial length of the apparatus.

Thus there is achieved a highly adjustable and adaptable dampening arrangement where the great disadvantage of known brush-type apparatus, the wear on the brushes, has been avoided.

BRIEF DESCRIPTION OF THE DRAWINGS

A particular embodiment of apparatus for use in a printing press will now be described with reference to the accompanying drawings, wherein:

FIG. 1 shows diagrammatically and in side view a web offset perfecting printing press equipped with the dampening apparatus.

FIG. 2 is a sectional view on the line II — II of FIG. 4 through the dampening apparatus on an enlarged scale with the cover 23 in place.

FIG. 3 is a detail of part of FIG. 2, showing the cutting action through the liquid, and

FIG. 4 is a perspective view of the dampening apparatus, with parts removed for clarity.

DESCRIPTION OF A PREFERRED EMBODIMENT

The embodiment of dampening apparatus to be described is applicable to e.g., the moistening of paper or other webs to affect their handling characteristics or to the moistening of printing plates in a printing machine. It will be particularly described in the latter context.

FIG. 1 shows diagrammatically a printing press 1 which is shown as a litho web offset perfecting press. The invention is equally applicable to other forms of press where plate-moistening is needed.

Blanket rolls 2 and 3 engage opposite sides of a web 4. Plate rolls 5 and 6 respectively engage the blanket rolls 2 and 3. The plates on the plate rolls 5 and 6 are inked by inking trains indicated at 7 and 8 respectively.

Before being inked the plates on the plate rolls are moistened by dampening liquid trains 9 and 10 respectively. Liquid is spread onto the first roll 11 and 12 respectively of these trains in a spray projected by dampening apparatus here generally designated 13, 14. The apparatus 13, 14 are identical and will now be described in greater detail with reference to the remainder of the drawings.

Referring first to FIG. 2, the dampening apparatus 13 or 14 has a rotor 15 made up of a core 16 on which are rings 17 of thin sheet material (such as brass shim, polyester material) each having a plurality of radial projections 18 in the plane of the sheet. The projections may have a certain flexibility in directions parallel to the axis of the rotor, but are rigid tangentially of it.

These projections taper symmetrically towards their greatest radius, but have at that greatest radius an arcuate end 20 centered on the axis of rotation 19 of the rotor. Other shapes of projection are, of course, possible.

The edges of the projections 18 need not be sharpened, so that the rings 17 may be made by a simple

stamping operation, or by a cutting operation carried out on a clamped stack of roughly shaped blanks.

The rings 17 are separated in the rotor by spacers 21 (FIG. 4), the whole assembly being axially clamped together on the core 16.

The projections 18 are staggered along the axis of the rotor, so that projections on adjacent rings 17 do not act on dampening liquid at the same time.

The rotor 15 is driven in rotation in journals in side plates 22 of the apparatus by a motor (not shown). A protective cover 23 rests on the top of the side plates and over the whole axial length of the rotor.

The axis of rotation 19 of the rotor is spaced above an edge 25 of a trough 26 containing dampening liquid.

The liquid is continually fed to the trough 26 by an inlet 27 and a distributor pipe 28, having small outlet holes 29 in its bottom surface along its length. At one end of the trough there is a small permanently open outlet 30 through which liquid may pass to a sump 31 and a drain 32 to be recirculated.

However the rate of feed of liquid through the pipe 28 is greater than the rate at which it can escape through the outlet 30. The side 33 of the trough opposite the edge 25 is higher than the edge 25 and so the excess liquid fed to the trough 26 can only escape by spilling over the edge 25.

This edge 25 is arranged to be exactly horizontal so that the liquid spills approximately evenly over it along its length. Thus there is formed a horizontally unrestrained, constantly refreshed, layer of liquid 35 (FIG. 3) of a thickness determined principally for a given liquid by the excess rate of flow.

The distance between the edge 25 and the axis 19 is slightly greater than the greatest radius of the projections 18 so that when the rotor rotates, in the sense of the arrow A, FIG. 2, the projections cut successively and repeatedly into that layer of liquid in the region of the weir formed by the edge 25. This is shown diagrammatically in FIG. 3, where the locus of the edges 20 is shown by dotted line 36.

The effect is that a spray 37 of liquid is projected out from the rotor.

The direction of projection of the spray is governed primarily by the relative vertical planes occupied by the edge 25 and axis 19. In the present embodiment the axis 19 is contained in a vertical plane offset from the vertical plane containing the edge 25 in the upstream direction (i.e. to the left in the FIGS. and by approx 3mm.

The axis 19 and edge 25 may however be in coincident vertical planes, or the axis 19 may be displaced slightly downstream of the edge 25; giving in each case a trajectory to the spray increasingly below the horizontal.

