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[33] **Germany**
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[54] **TRAIN OF FEED ROLLS FOR PAPER, PLASTICS OR TEXTILE WEBS**
10 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **226/177, 226/183, 226/195**
[51] **Int. Cl.** **B65h 77/00**
[50] **Field of Search** 242/75.2; 226/195, 183, 176, 177, 180

[56] **References Cited**

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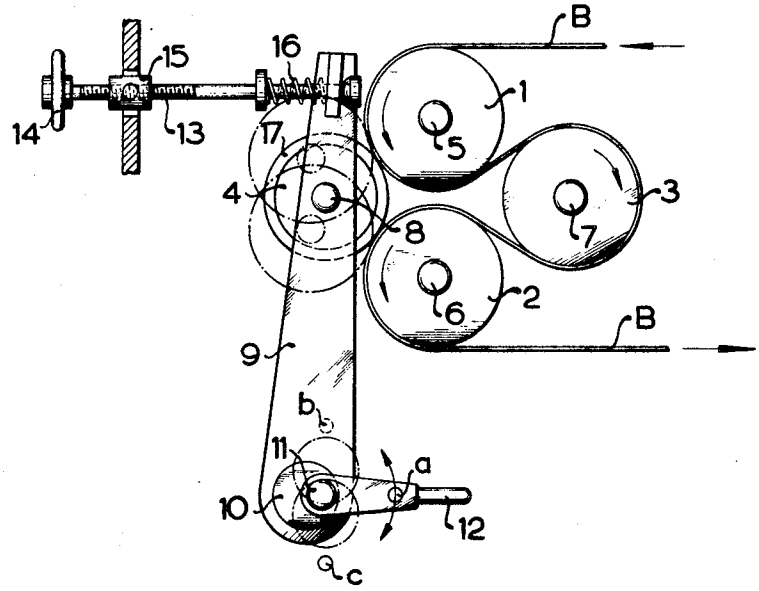
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ABSTRACT: A train of feed rolls for webs of material comprises a run-on roll, a runoff roll and an intermediate roll about all of which the web can be slung, and an adjustable pressure roll adapted to be selectively applied to the web to pass the latter against the periphery of the run-on roll or runoff roll or both said rolls simultaneously.



