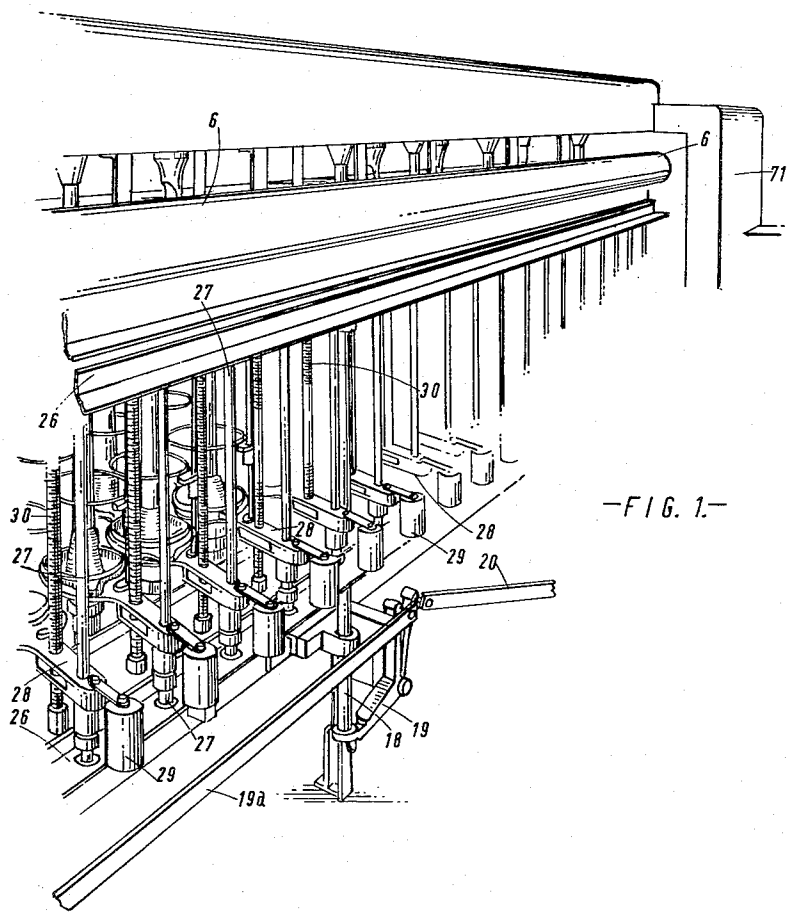
Aug. 29, 1961 F. LEACH ET AL 2,997,836

DOFFING OF SPINNING MACHINES

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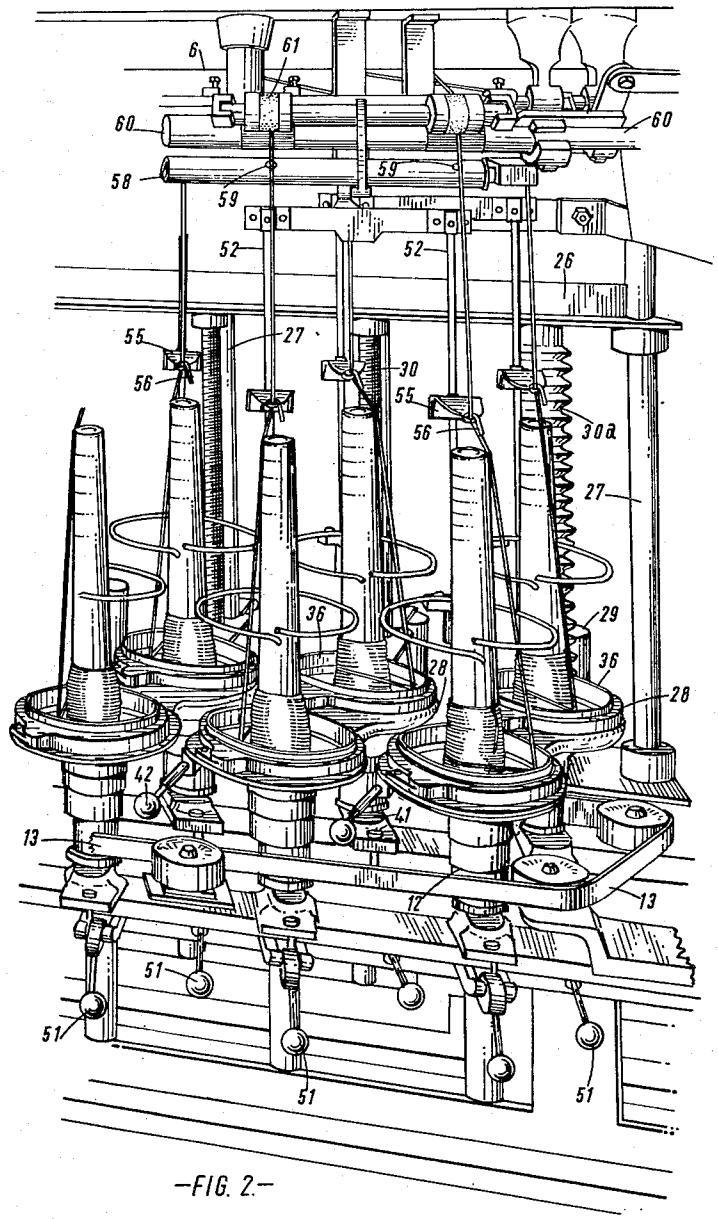
—FIG. 1.—

