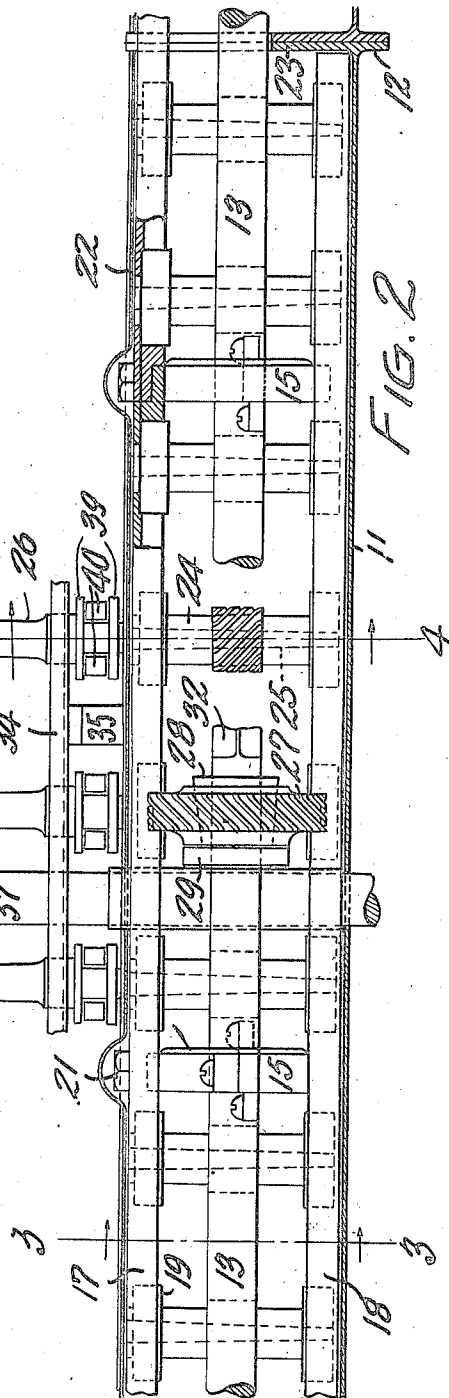
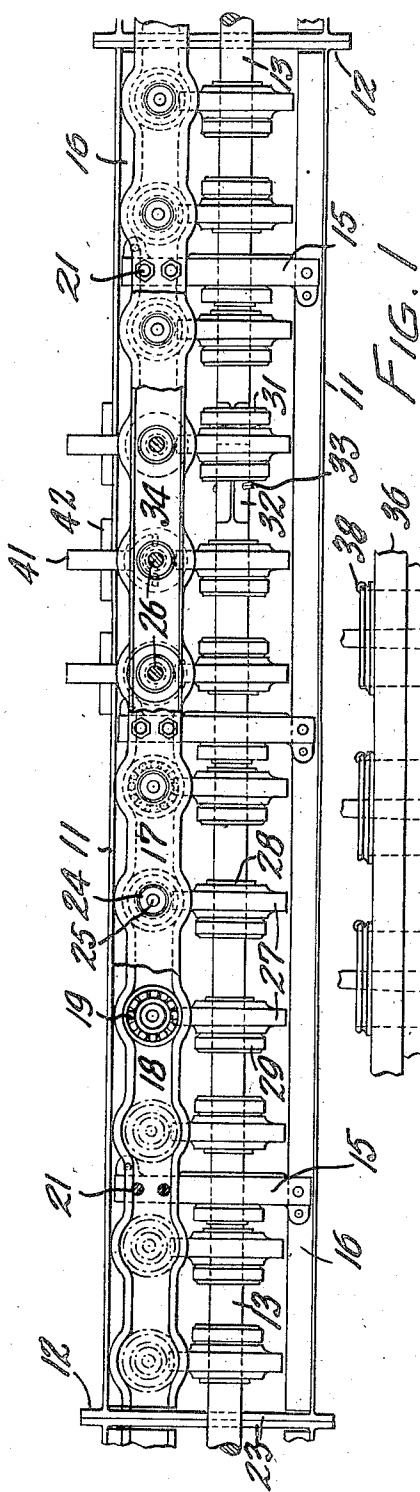


1,317,302.