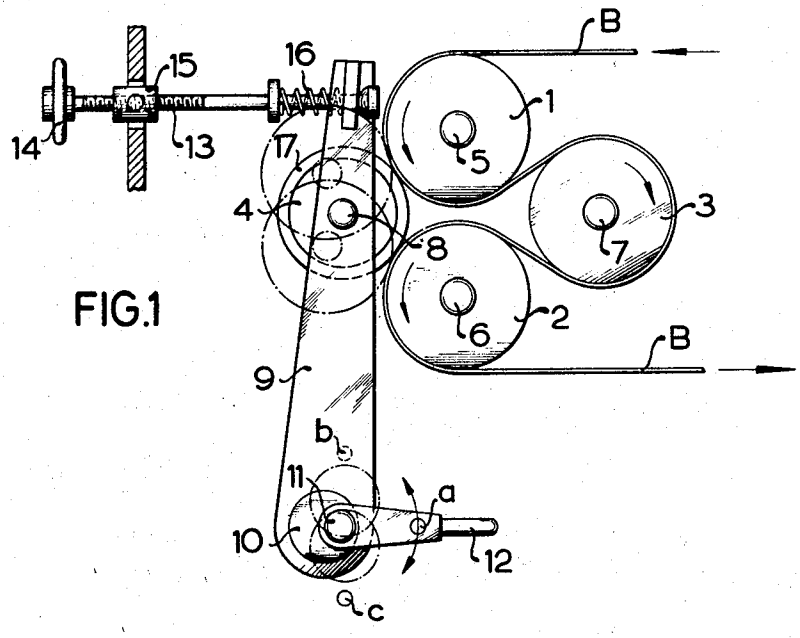


FIG.1

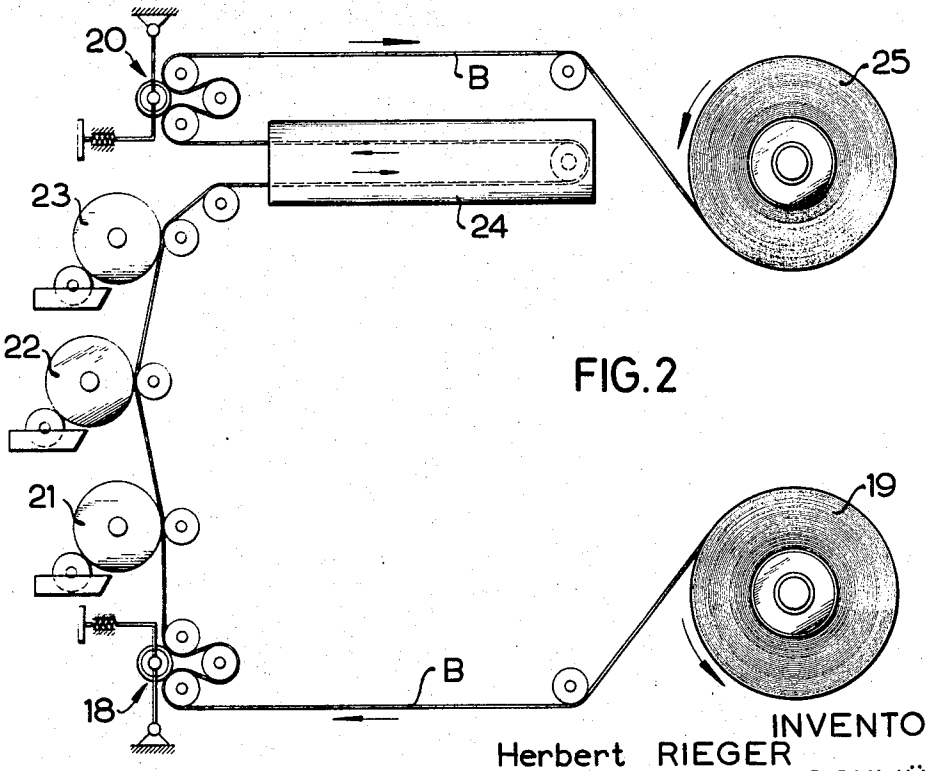


FIG.2

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TRAIN OF FEED ROLLS FOR PAPER, PLASTICS OR TEXTILE WEBS

The invention relates to a train of feed rolls for paper, plastics or textile webs and to machines incorporating such feed rolls, particularly printing machines.

For the purpose of feeding paper, plastics or textile webs under constant tension, for example for feeding such webs in multicolor printing machines, it is usual to employ a train of three feed rolls which are arranged at the corners of an imaginary triangle, are positively driven and about which the web is slung, the feed rolls turning at a peripheral speed that accurately corresponds to the speed at which the web is to be fed, i.e. at the peripheral speed of the printing rollers in the case of a multicolor printing machine. The triangular arrangement of the feed rolls permits large-area surface contact between the web and the rolls about which they are slung. Consequently, there is considerable friction between the web and the rolls and this minimizes slip of the web on the rolls. Feeding of the web at constant tension permits accurate registration of the colors that are subsequently printed thereon.

However, when the requirements for a constant tension are very high, and especially during acceleration of the web as well as when processing webs that have a comparatively smooth surface, the frictional contact at the feed rolls is not always sufficient to avoid slip, especially if for example the heavy storage reels on and from which the web is wound do not run truly concentrically or when, say, inaccuracies in the diameters of the printing rollers cause uncontrollable additional and varying tensile forces to be exerted on the web. Such inaccuracies in the diameters of the printing rollers are particularly disadvantageous when printing with rubber printing blocks which engage the web over a large area and therefore exert a particularly strong influence on the web.

The invention aims to provide a train of feed rolls which will permit the web to be fed at constant tension, especially in processing machines such as printing machines.

By pressing the web against the run-on roll, slipping is avoided during variations in the tension of the web portion that has left the feed rollers, while slipping caused by variations in the tension of the incoming web portion is avoided by pressing the web against the runoff roll. The effect of the pressure roll is to increase the friction between the web and the run-on and/or runoff roll and the resultant higher tensile forces will cause the web to be slung more tightly about the other feed roll or rolls of the train and thereby increase the overall friction between the web and the feed rolls. If the pressure roll is applied simultaneously to the run-on and runoff rolls, slipping will be avoided when variations in tension occur in the incoming as well as the outgoing web portions.

