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DOCTOR FOR PAPER MAKING AND LIKE MACHINES

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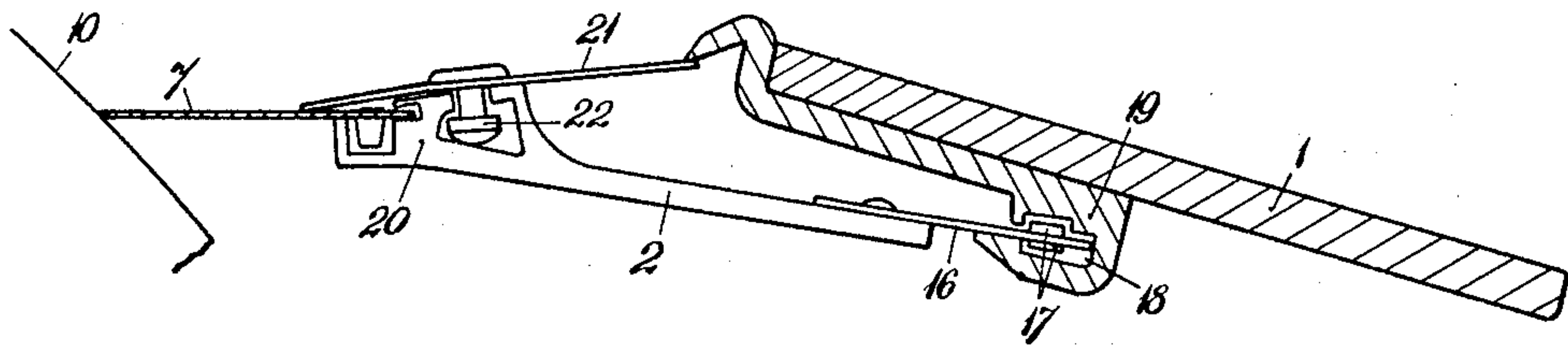


Fig. 3.

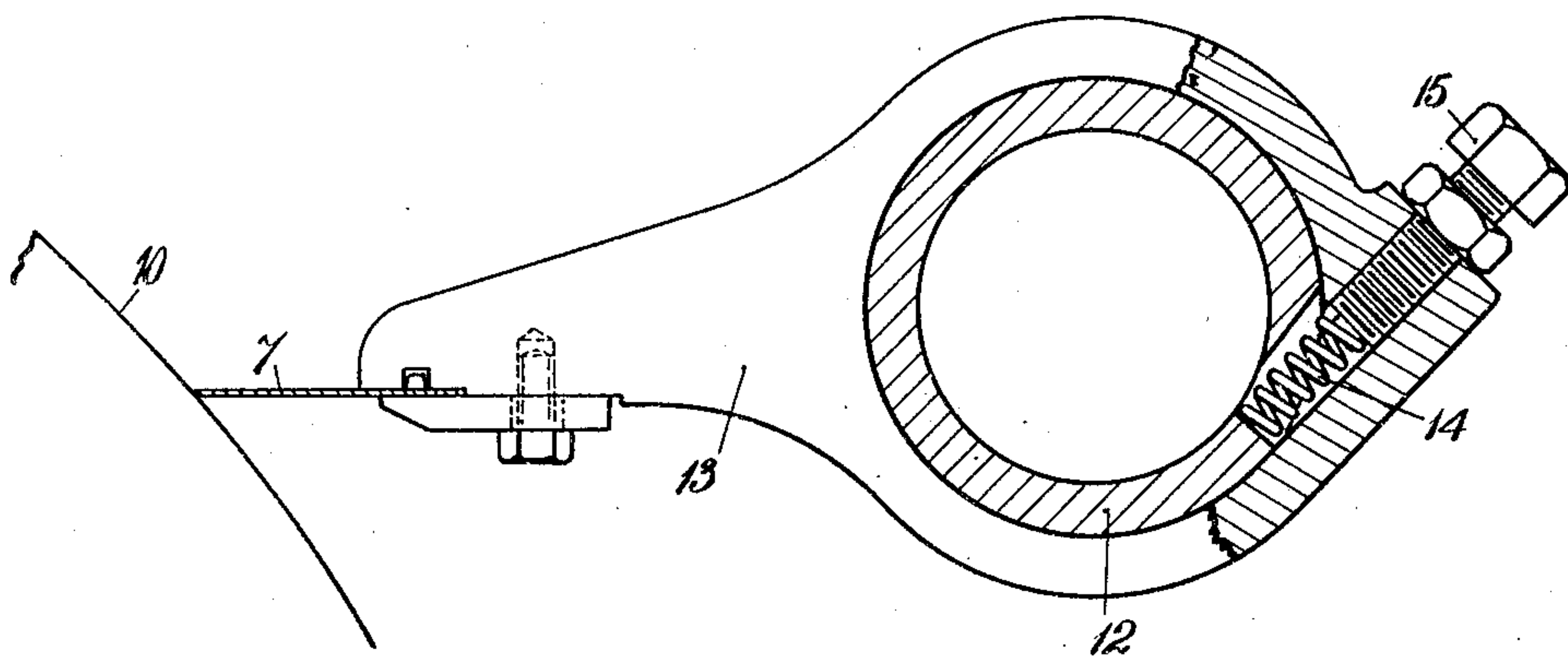


Fig. 4.

