Sept. 18, 1956 J. P. MACKIE 2,763,035

STOP MECHANISM

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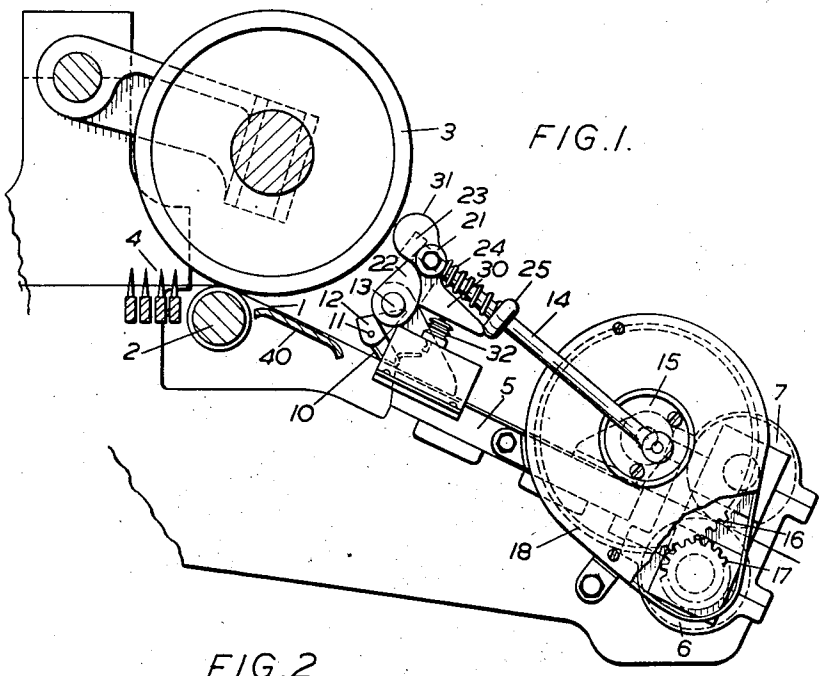

FIG. 1.

FIG. 2.

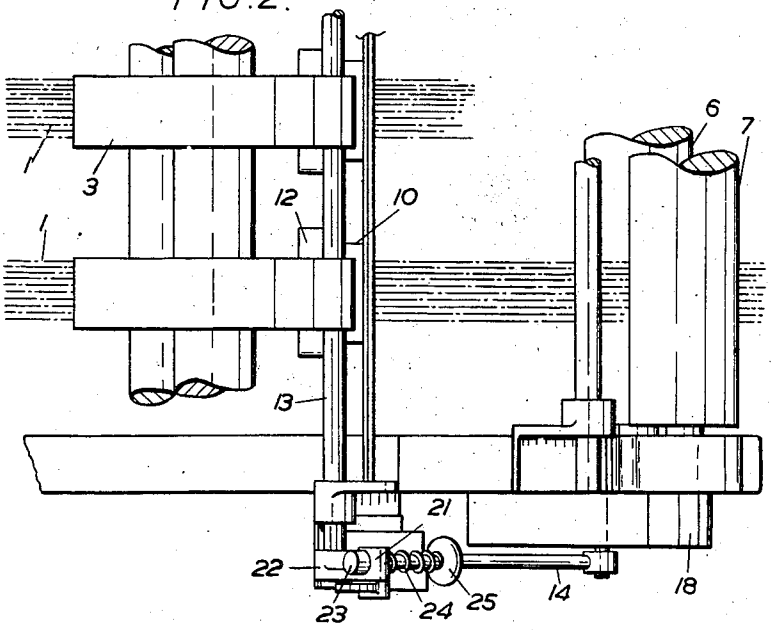

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FIG. 3.

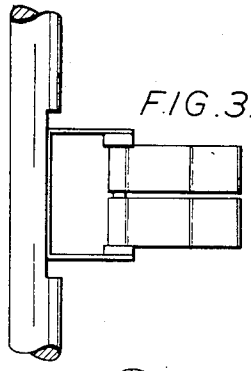


FIG. 4.

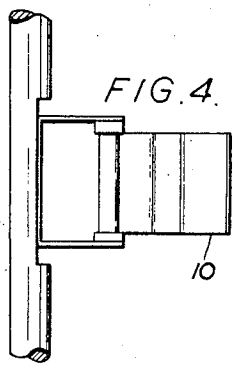


FIG. 5.

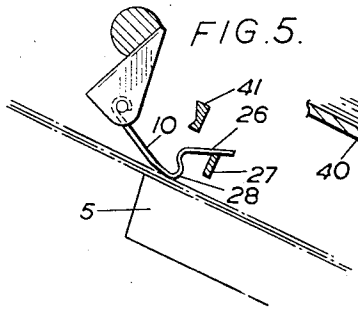


FIG. 6.