To achieve the optimum such effect, means may be provided for varying the application pressure of the pressure roll.

In one form of the invention, the pressure roll is carried by pivotable levers, the run-on and runoff rolls are mounted with their axes of rotation lying substantially in a common plane, the levers extend in a direction that is substantially parallel to said plane and a pivotal shaft of the levers is adjustable in the said direction. Provision for such adjustability can be made very simply by mounting the pivotal shaft of the levers for eccentric rotation in a machine frame, the shaft being lockable in its adjusted position. The application pressure of the pressure roll may be variable by means of a screw that engages the levers to press the pressure roll against the web. For the purpose of a very fine control of the application pressure, a compression spring is preferably included between the screw and the levers. For the same purpose the pressure roll may be provided with a peripheral covering of elastic material, for example rubber.

In printing machines and particularly multicolor printing machines, where the web must pass through the printing station with the highest possible accuracy, a feed roll train can be provided upstream as well as downstream of the printing station. This arrangement will effectively screen the web portion passing through the printing station from any fluctuations in tension that may be caused by untrue running of the storage reels for the web. Such an arrangement also prevents slipping of the web at the location of the two feed roll trains if, say, slight differences in the diameters of the printing rolls cause additional tension to be exerted on the web while passing through the printing station. In combination, the two feed roll trains force the web to move under substantially constant tension through the printing station so that irregularities in registration that might influence the color print can be avoided or minimized.

Examples of the invention are illustrated in the accompanying diagrammatic drawings, wherein:

FIG. 1 is a side elevation of a feed roll train, and

FIG. 2 shows a layout for a printing machine in which a feed roll train according to FIG. 1 is located upstream as well as downstream of a printing station.

The feed roll train of FIG. 1 comprises a run-on roll 1, a runoff roll 2 and an intermediate roll 3, these rolls being arranged at the corners of an imaginary triangle and a web B being slung about all three rolls. A pressure roll 4 can be selectively applied to the web to press the latter either against the run-on roll 1 or against the runoff roll 2 or simultaneously against both rolls.

The three rolls 1, 2, 3 are intercoupled by means of gears (not shown) so that they are positively turned in the direction of the arrows in FIG. 1. Their peripheral speed is exactly the same as the speed with which the web has to pass uniformly through a processing machine, for example a multicolor printing press. The rolls 1, 2, 3 have both ends of their rotary shafts 5, 6, 7 mounted in a machine frame (not shown). The lengths of the rolls is at least equal to the width of the web. As illustrated, the web B passes over the run-on roll 1, about the intermediate or direction changing roll 3 and leaves the feed roll train by passing over the runoff roll 2. The large areas of contact between the web and the rolls about which they are slung are instrumental in obtaining a good frictional grip of the web on the rolls.

The pressure roll 4 is of the same length as the feed rolls 1, 2, 3. Both ends of a rotary shaft 8 of the pressure roll are mounted in a pivotal lever 9. Both levers 9 extend in the direction of the common medial plane of the run-on and runoff rolls 1 and 2. Their pivotal axes are formed by eccentric discs 10 of which an eccentric shaft 11 is mounted in the machine frame and is rotatable into and out of three rotary positions *a*, *b* and *c* by means of a setting lever 12 which can be locked in any one adjusted position of the shaft 11. By turning the eccentric device 10, 11, the levers 9 are displaced relatively to the feed rolls 1, 2. The arrangement of the pressure roll 4 on the levers 9 is such that the pressure roll will be simultaneously applied to both feed rolls 1, 2 in the central rotary position of the discs 10, against only the upper feed roll 1 in the lower rotary position *c* shown in the drawing and against only the lower feed roll 2 in the upper position *b*, as indicated in chain-dotted lines for the roll 4 in FIG. 1.

The levers 9 are pivotable by means of a screw spindle 13 and handwheel 14. The spindle 13 engages in a nut 15 that is tiltable in the machine frame and engages the levers 9 via a compression spring 16. The screw spindle permits the pressure roll 4 to be applied at a variable pressure, the compression spring 16 permitting a very fine adjustment of the pressure. Pressure roll 4 may be provided with a peripheral covering of rubber.