J. J. LYTH.  
SPINNING FRAME.  
APPLICATION FILED AUG. 24, 1917.

Patented Sept. 30, 1919

2 SHEETS—SHEET 1.

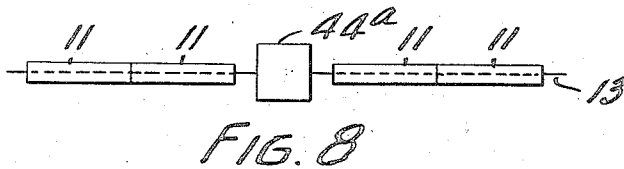
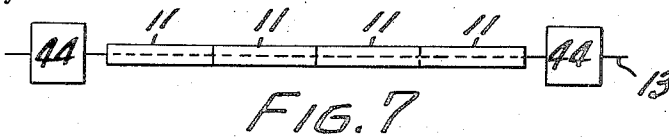
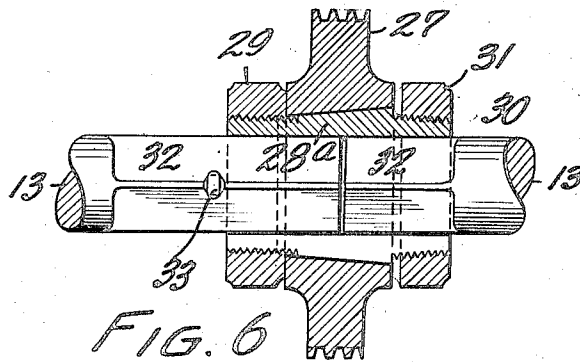
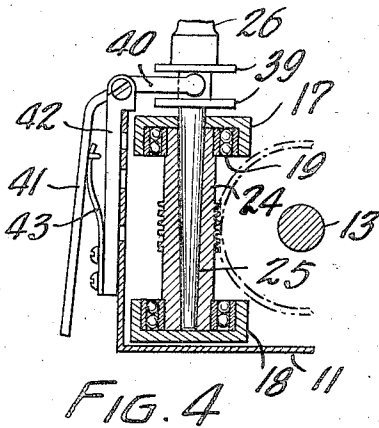
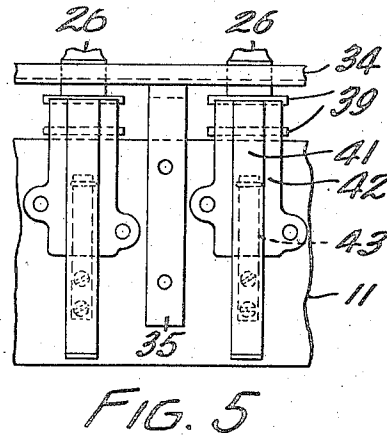
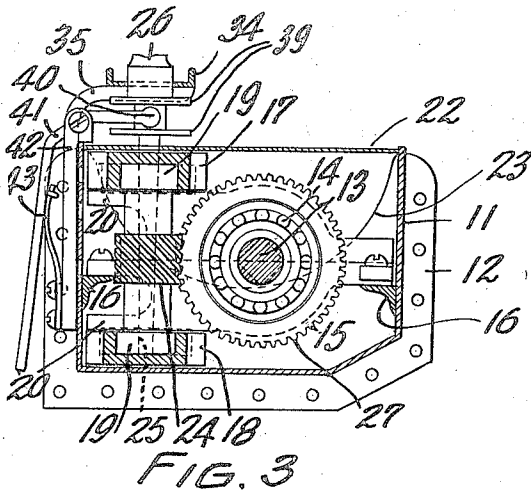


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Inventor  
 John J. Lyth  
 By *Arthur H. Lyth*  
 ATTY.

# UNITED STATES PATENT OFFICE.

JOHN J. LYTH, OF VALLEYFIELD, QUEBEC, CANADA, ASSIGNOR OF ONE-HALF TO JOHN LOWE, OF VALLEYFIELD, QUEBEC, CANADA.

## SPINNING-FRAME.

1,317,302.

Specification of Letters Patent. Patented Sept. 30, 1919.

Application filed August 24, 1917. Serial No. 188,014.

*To all whom it may concern:*

Be it known that I, JOHN J. LYTH, a subject of the King of Great Britain, and resident of the city of Valleyfield, in the Province of Quebec and Dominion of Canada, have invented certain new and useful Improvements in Spinning-Frames, of which the following is a full, clear, and exact description.

10 This invention relates to improvements in spinning machinery, and the object of the invention is to provide apparatus which will be simple and durable in construction and economical in operation.

15 A further object is to provide apparatus by means of which a predetermined speed may be obtained and maintained exactly, so that all spindles of the machine will turn at exactly the same speed at all times.

20 A still further object is to provide a spinning machine in which repairs may be made to parts of the machine without rendering all the spindles thereof idle.