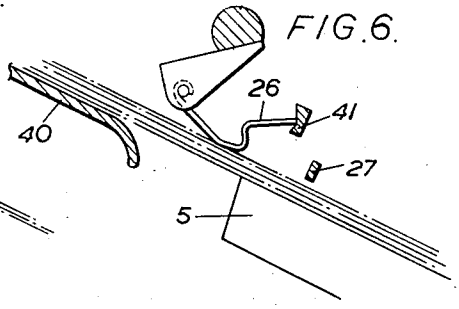
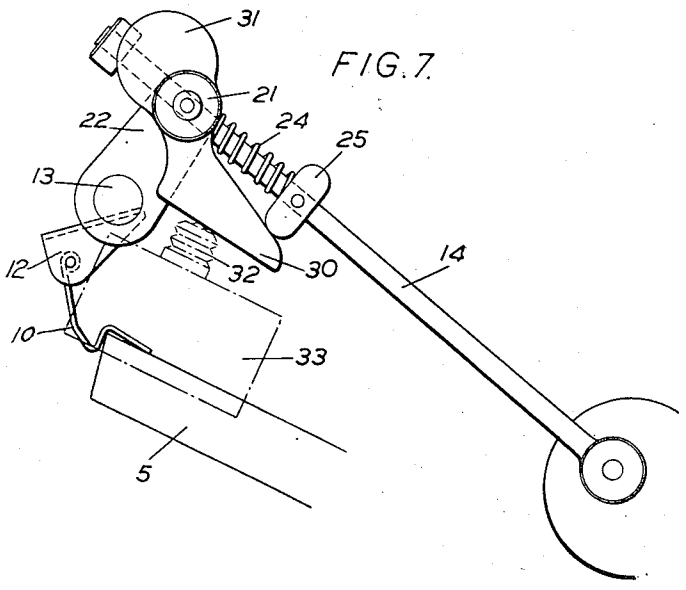


FIG. 7.



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STOP MECHANISM

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Application March 9, 1953, Serial No. 341,227

10 Claims. (Cl. 19—169)

This invention relates to stop mechanisms for drawing frames and similar textile machines such, for example, as spinning frames, in which sliver or other fibrous material emerging from a drawing head then proceeds to a further stage of treatment.

The most important of the faults occurring in the operation of such a machine and which may be detected by means of a stop mechanism is the disruption of the sliver on its passage from the drawing rollers, and stop mechanisms employing a detector bearing on the sliver over this part of its travel are well-known. The usual form of such stop mechanism comprises a detector which bears directly on the sliver in a fixed position between the drawing rollers and, in a drawing frame for example, the delivery rollers. In the event of disruption of the sliver in this region, the detector member passes through and beyond the normal line of travel of the sliver, and this movement is utilised to operate a stop device.

Stop mechanisms of this general type are unsatisfactory for a number of reasons. The sliver, particularly in a drawing frame of the finisher type, is extremely fragile and the detector is dependent on the strength of the sliver to support its whole weight. This often causes a gradual sag in the sliver, and in consequence a build-up of vagrant fibres takes place on the detector or between the detector and the moving sliver. This can then result in disruption of the sliver due to excessive friction and to the excessive bearing area thereby produced between the detector and the surface of the sliver.

This disadvantage can be partly overcome by the use of a very light detector, but this gives rise to a further disadvantage in that such a detector will not function until the sliver is completely disrupted. It often happens that the sliver becomes partially broken and it is clearly desirable that the stop mechanism should be brought into action under such conditions.

These disadvantages are overcome in accordance with the present invention by the use of a detector member which is repeatedly caused to move relatively to the fibrous material in a closed path in such a way as to engage the fibrous material over part at least of its path of movement, and which in the event of disruption of the fibrous material has its normal movement interrupted so as to operate a stopping device.

The substantially continuous movement of the detector avoids any such build-up of vagrant fibres as previously mentioned, while at the same time the detector is able to operate satisfactorily with only partial disruption of the material. In practice, the departure of the detector member from its normal path of movement causes either the member itself or a part moving with it to engage a co-operating member and so operate the stopping device. Preferably, the path of movement of the detector runs generally parallel with the direction of movement of the fibrous material, and the detector is caused to reciprocate along this path, being deflected from it to engage the co-operating member when the fibrous material is disrupted.

Although the path of movement is generally parallel with the direction of movement of the fibrous material, it is preferred that the detector should touch the material during only a short portion of its travel. This has the effect of deflecting the material to the smallest extent and does not interfere with its normal passage from the machine. The co-operating member preferably consists of an abutment so that when the detector departs from its normal path of movement, its motion is stopped by the abutment, and this is utilised to operate a stopping device. This may be achieved by transmitting the motion to the detector from a driving member by way of a spring so that when the motion of the detector is stopped, the spring is deformed. The relative movement then occurring between the ends of the spring is used to operate the stopping device.