If extensive fluctuations in tension are anticipated only in that portion of the web material that is running off the runoff roll 2, such as might be caused by untrue running of a storage reel on which the web is being wound, then the pressure roll 4 is applied to press the web against the run-on roll 1. The pressure exerted by the pressure roll causes an increase in friction between the web *b* and the run-on roll 1 and thus the web will slip less readily on the run-on roll than on the rolls 2, 3. A sudden increase in the tension of the web portion leaving the feed roll train will therefore cause the web to be swung more tightly about the rolls 2 and 3 and thereby increase the friction

between the web and these rolls. Such increase in friction depends on the pressure with which the pressure roll **4** is applied. By means of the screw spindle **13** it can be adjusted so that slipping of the web in the train of feed rolls is prevented despite the fluctuations in tension that are expected to be encountered in the running-off portion of the web. The variations in tension are thereby kept quite remote from the incoming portion of web material.

On the other hand, if fairly large variations in tension are anticipated only in that portion of the web that is arriving at the feed roll **1**, as caused for example by untrue running of a storage reel from which the web is being unwound, then the pressure roll **4** is applied to the runoff roll **2** where it will have the same effect on the rolls **1**, **2** as previously described and keep the tension fluctuations remote from the web portion that is leaving the feed roll train.

Finally, if tension fluctuations are expected in the incoming as well as the outgoing portions of web material, then the pressure roll **4** should be applied to both feed rolls **1**, **2** to avoid slipping of the web.

FIG. **2** illustrates two trains of feed rolls of the FIG. **1** kind used in conjunction with a multicolor printing press. The web *b* which is to be printed is unwound from a storage reel **19** by means of a feed roll train **18** and it is moved through a printing station formed by the individual printing rollers **21**, **22** and **23** and past a drying station **24** by a feed roll train **20**. The printed web is finally wound onto a storage reel **25**. The two trains **18**, **20** are thus arranged respectively upstream and downstream of the printing station **21**, **22**, **23**. The downstream train need not run at precisely the same peripheral speed as the printing rollers. This is because the humidity of the printing inks or intensive drying in the drying station may give rise to elongation or shrinkage of the web that would necessitate a different withdrawal speed for the web at the location of the train **20**. For this reason the downstream train **20** is driven through a control drive that sets the correct peripheral speed that is required at any particular time in order to give the desired web tension.

In view of the above-described effect, the feed roll trains in FIG. **2** screen the web portion passing through the printing station against any damaging variations in tension that might be caused by untrue running of the store reels **19**, **25** and that might make themselves felt downstream of the printing station. In addition, the FIG. **2** arrangement minimizes slipping of the web in the feed roll trains **18**, **20** under the influence of fluctuations in tension that might be caused at the printing station **21**, **22**, **23** by untrue running of the printing rolls or differences in the diameters thereof.

We claim:

1. A train of feed rolls for webs of material, comprising a run-on roll, a runoff roll and an intermediate roll about all of which the web can be slung, an adjustable pressure roll and means for varying the position of said pressure roll so as to selectively press against the periphery of the run-on roll, the runoff roll, or both said rolls simultaneously.

2. A feed roll train according to claim **1**, including means for varying the application pressure of said pressure roll.

3. A feed roll train according to claim **1**, wherein the pressure roll is carried by pivotable levers, the run-on and runoff rolls are mounted with their axes of rotation lying substantially in a common plane, the levers extending in a direction that is substantially parallel to said common plane and a pivotal shaft of the levers is adjustable in the said direction.

4. A feed roll train according to claim **3**, wherein the said pivotal shaft of the levers is mounted for eccentric rotation in a machine frame and can be locked in its adjusted position.

5. A feed roll train according to claim **3**, including a screw engaging the levers for pressing the pressure roll against the web.

6. A feed roll train according to claim **5**, including a compression spring between the screw and the levers.

7. A feed roll train according to claim **5**, wherein the pressure roll has a peripheral covering of elastic material.

8. A web-processing machine incorporating a feed roll train according to claim **1**.

9. A printing machine for a web of material, comprising a printing station and a feed roll train according to claim **1** located upstream as well as downstream of the printing station.

10. A printing machine according to claim **9**, wherein the feed roll train downstream of the printing station is driven through control gearing.

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