INVENTOR
Frank Leach and Harry Hunter
BY Reed & Ross
ATTORNEYS

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DOFFING OF SPINNING MACHINES

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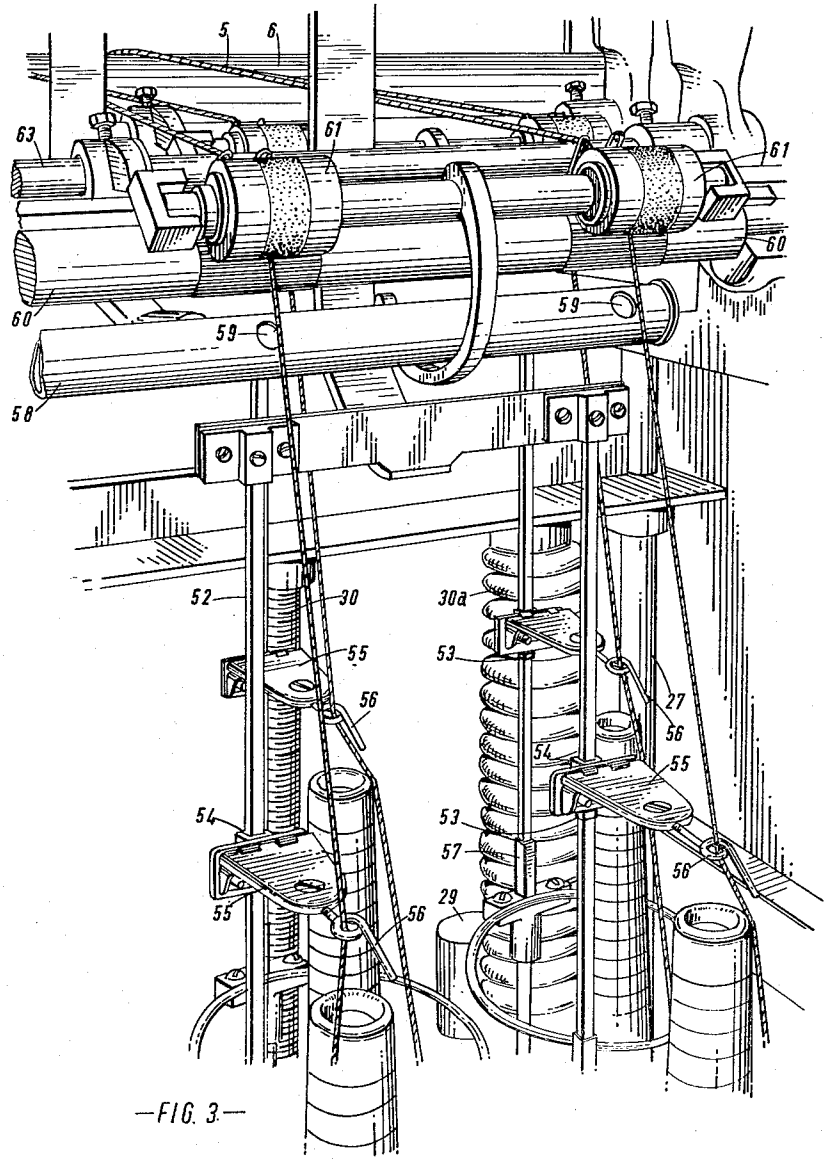
—FIG. 2.—