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# UNITED STATES PATENT OFFICE

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## DOCTOR FOR PAPER MAKING AND LIKE MACHINES

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This invention relates to doctors for paper-making and like machines comprising a relatively narrow flexible blade (such as will not be warped by heating at one edge when unconfined) with means for supporting it from a rigid carrier so that it can bend longitudinally throughout its width and for pressing it resiliently upon the roll to be doctored.

10 The object of the invention is a construction of such doctors which will permit the blade to yield considerably in order to maintain firm contact with the roll, notwithstanding movements of the roll, deformations of the roll or doctor by heating, or wear of the roll, without appreciably changing its angle of inclination to the roll, a matter of particular importance where the blade is set at a steep angle. Another object of the invention is to make the angle of inclination of the blade independent of its wear. A further object of the invention is to lessen the likelihood of the blade or its carrier being set in vibration.

25 With these objects in view the invention provides for the blade being borne from the rigid carrier upon supports unyielding in themselves but so yieldably connected with the carrier, as by a pivotal, flexible or merely a loose connection, that they can move slightly at right angles to their plane hinging about the connection to the carrier. The rigid carrier, as usual, is movable under gravity or spring pressure to press the blade as a whole upon the roll; and the blade and its supports are also movable relatively to the carrier under spring pressure or gravity distributed along the doctor so as to provide for differential movement of parts of the blade as may be required.

40 Thus in one aspect the invention contemplates the combination with the usual rigid carrier loaded by spring pressure or gravity so as to press towards the roll of a plurality of stiff supports bearing the blade at their ends, so that the several parts of the blade rock, not about the rear edge of the blade but, about an axis at a distance from the rear edge, the said supports having their individual gravity or spring loading to cause each

to press its section of the blade towards the roll.

In some cases it suffices if major movements of the blade, such for instance as are needed to enable it to follow the bodily displacement or inclination of the roll, take place about an axis distant from its rear edge while minor movements adapting the blade to slight irregularities of the roll and so forth can be taken care of by allowing yield between the blade and stiff support.

Viewed from this aspect the invention resides in carrying the blade yieldably in a single stiff support itself yieldably attached to the usual loaded carrier resilient means exerting pressure between the carrier and either the blade or its support to press the blade upon the roll.

In one embodiment of the invention employing a plurality of supports these consist of a number of stiff fingers fastened to the carrier so that they can rock a little with respect to it at right angles to their plane. The blade is carried in the free ends of these fingers and each finger or each section of the blade is pressed towards the roll preferably by a separate spring acting between the carrier and the finger or blade.

It is to be noted that the springs can rock under the influence of their spring or other loading while the doctor is in use; the freedom given to them is not for the purpose of enabling them merely to be adjusted once for all with respect to the carrier and then fixed to it.

Examples of this construction are illustrated in the accompanying drawings,

Figure 1 being an elevation in section on the line I—I of Figure 2,

Figure 2 a part plan of one form,

Figure 3 a similar sectional elevation of a modification, and

Figure 4 a sectional elevation of a second modification.

In Figures 1 and 2, a part of the usual rigid carrier is indicated at 1, and it is to be clearly understood that this carrier is, as usual, capable of movement, as a rule by rocking on pivots, under spring action or its own weight for the purpose of pressing



the blade as a whole upon the roll. Upon the carrier are stiff fingers 2 the ends 5 of which abut against a strip 3 screwed to the carrier. The fingers are attached to the carrier by set screws 4 but these pass loosely through the fingers and their heads do not bear on the fingers, so that the latter can rock a little about their ends 5. The fingers being of considerable width and their ends square they cannot rock in their own plane. At their outer ends 6 the fingers carry the blade 7. This may be held between the fingers and the heads of bolts, which by a shoulder or a distance piece are prevented from clamping the blade tight. In the construction shown slotted keeps 8 are riveted to the fingers and the rear edge of the blade is engaged in the slot and retained by rivets or other projections 9. A small portion of the roll is indicated at 10 in Figures 1 and 3.