25 Another object is to provide improved means for stopping the movement of individual spindles.

At the present time, spinning machines or spinning frames consist usually of a framework carrying the spindles. A pulley is provided having its face extending the full length of the frame, and the spindles are driven singly or in small groups by belts passing over this pulley or drum. To produce efficient and uniform spinning, it is necessary for all spindles to rotate at the same speed, and for this speed to be uniform at all times. With belt drives, this is a practical impossibility. The use of belts not only produces imperfect spinning, but is very expensive to maintain, owing to the constant wear and slackening of the belts and the power lost in overcoming friction caused by the necessary tightness of the belts. The present machines are usually belt driven from line shafting, and this is in itself expensive, both from the point of capital investment and renewals, and from the large amount of power required to overcome losses due to friction and spindle belt slippage. Attempts have been made to drive ordinary spinning frames by means of direct connected motors, but this is not considered advisable, as the retention of the driving drums necessitates the use of low speed

motors which are large and expensive, and do not eliminate the troublesome spindle belts and slippage of same.

According to the present invention, the belting and drum are eliminated, and the spindle's spiral gear driven from a high speed shaft, to which small and inexpensive high speed motors are directly connected. The shaft and spindle gears run in an oil bath on ball bearings, so that friction is as far as possible eliminated, the size of the machine reduced, the power lost due to belt slippage eliminated, and uniformity of spindle speed insured. Improved means are provided for quickly and easily stopping individual spindles to repair broken threads.

70 The device is preferably made in comparatively short sections, so that these sections may be built up into a machine of any desired length. Each machine may be driven by a single motor at the end or by two motors arranged one at each end of the shaft, or by a single motor arranged in the middle of the machine. The shaft is also made up in short sections, which may be readily disconnected if it becomes necessary to repair any breakage in that section of shaft or mechanism driven thereby. With this arrangement of motors and sectional shaft, never more than half of a shaft need be rendered inoperative at a time. The use of short sections of shaft further limits the amount of dismantling necessary to replace parts, and therefore reduces the time consumed in such repairs.

In the drawings which illustrate the invention:—

Figure 1 is a plan view of one section of the device showing parts broken away.

Fig. 2 is an enlarged elevation partly in section.

Fig. 3 is a transverse section on the line 3—3, Fig. 2.

Fig. 4 is a transverse section on the line 4—4, Fig. 2.

Fig. 5 is a fragmentary rear elevation showing the spindle release.

Fig. 6 is a fragmentary sectional view showing the method of joining two sections of shaft.

Figs. 7 and 8 are diagrammatic views illustrating methods of applying motor drive to the machine.

Referring more particularly to the draw-

ings, 11 designates a trough having at the ends flanges 12, by means of which it may be connected to adjacent troughs. A shaft 13 passes longitudinally through the trough, the shaft being preferably formed in sections of approximately the same length as the trough, so that there will be one shaft coupling in each trough. The shaft is journaled in ball bearings 14 mounted in carriers 15 supported on brackets 16 extending longitudinally of the front and back of the trough.

Upper and lower bearing rails 17 and 18 respectively are provided at the front of the trough. These rails are preferably of channel form and arranged with their flanges facing one another. The flanges of each rail are upset away from each other, so as to form seats for ball bearings 19. The rails are constructed in sections of approximately the same length as the sections of trough, and in joining up these sections, the joints of the upper rail are staggered with respect to the joints between the trough sections, so that the upper rail may be used to assist in aligning trough sections. Each section of the lower rail preferably extends throughout a section of the trough. The bearing carriers 15 are provided with lugs 20 which bear on the lower rail and support the upper rail. These bolts perform the triple function of holding the sections of the top rail together, holding both rails in place and holding the supports 15 in place. Each section of the trough is provided with a cover 22. At the ends of the sections and if desired at a suitable number of intermediate points, internal flanges 23 are provided, which stiffen the trough and form oil checks, so that if the machine is not properly leveled, oil in the troughs will not run all to one end. These flanges are of such height between the front and back of the trough that the shaft passes over and not through them.

Spiral gears 24 are mounted between the upper and lower bearing rails 17 and 18 in the ball bearings 19. These gears each have a slightly tapered bore 25 for the reception of the tapered end of a spindle 26, the taper being so slight that the spindles will wedge in sufficiently tight for driving purposes of their own weight or may be pressed in to a driving connection, but not so tight that they cannot be easily removed. Spiral gears 27 are mounted on the shaft 13 to mesh with the gears 24. These gears 27 are each mounted on the shaft by means of a split tapered bush 28 threaded at the small end to receive a nut 29, which bears against the side of the gear. By tightening the nut against the side of the gear, the tapered bush is drawn through the gear and contracted around the shaft, so as to clamp the gear tightly to the shaft,