INVENTOR
Frank Leach and Harry Shenton
BY Ross & Ross
ATTORNEYS

Aug. 29, 1961 F. LEACH ET AL 2,997,836

DOFFING OF SPINNING MACHINES

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—FIG. 3.—

INVENTOR

Frank Leach and Harry Silverton

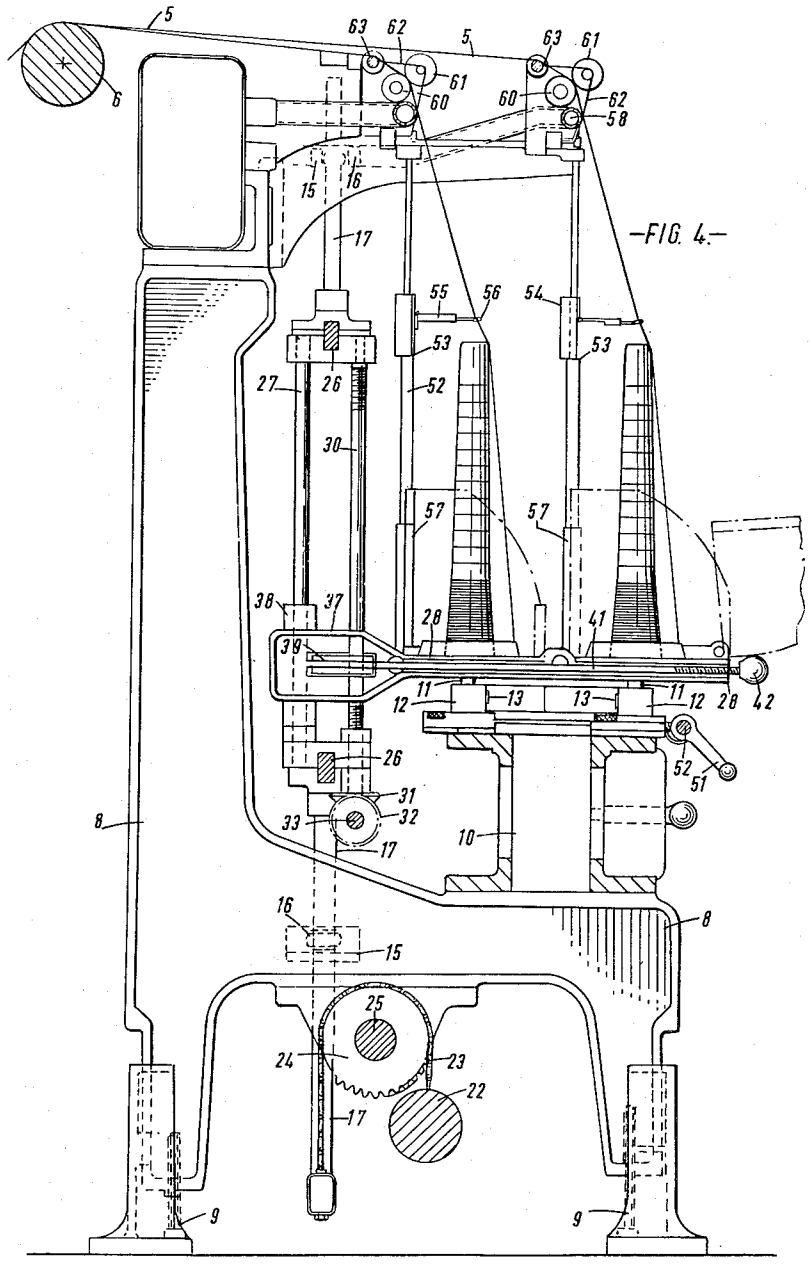
BY Ross & Ross

ATTORNEYS

Aug. 29, 1961 F. LEACH ET AL 2,997,836

DOFFING OF SPINNING MACHINES

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-FIG. 4.-

INVENTOR

Frank Leach and Harry Shenton

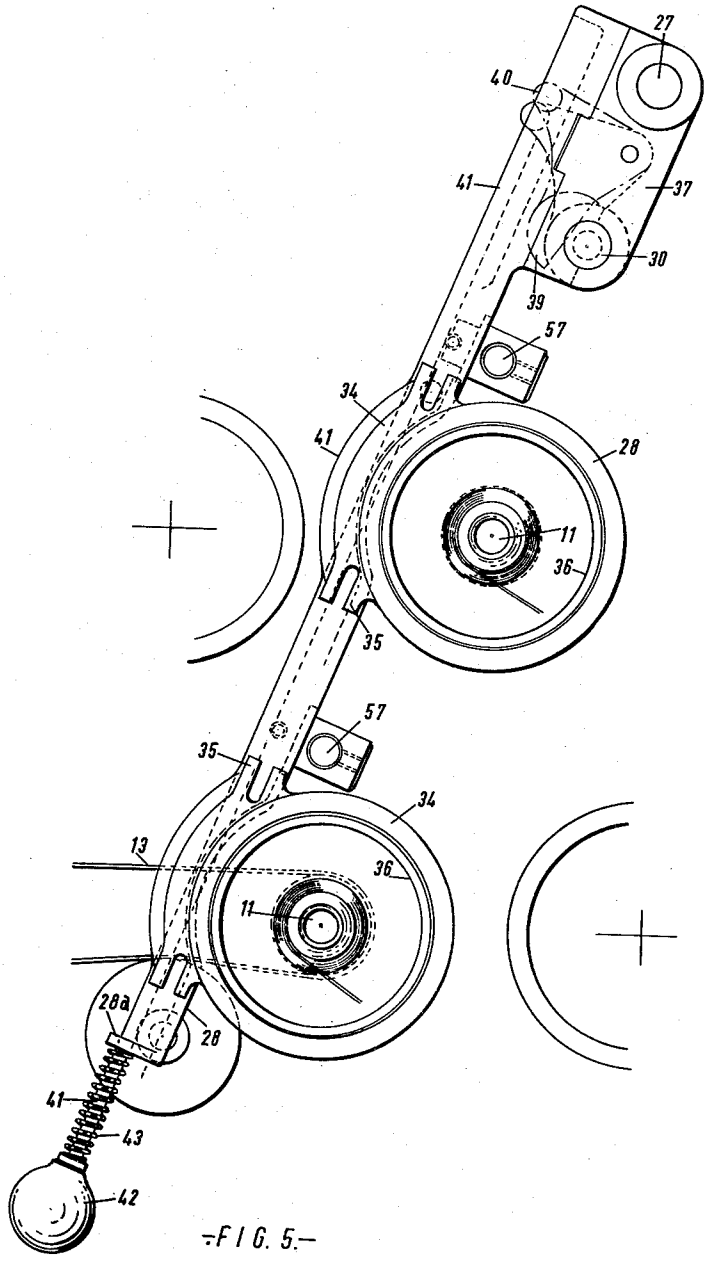
BY Russ & Ross

ATTORNEYS

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DOFFING OF SPINNING MACHINES