The blade is pressed as a whole upon the roll by the weight or springs of the carrier 1. To provide for the differential movement of one part of the blade with respect to another which is necessary to keep its edge in contact with the roll and which cannot be shared by the rigid carrier, the blade is further pressed upon the roll by pressure distributed over its length and exerted between it and the carrier. This pressure may be exerted by a spring plate, which however is preferably divided into separate springs 11, one for each finger, which are secured to the carrier 1 and bear upon the blade or finger. The set screws 4 afford a means of adjusting the pressure of the several springs.

Where the doctor is dealing with wet rolls or is subject to large displacements, it is preferable that the spring plate or springs 11 should press upon the blade through an interposed strip of rubber. Such means may also be provided to make a water-tight joint between the springs or fingers.

In lieu of the loose connection above described the fingers may be connected to the carrier by short springs, the ends of the fingers being preferably rounded and resting against a rounded edge on the carrier; or long springs may be used extending the whole length of the fingers and riveted to them, one end of the spring forming the hinge connection to the carrier and the other bearing upon the blade. Alternatively the fingers may be reduced in section, either in width or thickness or by perforations, at their ends so as to be springy, and these springy ends may be secured in a slot in the carrier or otherwise fastened to it.

Thus in Figure 3 the fingers 2 are reduced in thickness at their ends, or preferably attached to springs 16 which form the hinge connection to the carrier 1. These springs might be attached by screws to the carrier; to facilitate assembly they are fitted with projections 17 which are received in an un-

dercut slot 18 in an extruded metal strip 19 fitted to the carrier for the purpose. This method of attachment affords a certain freedom of movement irrespective of the yield of the springs 16, and therefore these springs may be omitted and the projections 17 may be attached to or made integral with the fingers 2, for instance by forming the fingers with an arrow head at their ends. The fingers have a slotted enlargement 20 at their free ends to receive projections on the blade 7. Pressure is exerted as between the carrier 1 and the blade, not only by the weight of the fingers 2, but also by springs 21 which are compressed between the fingers and the lip of the member 19. These springs 21 may be attached to the fingers in the same way as the fingers are attached to the carrier, namely by the engagement of projections in the form of studs 22 in an undercut slot formed in the enlargement 20. The ends of the springs 21 project over the blade 7 and complete with the enlargement 20 the undercut slot in which the projections of the blade are received; they may also normally exert a frictional grip on the blade, and in the form shown they permit with elastic resistance some relative movement of the blade 7 and fingers 2.

Where a pivoted carrier is employed the stiff fingers may be fastened to the carrier so as to pivot co-axially, or nearly so, with it, while the spring plate or its equivalent is fastened to the carrier at a distance from its axis. Figure 4 shows such an arrangement upon a tubular carrier, which, as usual, rocks upon its axis under spring or other loading. The stiff fingers 13 surround the carrier and can turn upon it. They carry the blade 7 substantially as above described. Springs 14 supplement the weight of the fingers tending to turn them anti-clockwise and press the blade on the roll; and their pressure is adjustable by the locked set screws 15.

I claim:

1. A doctor comprising a renewable flexible strip blade, a rigid carrier movable and loaded to apply the blade as a whole to the roll, and stiff supports individually loaded and movable with respect to the carrier interposed between the blade and carrier.

2. In a doctor the combination of a carrier, stiff supports rocking upon said carrier, a flexible blade borne at the end of said supports, means for exerting pressure upon the carrier to force the blade towards a roll, and means for exerting distributed pressure between the carrier and said supports to force the blade towards a roll while allowing differential movement of different elements of the blade.

3. In a doctor the combination of a rigid carrier loaded to press towards a roll, a flexible blade, and a plurality of stiff supports interposed between said blade and said carrier



and permitting the several elements of the blade to rock about an axis at a distance from the rear edge of the blade, said supports being individually loaded to press the blade upon the roll.

4. In a doctor the combination of a rigid carrier having an undercut slot formed therein, a plurality of stiff fingers having enlargements at one end loosely engaging in said slot, a flexible blade, and means securing said blade in the other ends of said fingers.

5. In a doctor the combination of a rigid carrier, a plurality of stiff supports yieldably attached at one end to said carrier and having an undercut slot formed therein, a blade attached to the other end of said supports, and springs having enlargements engaging in the undercut slots of said stiff supports and compressed between them and the carrier.

6. In a doctor the combination of a rigid carrier loaded to press towards a roll, a plurality of stiff fingers, means loosely connecting each of said fingers with said carrier, springs mounted on said carrier bearing on respective fingers, and a flexible blade carried in the ends of said fingers.

7. In a doctor the combination of a rigid carrier loaded to press towards a roll, a stiff support yieldably connected with said carrier, a blade yieldably mounted in said support, and means for exerting resilient pressure between said carrier and said blade.

In testimony whereof I have signed my name to this specification.

FREDERICK WILLIAM VICKERY.