The coupling of the shaft sections is made by means of a special tapered bush 28<sup>a</sup> similar to the bushes 28 but having at its large end a reduced portion 30 taper-threaded to receive a nut 31. The bush 28<sup>a</sup>, instead of having a cylindrical bore similarly to the bush 28, has a polygonal bore to receive the polygonal end portions 32 of the shaft sections. The polygonal end portion of one shaft is twice as long as the polygonal end portion of the other shaft, and is slightly longer than the bush itself. Thus, the bush may be slid on to the longer polygonal end portion of one shaft, so as to disengage the other shaft, but when the bush is slid on to the other polygonal end portion, it engages both end portions for an equal distance as clearly shown in Fig. 6, and may be held in this position by a split pin 33 if the bush is not properly tightened on the shafts by its nuts 29 and 31.

A short distance above the troughs 11, a brake rail 34 is provided, through which the spindles pass freely. This brake rail is supported at suitable intervals by brackets 35 secured to the fronts of the trough sections. Above the brake rail, the usual ring rail 36 is mounted on the poker rods 37 and carries a spinning ring 38 for each spindle.

Each spindle is provided in the space between the top of the trough and the brake rail with a pair of spaced collars 39 between which the spindle is embraced by the jaws 40 of a bell crank lever 41 mounted in a suitable bracket 42 attached to the front of the trough. A spring 43 is arranged to hold the lever in such position that when the spindle is operatively engaged in the gear 24, the jaws will be out of engagement with both collars, so that there will be absolutely no friction between the jaws and the collars. The necessity for this can be readily understood when it is remembered that the spindle turns at approximately 10,000 revolutions per minute. This lever may also be used to press the spindle into driving engagement with the pinion.

The assembly of the device is as follows:—

As many trough sections as required are secured together by means of their end flanges 12. The alinement is facilitated by the fact that the joints of the upper bearing rails are staggered with relation to the joints between the trough sections. The shaft and gears 27 are set in place and a small high speed motor 44 may be connected to one or both ends of the shaft or a single motor, designated, 44<sup>a</sup>, may be connected at an intermediate point. In the first arrangement, which is shown diagrammatically in Fig. 7, each of the motors will deliver half the power required to operate the shaft, whereas with the arrangement shown in Fig. 8, the single intermediately disposed motor will deliver the full amount of necessary power,

and will therefore be slightly larger than either of the motors 44. In either case, it is obvious that if a break-down occurs, it will not be necessary to stop more than half the shaft in order to repair it. When it is desired to effect repairs the couplings 28 of the shaft are loosened and the couplings slid along so as to disconnect the shaft from the adjacent shafts, the pins 33 being of course removed. The affected shaft, with its attendant mechanism, may now be removed. With the motor arrangement shown in Fig. 7, the entire machine with the exception of the shaft removed may remain in operation, as the drive is from both ends, and with the arrangement shown in Fig. 8, one-half of the shaft and that part of the other half not cut off from the motor by the removal of a shaft section will remain in operation.

The operation of the device is as follows:—The shaft 13 is rotated by its driving motor and rotates the spiral gears 27 which mesh with the spiral gears 24 and drive the same at high speed. The tapered spindles fit in the tapered bores of the gears 24 sufficiently tight so that the spindles rotate with the gears, without any slip or loss of power. The jaws of the levers 41 remain out of contact with the spindles so that there is no friction, and the springs 43 hold these levers against swinging with vibration of the machine and striking the spindle collars, which would result in a chattering sound and rapid wear. When it is desired to remove a bobbin from any spindle or to stop the bobbin for the purpose of joining a broken thread, the operator presses the lower end of the lever 41, thus raising the jaws 40 into contact with the upper collar 39, and lifting the spindle up in the gear. This slight upward movement breaks the driving engagement, and at the same time jams the upper collar against the brake rail, so that the rotation of the spindle is almost instantly checked. When it is desired to restart the spindle, all that is necessary is to release the lever 41, which is returned to proper position by its spring 43, the spindle dropping at the same time into driving engagement with the gear. When the device is in operation, the troughs are closed by their covers 22, and are each charged with such a depth of oil that the lowest part of the gears 27 will run in the oil and the gears and bearings throughout will be lubricated on the splash system. If the machine is set up out of level, the internal flanges 23 will prevent the oil accumulating at one end and leaving the other end dry.

As shown in the drawings, the ratio of the gears is approximately 2.6 to 1, and thus a motor with a speed of 3800 to 4000 revolutions per minute would drive the spindles at 9880 to 10,400 R. P. M.