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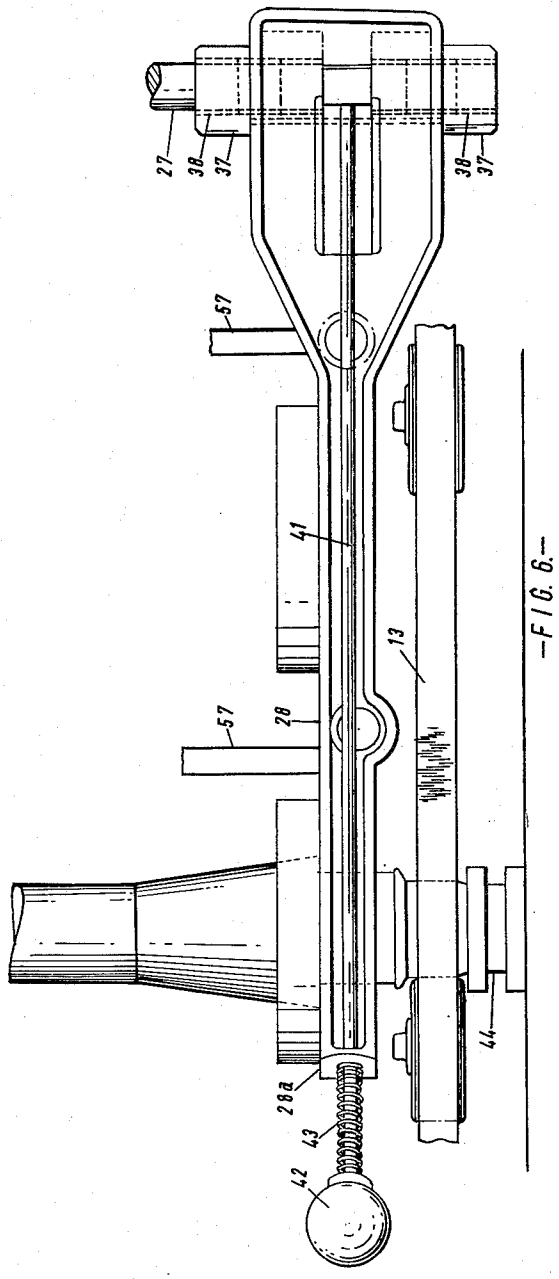
-FIG. 5.-