Preferably the reciprocation of the detector is produced by a shaft rocked by a connecting rod driven from an eccentric. The drive from the connecting rod is transmitted through a spring to a link mounted on the shaft so that when the motion of the detector, and hence the shaft, is stopped, the connecting rod is displaced in relation to the link. The relative motion between the ends of the spring is then used to produce a camming action to operate a switch, and thus stop the machine. If the stop mechanism is to be used for a drawing frame comprising a large number of separate drawing heads, the rocker shaft may extend across the whole width of the machine and carry a number of detectors, one for each drawing head and co-operating respectively with the sliver from that drawing head.

Although detection of disruption of the sliver or other fibrous material is of primary importance, another fault which may occur is caused by choking of the sliver in its passage from the drawing rollers. This may be caused in a number of ways, such, for example, as failure of the drawing rollers to pull the sliver through the machine at the correct drafting speed, with the result that a very heavy sliver is delivered and causes an obstruction between the drawing rollers and the next part of the machine. This sliver mass quickly builts up and may result in considerable damage. A stop mechanism in accordance with the present invention may further be utilised to operate on occurrence of a fault of this nature.

In order to achieve this, a second co-operating member is provided with which the detector or a part moving with it moves into contact when deflected by the presence of the thickened sliver. In addition, a deflector plate or similar member is preferably located on the opposite side of the sliver to the detector. Any choking that occurs then forces the sliver away from the plate, carrying the detector with it so as to deflect it from its path of motion in the opposite direction to that caused by the disruption of the sliver. This brings the detector into engagement with the second co-operating member to stop the machine.

A stop mechanism, in accordance with the invention will now be described in more detail, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a side elevation of the delivery and of a drawing frame;

Figure 2 is a plan view of the part shown in Figure 1;

Figures 3 and 4 are plan views of forms of detectors used in the mechanism shown in Figures 1 and 2;

Figures 5 and 6 are side elevations of the detector in operation; and

Figure 7 is a side elevation of the detector and co-operating parts of the stop mechanism illustrating their operation to stop the machine upon the breaking of a sliver.

Referring first to Figure 1, sliver 1 is shown emerging from between drawing rollers 2 and 3 after leaving gill

pins 4. The sliver passes over a sliver plate 5 in the usual way and thence between delivery rollers 6 and 7 to the next stage of treatment. It is during its passage between the drawing rollers and the delivery rollers that faults in the sliver may most readily be detected. For this purpose, a detector 10 bears on the sliver close to the point where it passes over the sliver plate 5. The detector is pivotally mounted by means of a pin 11 to a bracket 12 turning with a rocker shaft 13, best seen in Figure 2.

The shaft 13 is rocked by means of a connecting rod 14 connected to an eccentric 15 driven by meshing gears 16 and 17. The latter is mounted on the shaft of the delivery roller 6 and the gears are enclosed within a casing 18. The rod 14 is free to slide through a bush 21 turning on the end of a link arm 22 rigidly mounted on the shaft 13, and is prevented from withdrawal from the bush 21 by means of a nut 23. The operative thrust is transmitted from the rod 14 to the bush 21 by means of a coiled spring 24 situated between the bush 21 and a collar 25 secured to the rod 14. Thus, as the eccentric 15 rotates so the rod 14 transmits a rocking motion to the link 22 causing the shaft 13 also to rock.

This rocking movement causes the detector 10, which is bearing on the sliver, to reciprocate in a direction parallel with the direction of motion of the sliver. The detector 10, however, is only in contact with the sliver for a short portion of its travel, being lifted clear during the remainder of its travel by the engagement of an extension 26, which engages with a camming surface 27 mounted on the frame of the machine as shown diagrammatically in Figure 5. Thus, the detector touches the sliver briefly during each stroke and any tendency to the build-up of vagrant fibres is overcome. If, however, the sliver should break or become thin, the detector 10 is allowed to drop, and during the course of its reciprocation a shoulder 28, formed in the detector, comes into engagement with the edge of the sliver plate 5 as shown in Figure 7. This immediately stops the movement of the detector, and since this is rigidly connected to the shaft 13, the rocking of this shaft is also stopped.

Consequently, the thrust of the rod 14 causes the spring 24 to be compressed, and the collar 25 moves towards the bush 21. This brings the surface of the collar 25 into engagement with a cam surface formed on one side of an arm 30 pivoted to the bush 21 and provided with a counterweight 31, which normally tends to rotate the arm in an anti-clockwise direction. Movement of the collar 25 towards the bush 21 rocks the arm 30 in a clockwise direction and brings its opposite side to bear against the plunger of a small switch 32 mounted on a block 33 attached to the frame of the machine. This opens the switch and stops the machine.