The framework supporting the troughs and motors has not been illustrated, as it may be of any character, and presents no novelty whatever, except that it will be very much smaller than the frames now used, thus enabling a greatly increased number of machines to be installed on the same floor space. The entire mechanism being run in oil and carrying practically no load, it will be obvious that the power loss in friction will be very little. The complete elimination of belts does away with the very large power loss due to slippage, so that the power required to operate the additional number of machines will be very little, if any, greater than that required for a smaller number of the existing type of machine. The spindle speeds being absolutely uniform, the product will be superior and the operating cost of the machine will be less than the upkeep cost of existing machines owing to the elimination of the multitude of small belts driving the spindles which wear rapidly and require replacement.

In dealing with machinery having rapidly revolving parts lubrication and throw of oil from the parts are very considerable factors. In the present invention the shaft rotates in such direction that the gears throw oil up from the bottom of the trough on to the pinions, that is the gears travel upwardly adjacent the pinions. If the direction of rotation was reversed the gears would throw the oil up against the back and top of the casing and owing to their high speed would be practically dry when coming into mesh with the pinions. Owing to the taper and high speed of the pinions and spindles there will be a certain upward movement of oil in the pinions or around the spindles which if excessive may be checked by plugging the lower ends of the pinions to prevent ingress of oil. The upper bearing of the pinions must be slightly spaced from the cover, as shown, so that any oil which works up on the spindles will be thrown off under the cover. If the cover touches the bearing the oil would travel through the cover and be thrown off outside. In order to prevent oil creeping through the joint between the trough and cover the latter must be set into the trough as shown. It will be understood that the single line of shaft shown and described is duplicated in each frame, the shafts being arranged parallel. From this it will be apparent that for repairs only part of one side of a frame need be stopped and that in doffing only one side of a frame need be stopped at a time, thus getting the maximum production per frame.

Having thus described my invention what I claim is:—

1. In a ring spinning frame, a housing, individual gear drives for the spindles in said housing and a common operating shaft

for said drives built up of independently operable sections releasably connected end to end.

2. In a ring spinning frame, individual gear drives for the spindles, a common operating shaft for the spindles, built up of sections, and chucks connecting the drives individually to the shaft, a housing inclosing said drives and shaft, and means for disconnecting individual spindles from their drives.

3. In a ring spinning frame, an oil-tight housing built up of sections connected end to end, a shaft in the housing built up of sections connected end to end and individual gear drives for the spindles each releasably connected to the shaft by a chuck.

4. In a spinning frame, a housing built up of sections connected end to end, upper and lower bearing rails mounted in the housing the upper rail being built of sections connected end to end, the joints being staggered with relation to the housing joints.

5. In a spinning frame, a housing, upper and lower bearing rails therein, pinions forming spindle sockets revolubly mounted between the rails, a shaft in the housing and gears on the shaft meshing with the pinions.

6. In a spinning frame, a housing, spindle sockets revolubly mounted therein, means for revolving the sockets, spindles resting in the sockets, a brake rail, and means for lifting individual spindles out of their sockets and pressing them against the brake rail.

7. In a spinning frame, a housing, spindle sockets revolubly mounted therein having taper bores, tapered spindles resting in said sockets, spaced collars on the spindles, a brake rail above the spindle collars, a lever engaging between the collars of each spindle adapted to lift the spindle out of the socket

and into engagement with the brake rail, means for revolving the sockets and spindles therein, and means normally holding the levers out of engagement with the collars during revolution of the spindles.

8. In a spinning frame, a housing built up of similar sections connected end to end, upper and lower sectional bearing rails in the housing, each lower rail section extending the length of a housing section and the upper rail sections breaking joints with the housing section, spindle sockets mounted between the rails, a sectional shaft in the housing, and individual drives for the sockets operated by said shaft.

9. In a spinning frame, a series of individual spindle drives, a common operating shaft therefor formed in more than two sections arranged end to end, and a plurality of driving means for said shaft, whereby the disconnection of any one section of the shaft will not affect the operation of spindles driven by other sections of the shaft.

10. In a spinning frame, a housing built up of sections connected end to end, each section being complete in itself and adapted to retain oil whereby flow of oil from one section to the next is prevented, a shaft in said housing, and individual gear drives for spindles in said housing.

11. In a spinning frame, a housing having a tightly fitting cover apertured for the passage of spindles, driving gears adapted to receive the spindles, a flange bearing rail arranged flanges down, and driving gear bearings embraced between the flanges of said rail, said bearings being sufficiently larger than the spindle apertures of the cover to insure the exclusion of lubricating oil from the spindle and spindle aperture.

In witness whereof, I have hereunto set my hand.

JOHN J. LYTH.