INVENTOR
Frank Leach and Harry Shenton
BY
Ross Ross
ATTORNEYS

Aug. 29, 1961 F. LEACH ET AL 2,997,836

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—FIG. 6.—

Frank Leach and Harry Shanton INVENTOR

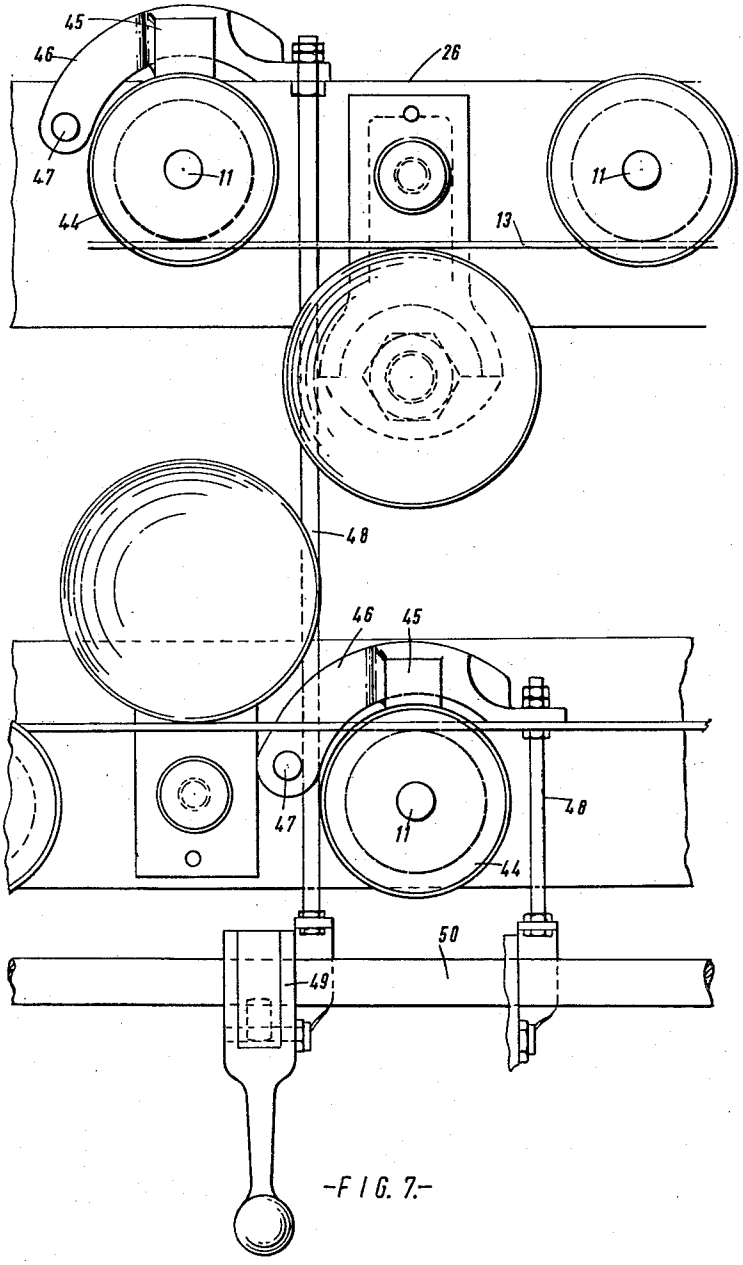
BY Ross Ross

ATTORNEYS

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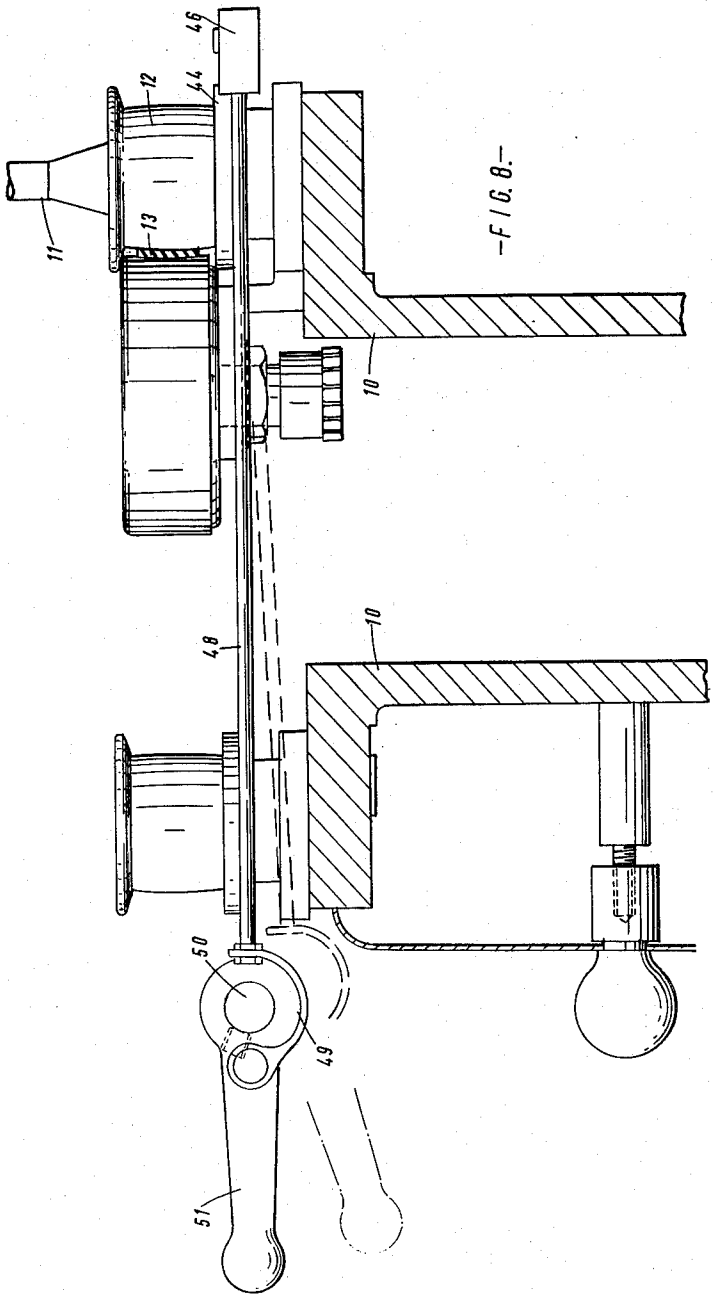
-FIG. 7.-