The stop mechanism is also designed to work in the event of an abnormally thick sliver passing through, or if there is a choke to the left-hand side of the drawing rollers which eventually passes through to the delivery rollers. For this purpose, a deflecting plate 40 is situated below the path of the sliver to the left of the sliver plate 5 so that when an extra thick body of sliver passes from the drawing rollers, the detector 10 is lifted from its usual path of movement. This brings the extension 26 into engagement with a stop member 41 shown diagrammatically in Figure 6 and this again arrests the travel of the detector. This stops the motion of the shaft 13 and causes the spring 24 to be compressed so as to operate the switch 32.

Thus it will be understood that a single detector is arranged to operate either in the event of missing sliver or in the event of abnormally thick sliver. In general, a detector of width corresponding to that of the sliver is used as shown in Figure 4. In some cases, however, if there is likelihood of part only of the sliver being missing, the detector may consist of two or more separate fingers. A construction including two such fingers is

shown in Figure 3, and it will be clear that if either one or the other of these two fingers drops below its normal path of travel owing to the absence of part of the sliver, it will come into engagement with the edge of the sliver plate 5, and operate to stop the machine in the manner already described.

I claim:

1. In a textile machine having a pair of drafting rollers, a sliver plate and a pair of delivery rollers, said drafting rollers feeding sliver over said sliver plate to said delivery rollers, the combination of a detector, means for cyclically moving said detector so as to engage said sliver over part at least of its path of motion, said path of motion being such that if said sliver is missing said detector drops to engage the edge of said sliver plate stopping further motion thereof, and means responsive to stoppage of the motion of said detector for stopping the machine.

2. A textile machine according to claim 1 in which said means responsive to stoppage of the motion of said detector comprises a yieldable connection between said detector moving means and said detector, and means responsive to yielding of said connection for stopping the machine.

3. In a textile machine having a pair of drafting rollers, a sliver plate and a pair of delivery rollers, said drafting rollers feeding sliver over said sliver plate to said delivery rollers, the combination of a rocker shaft, a radial arm projecting from said rocker shaft, a detector pivoted to said arm, means for rocking said rocker shaft whereby said detector is caused to reciprocate in engagement with said sliver, the path of reciprocation being such that if said sliver is missing said detector drops to engage the edge of said sliver plate whereby said rocker shaft is stopped, and means responsive to stoppage of said rocker shaft for stopping the machine.

4. A machine according to claim 3, in which said rocking means comprises an eccentric, means for driving said eccentric, a rod connected to said eccentric, a second radial arm on said rocker shaft, and a spring transmitting the movement of said rod to said second arm, and in which said means for stopping the machine comprises cam means responsive to distortion of said spring consequent on stoppage of said rocker shaft.

5. A machine according to claim 4 and including an electric switch operated by said cam means.

6. In a textile machine having a pair of drafting rollers, a sliver plate and a pair of delivery rollers, said drafting rollers feeding sliver over said sliver plate to said delivery rollers, the combination of a rocker shaft, a radial arm extending from said shaft, a detector pivoted to said arm, a second radial arm extending from said shaft, an eccentric, means for driving said eccentric, a rod connected to said eccentric, a spring transmitting the movement of said rod to said second arm to rock said rocker shaft, whereby said detector is caused to reciprocate in engagement with said sliver, means for lifting said detector from said sliver during part of its reciprocation, the path of reciprocation being such that if said sliver is missing said detector drops to engage the edge of said sliver plate, abutment means situated above the path of reciprocation of said detector, said detector moving into engagement with said abutment means when the thickness of said sliver increases, cam means responsive to distortion of said spring consequent on stoppage of said rocker shaft, and switch means operated by said cam means to stop the machine.

7. A machine according to claim 6, in which said detector comprises a plurality of parallel fingers spaced across the width of said sliver.

8. A machine according to claim 6, and also comprising a deflector plate situated on the opposite side to said detector of said sliver.

9. In a textile machine including means defining a a path of travel of fibrous material, the combination of a

pivoted detector, a mounting for said detector, support means for said fibrous material, said fibrous material passing between said detector and said support means, means for producing cyclically repeated relative motion between said detector and said support means, and means responsive to interruption of said cyclic relative motion to stop said machine.

10. In a textile machine including means defining a path of travel of fibrous material, the combination of a pivoted detector, a mounting for said detector, support means for said fibrous material, said fibrous material passing between said detector and said support means, means for producing a cycle of repeated relative motion between said detector and the said support means so as to bring said detector into engagement with said fibrous material as it passes over said support means, failure of said detector to encounter said fibrous material at that point resulting in an interruption of said cycle, and means responsive to said interruption for stopping the machine.

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