The action of the staggered projections 18 on the liquid as it spills assists distribution of liquid and evenness of flow as between different points of the length of the edge.

Excess liquid spilling over the weir 25, not sprayed out by the action of the rotor, follows down an inclined portion 38 of a front wall 39 of the trough 26, thence to fall into a collection gully 40 at one end of which is an outlet opening 41 leading to the sump 31 and drain 32.

The spray 37 is directed at the roll 11 or 12 which is the first roll of the dampening liquid transfer train. In

other arrangements it may be received directly by a former roll running on the printing plate.

A front wall 42 of the gully 40 offers a support to movable shutter 43 which control the distribution of liquid received by the plate, across its axial width.

The rate at which liquid is sprayed is governed (for a given liquid and shape of rotor) by the speed of rotation of the rotor 15 (adjustable about 800 to 1,200, preferably 1,000 r.p.m. for example); this being an adjustment under the control of a machine operator. This comparatively high speed of rotation assists self-cleaning of the rotor. It is also governed by the depth to which the projections cut into the layer 35, which can be adjusted by e.g. "raising the liquid" (i.e. raising the weir 25 or increasing the rate of flow of the liquid over that weir) or by moving the axis of rotation 19 of the rotor. In any case, no part of the rotor must hit the weir.

As mentioned distribution is governed by the shutters 43. As best seen in FIGS. 2 and 4, shutters 43 are T-shaped plates slidably mounted on the front wall 42 of the gully 40.

The undersurfaces of the wings 44 of the T rest respectively on eccentric discs 45 mounted on adjustment shafts 46 which pass, in a sealed bush 47, through the trough 26, and have a handle 48 so that the machine operator can angularly adjust the shaft and hence the disc 45 and the level of the wing 44 of the shutter 43 which is engaged by that particular disc. A friction lock 49 holds the shaft in the position selected.

One end 50 of each shutter 43 is joggled to overlies and overlap the other end of the adjacent shutter 43.

Liquid in the spray is intercepted by each shutter 43 to a degree determined by the height to which that particular shutter is adjusted. The degree of adjustment should be enough to permit complete cutting off of the spray by any shutter 43. The mounting of the shutters 43 is such that they can tilt slightly to the horizontal to give further fineness of control.

Liquid caught by the shutters falls down their inside face into the gully 40 to drain away through the outlet 41 and be recycled.

Liquid caught on the edge of the shutters and passing over them, or back spray bouncing off the roll 11, 12 dribbles down the front face of the wall 42 onto a drip edge 51 at its base, and thence into a drip pan 52 which also catches any drips falling direct from the roll 11, 12. This liquid, which may be slightly contaminated by ink traces on the roll 11, 12, is preferably not recirculated.

The whole of the trough and gully structure 26, 40, of which the end walls 54 fit clear of and within the end plates 22 bearing the rotor, is borne on a slide plate 53 and is removable from underneath the rotor without interfering with it. The drip tray 52 is also separately removable.

I claim:

1. In a printing machine having dampening apparatus and a dampening train for a plate roll the improvement comprising a dampening apparatus having a trough, the trough having upstanding walls, one of said walls having a horizontal upper edge lower than upper edges of other walls thereby providing a weir edge, means for feeding liquid in the trough so that the liquid can be maintained at a given level in the trough higher than the level of the weir edge and spill continuously over the weir edge, a tangentially rigid rotor with an axis of rotation parallel to the weir edge and approximately

vertically above it, thin projections extending radially from the rotor and axially spaced from one another along said axis of rotation, the said projections being spaced from the weir edge and extending to above the level of the weir edge and below the level of the liquid in the trough, means for rotating said rotor for causing the projections to cut into the thickness of the liquid over the weir edge to emerge where it spills from the weir edge to project directionally a spray of liquid and means positioning the dampening apparatus and a roll of the dampening train such that the said roll receives liquid directionally sprayed by the rotor.

2. A dampening apparatus according to claim 1 wherein the axis of rotation of the rotor is in a vertical plane slightly offset from the vertical plane containing the edge, and is upstream of the edge.

3. A dampening apparatus according to claim 1

wherein a plurality of shutters are spaced from the edge and are movable individually into and out of the path of the spray projected from the rotor.

4. A dampening apparatus according to claim 1 in combination with, and forming part of, a printing machine, and a roll train for transferring the liquid sprayed by the rotor to a plate roll of the printing machine.

5. A dampening apparatus according to claim 1 wherein the projections on the rotor are of a planar, thin, sheet material and are integral with and spaced circumferentially around respective rings of that material each arranged with its plane normal to the axis of rotation of the rotor.

6. A dampening apparatus according to claim 1 wherein the projections are staggered along the axis of the rotor.

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