INVENTOR
Frank Leach and Harry Shenton
BY Ross, Ross
ATTORNEYS

Aug. 29, 1961 F. LEACH ET AL 2,997,836

DOFFING OF SPINNING MACHINES

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-FIG. 8.-

Frank Leach and Harry Shenton INVENTOR

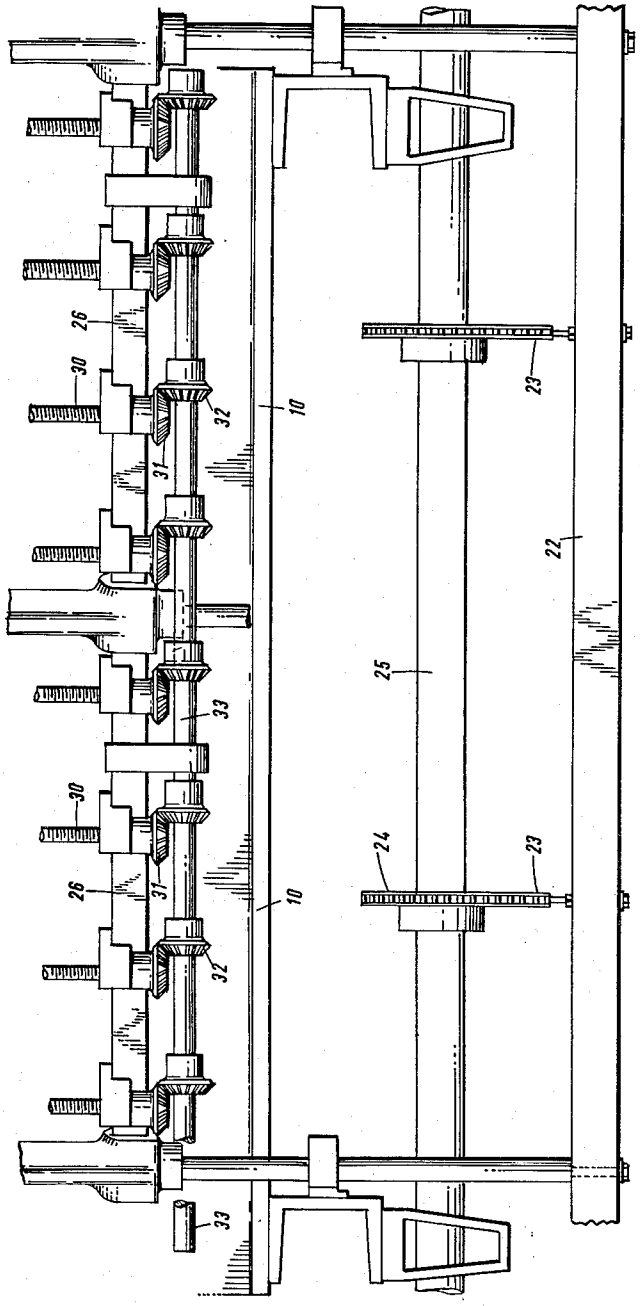
BY Bass, Ross

ATTORNEYS

Aug. 29, 1961 F. LEACH ET AL 2,997,836

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-FIG. 9.-

INVENTOR
Frank Leach and Harry Shanton
BY Ross & Ross
ATTORNEYS

United States Patent Office

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2,997,836

DOFFING OF SPINNING MACHINES

Frank Leach and Harry Shenton, Rochdale, England, assignors to Permo Spinning Limited, Rochdale, England, a British company

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Claims priority, application Great Britain Mar. 5, 1958
4 Claims. (Cl. 57—52)

This invention relates to the spinning of yarn in a ring frame, and has for its object to provide means whereby stoppages of the frame due to the necessity of doffing full bobbins of yarn are avoided. Hitherto the structure and manner of use of a ring frame has been such that all the yarn packages have been filled at the same time and the machine has had to be brought to a standstill while all the spindles are doffed and donned. This has involved much loss of production time because each spindle has had to be idle not only while its own doffing and donning is carried out but while the doffing and donning of all the other spindles has been carried out.

The present invention eliminates this time wastage since it allows for each spindle being idle only while its own doffing and donning is effected, the machine as a whole operating continuously.

The invention provides a method of spinning yarns on a ring frame wherein the timing of the filling of the yarn packages on the respective spindles is such that the packages become full in a predetermined sequence, and wherein doffing is effected in the same sequence, the ring at a full package being moved to its lowest position selectively prior to the doffing of such full package, independently of the movements of the rings at all the packages not yet full.

In an apparatus according to the invention, ring holders associated with the respective spindles in a ring spinning machine are made adjustable axially of the spindles independently of each other (or in small groups) so that, when a bobbin (or small group of bobbins) is full, the ring holder associated therewith may be moved to its lowest position and the bobbin (or group of bobbins) removed and replaced by an empty one without interfering with the spinning of the other bobbins, and thus without stopping the machine. A convenient number of rings in a group for simultaneous return to the starting position independently of other rings is two, but in some machines there may be more than two, or on the other hand, each individual ring may be independently movable.

The invention may include the further feature that the lappets which guide the yarn to the travellers on the rings are vertically adjustable between a normal lower position and a temporary higher position and are adapted to partake of the traverse movement of the ring during the later stages of building up the cop, so as to ensure a minimum distance between lappet and traveller in the later stages of cop-building without having too great a maximum distance between those parts in the first stages of cop-building. This feature is particularly useful in the spinning of yarn into the longer packages now becoming more popular.

The invention will now be described with reference to the accompanying drawings, wherein:

FIG. 1 is a perspective view of a part of the rear of a ring spinning machine according to the invention;

FIG. 2 is a perspective view of a part of the front of the machine;

FIG. 3 is an enlarged perspective view taken from the front of the machine to show the arrangement of adjustable lappets;

FIG. 4 is an end elevation of the machine;

FIG. 5 is a plan to a larger scale of one of the releasable ring carriers equivalent to sections of a ring rail;

FIG. 6 is a side elevation of the ring carrier shown in FIG. 5;

FIG. 7 is a diagrammatic plan of a braking mechanism for the spindles;

FIG. 8 is a side elevation of such braking mechanism; and

FIG. 9 is a front elevation of the means for driving the traverse mechanism.

Referring particularly to FIGS. 1, 2 and 4, the improved spinning machine comprises end frames **8** adjustably carried on feet **9**. Said end frames **8** carry between them a longitudinal structure or bolster **10** on which are mounted spindle bearings for two rows of spindles **11**, these spindles being fitted with the usual driving pulleys **12** for engagement by a snake band or belt **13** in known manner. All the spindles rotate in the same direction and at the same speed, the snake band **13** receiving its drive in known manner, usually through a variable speed drive.

Also carried between the said end frames **8** are longitudinal bars **15** on which are bearings **16** for vertically slidable rods **17**, which are in upper and lower parts and are adapted to be raised and lowered through said bearings **16**. The raising and lowering movement is effected by poker bars **18** (FIG. 1) under the control of bell cranks **19**, which in turn are oscillated by a connecting rod **20** from any known kind of drive, the several bell cranks being coupled together by a coupling rod **19***a* for simultaneous movement. The poker bars therefore impart a "chase" movement to the said rods **17**, and the actual drive for this movement may be of any known kind. The said rods **17**, and the cop-building structure carried by them (described below), are counterweighted by balance weights **22** held on the ends of chains **23** which pass over the chain sprockets **24** on a shaft **25**.

Between the upper and lower portions of the said vertical rods **17** is a rectangular frame structure comprising longitudinal members **26** connected together by vertical spacers **27**, said spacers **27** also constituting vertical guides for the rear end of ring-carrying arms **28**. Said arms **28** are counter-balanced by weights **29**, see for example FIG. 1.

Also extending between the members **26** are vertical screws **30**, one for each ring-carrying arm **28**, on the lower end of each of which screws is a bevel wheel **31**, see FIG. 10, meshing with a complemental bevel wheel **32** on a horizontal shaft **33** extending across the machine. This shaft **33** will be driven by a chain drive on a toggle linkage (not shown), the toggle linkage straightening and flexing as the shaft **33** rises and falls during the chase movements. The chain sprockets will be co-axial with the pivot points of the said linkage and the shaft **33** will therefore have a continuous rotation despite its rising and falling movements. The screws **30** may be enclosed in a resilient bellows type cover **30***a*, one of which is shown in FIG. 3. This serves to exclude dust and fly from the screw threads.

The up and down movement of said frame takes place continuously between fixed limits, which limits are variable for example by varying the connections between the said connecting rod **20** and the bell crank levers **19** or by making variations in the drive to the connecting rod. This up and down movement constitutes a "chase" movement as known in ring spinning frames.

Referring now more particularly to FIGS. 5 and 6, each ring-carrying arm **28** carries in a removable manner two annular ring holders **34**. These ring holders have connecting lugs **35** by which they are secured to the arm **28** and each such holder carries a ring **36**, provided with a traveller (not shown) and lubricating means therefor in known manner. Each ring **36** lies around and concentric with a spindle **11**. In the particular case shown,

each arm 28 carries two rings 36, one for a spindle in a front row and the other for a spindle in a rear row. In other cases, there could be only one ring or more than two rings on each arm, as may be convenient.

At its rear end, each said arm 28 is formed or provided with a bearing system 37 having bushes 38 to slide on the said spacers 27 and on the screws 30. Pivotally mounted in each such bearing system 37 is a half-nut 39 adapted by its pivoting movements to enter into and be withdrawn from engagement with the screw 30. This half-nut 39 is pivotally connected at 40 to a push rod 41 which lies alongside the arm 28 and the front end of which has an operating knob 42 between which and the front end 28a of the arm 28 is a compression spring 43. This spring normally moves the rod 41 forwardly so as to pivot the half-nut 39 in a direction (anticlockwise in FIG. 5) to engage the screw 30, in which position it causes the arm 28, and all that is carried thereby, to move upwardly under the driving influence of the rotating screw 30. At the same time however, since the arm 28 when coupled to the screw 30 becomes a part of the rising and falling frame, it partakes of the above-mentioned chase movement as well as having a rising movement within the frame.

By pushing the knob 42 inwardly, against the resistance of spring 43, the half-nut 39 can be disengaged from its screw 30, thereby leaving the arm 28, and all that it carries, free to be lowered (and raised) on its guides independently of the chase movements of the frame and independently of all the other arms 28.

Referring now to FIGS. 7 and 8, each spindle 11 carries a brake disc 44, to be engaged by a brake pad 45 on a shoe 46 which is pivoted at 47 to the adjacent angle member 26 of the said frame. Each shoe 46 has a pull rod 48, the forward end of which is connected to a crank disc or eccentric toggle member 49 freely mounted on a shaft 50 running along the front of the machine. Said member 49 has an operating knob 51 to facilitate its being rotated. When the knob 51 is in the lowered position as shown in broken lines in FIG. 8, the rod 48 is pushed backwards and thereby disengages the brake pad 45 from the brake disc 44, whereas, when the knob 51 is pulled upwardly to the position shown in full lines, said rod 48 is moved forwards and causes the brake pad 45 to engage its brake disc 44. This braking mechanism is quite optional and, although tending to shorten the doffing and donning interval, is not essential to the invention.

Behind each spindle 11 is a vertical guide rod 52 of square section (FIG. 4), which is fixedly held in the said frame and has a fixed shoulder or collar 53 near its upper end. Slidable on said rod 52, above said collar 53 is a carrier 54 for a hinged lappet 55 having a pigtail guide 56 at its forward end. The normal position of said lappet is its lowermost position where its carrier 54 rests on the collar 53, but in the later stages of building up the cop, the carrier 54 is engaged by an upward extension 57 on the ring-carrying arm 28 (FIGS. 6 and 7) so that, thereafter, further rising movements of the arm 28 cause the lappet 55 to rise with it. There is therefore a guaranteed minimum distance between the cop and the lappet 55 during the later period of cop building, without having too great a distance between the cop and the lappet during the earlier period of cop building.

Referring now to FIGS. 1 and 4, there are provided at the top of the machine pairs of drafting rollers 60 and 61, one pair for each spindle, the lower rollers 60 of each pair being driven while the upper rollers are held against the lower rollers removably by resilient means indicated at 62 in FIG. 5. There are two sets of such pairs of rollers, one for the spindles 11 in the front row and the other for the spindles in the back row. The yarns 5 after passing over the guide roller 6 pass over respective guide bars of rollers 63 and then through the pairs of drafting rollers 60, 61 and from thence to the pigtail guides 56 and on to the travellers on the rings 36.

On first starting up the machine, the spinning at the various spindles 11 is commenced not at the same time as in a normal ring frame but in a sequence, pair by pair, usually from one end of the machine to the other. At each spindle, the ring carrying arm 28 is in its lowest position when spinning begins. This means that after the machine has been running for a while, the ring carrying arms 28 are at progressively lower levels along the machine since they commenced their rising movement from the initial position at successively later time instants. Similarly, the completion of cop building on the various spindles takes place in the same sequence, and accordingly, when the pair of cops at the highest arm 28 is ready for doffing, the respective ring carrying arm 28 may be disengaged from its lifting screw 30 and lowered to its initial position, thereby making space available for those full cops to be doffed and empty ones donned.

It is apparent therefore, that an operator may set the various spindles spinning at such time intervals that cops are completed at the same intervals, say first at one end of the machine and then progressively along the machine, and the intervals need be of only sufficient duration to give the operator time to doff the full cops and replace them by empty ones. As a result, the machine runs continuously without simultaneous interruption of all the spindles.

Other means for the gradual raising of the ring holders in said frame may be adopted in the place of the screw and nut mechanisms described. For example, there may be for each ring holder 28, an endless chain passing over upper and lower sprockets in the frame with means operated similarly to the rod 41 for clutching and declutching one of said sprockets to and from a driving source, such as the shaft 33; or with means for connecting and disconnecting the ring holder to and from the chain. Either of these arrangements would allow the ring holders to be moved to the lowermost position selectively. In another alternative, a notched bar and ratchet mechanism is used, the bar, or a slide thereon, being raised notch-by-notch to raise the ring holder, and being held by a retaining pawl in such a way that withdrawal of the pawl allows the ring holder to slide freely down the bar to be brought again to its lowest position.

In another arrangement, instead of the push rod 41, a pull rod is provided for pivoting the half-nut 39 into and out of engagement with the screw 30, and a lever for operating that rod is pivoted at the front end of the arm 28 in such a way that the operator may grasp both the arm and the lever to squeeze them together against spring pressure to release the half-nut from the screw 30, the lever returning to its initial position when released, to re-engage the half-nut into the screw.

The selective doffing of individual spindles or of small groups of spindles, in a succession or series, may be carried out in a reverse way to that described without having to stop the machine. For example, the ring holders may be normally stationary with the spindles themselves rising and falling through them and building up the cop, each spindle being selectively engageable with and disengageable from the lifting mechanism so that, at the time of doffing, the spindle may be brought to a lowermost position. In such an arrangement, a normal, continuous ring rail could be used, or if desired, the ring rail could be in end to end sections, each temporarily displaceable to give more room for the donning and doffing movements. In another example, the ring holders (or spindles) could participate in a chase motion only and the spindles (or ring holders) have the building up motion only, but in all cases so that the rings and spindles may be brought to their starting position selectively for doffing individually or in groups without stopping the machine.

What we claim is:

1. In a spinning machine incorporating traverse and chase motions and comprising, a ring frame having independently adjustable replaceable ring holders, a plu-

rality of spinning heads having their rings independently releasable from the chase motion and capable of being returned independently to a starting position, a driving member for a build-up motion at each said spinning head, and releasable clutch means between said driving member and the respective ring or group of rings whereby any ring may be caused to selectively partake of the chase motion at any position in the build-up of the package.

2. In a spinning machine incorporating traverse and chase motions relative to the spindles and comprising, a ring frame having independently adjustable ring holders, a driving member for effectuating a build-up motion at each spindle, releasable clutch means between said driving member and the respective ring whereby any ring may selectively partake of the chase motion at any position in the build-up, said driving member being a constantly rotating screw, said clutch means being a half-nut on a member carrying the ring or rings, and means for moving said half-nut into and out of engagement with the respective said screw.

3. In the spinning machine as set forth in claim 2 with a frame extending across the machine and to which a constant chase motion is imparted, said frame including vertical guides, a ring holding arm on each such guide, and a constantly rotating lifting screw for each such arm,

with the retractable half-nut on the arm for engagement with and disengagement from said screw.

4. In a ring frame incorporating traverse and chase motions, the combination of, a plurality of ring holders adjustable independently of each other in the direction of the traverse and chase motions, drive receiving means on each ring holder of said plurality thereof for releasable connection with the traverse and chase motions, separate driving means on the traverse and chase motions for each ring holder of said plurality thereof for connectively receiving the respective of said drive receiving means at any point in the path of the traverse motion.

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