March 12, 1940. L. M. COTCHETT 2,193,552

DRAWING MECHANISM FOR SPINNING FRAMES AND THE LIKE

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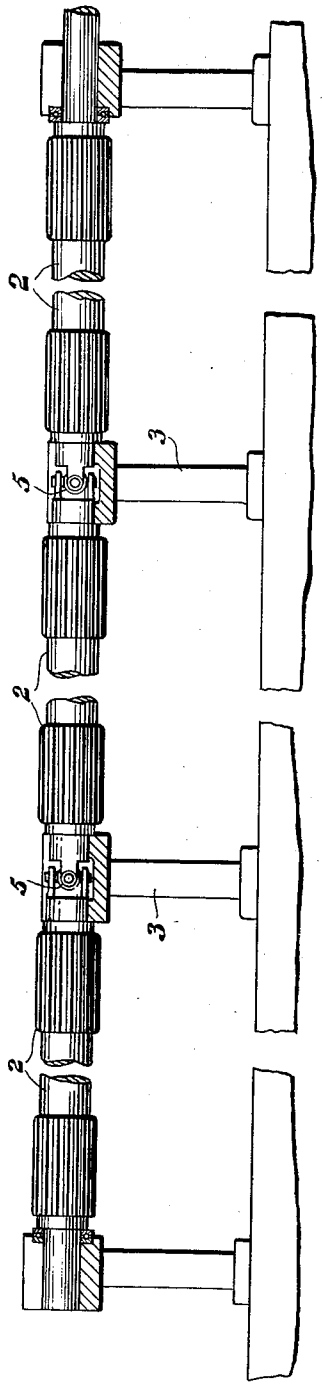


Fig. 1

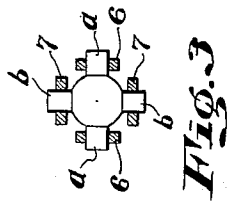


Fig. 3

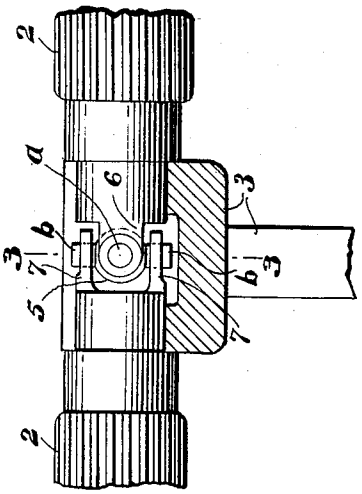


Fig. 2

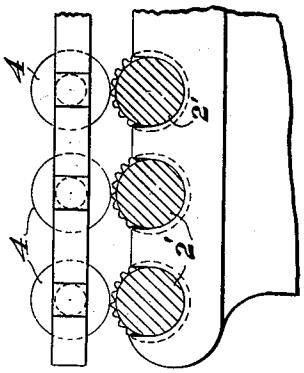


Fig. 4

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DRAWING MECHANISM FOR SPINNING FRAMES AND THE LIKE

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7 Claims. (Cl. 19—134)

This invention relates to spinning, twisting and roving frames, and more especially to the construction and mounting of the drawing rolls used in machines of this general character. For convenience, such machines will be hereinafter referred to generically as "spinning frames."

The drawing mechanism of machines of this type comprises several pairs of upper and lower drawing or drafting rolls disposed in parallel lines extending the entire length of the machine, which often is fifty feet or more, these rolls being supported at frequent intervals in suitable bearings, and the lower rolls being positively driven, usually from gearing located at one end of the machine. These lower rolls require many machining operations to obtain the contour and surface characteristics which have been found best suited to produce the desired results on the rovings, slivers, or other textile strands on which they operate. For example, the rolls are alternately necked and bossed at frequent intervals, and the intermediate ports are longitudinally fluted or otherwise machined to produce a surface designed to exert the necessary grip on the strands. As many as forty separate operations may be required on each drafting section of a typical roll. For this reason it has been found essential to manufacturing convenience and economy that the roll be produced in short component sections, each usually of a length to coincide with the distance between centers of the supporting bearings. The joining of these sections together to make up the length of a complete drafting roll has commonly been accomplished heretofore by making an integral square tang at one end of each section, and recessing the opposite end to provide a square orifice of such dimensions that the tang of the next adjacent section will fit tightly in it when the two are driven together. Another joint construction less commonly used comprises a screw threaded projection at one end of the section joined thereto by a smooth surfaced piloting length of round cross-sectional form, while the opposite end of the section is provided with an orifice shaped and dimensioned to receive the screw threaded projection and the aforesaid pilot portion of an adjoining section.

Both of these coupling methods have proved expensive since both require not only very close fits between the tang or projection at one end and the orifice at the other, but also that the concentricity between these elements and the outside diameter of the roll section with which they are integral shall be accurate to a high degree in order that the entire working circumference of the assembled sections shall run concentric with the bearing portions thereof. Although much time and money has been expended in perfecting methods of producing these results in couplings of the commonly used types, nevertheless there are still inherent errors in concentricity which cause trouble and expense both to the producing manufacturer and also to the mill which utilizes them.

In operation, the long frame on which these rolls are mounted is made fast to the mill floor at frequent intervals throughout its length. Consequently, as the floor varies in its level, due to changes in humidity, settling of the building, or other unpredictable conditions, the level of the machine anchored thereto is necessarily affected, with the result that the series of bearings supporting the drawing rolls are thrown out of line. The effect of this misalignment is to produce, in successive portions of the machine, a sag, elevation, or lateral displacement of adjoining portions of the axis about which roll rotates. Also, since the forces of misalignment necessarily operate through the joints of the component sections, the joining means are caused to chafe and to wear progressively as the tang or projection of one section enlarges its fit in the orifice of the next, so that looseness and eccentric rotation are inevitable results. This trouble may eventually progress to a point where the quality of the work is affected to an intolerable degree or a machine breakdown occurs.

While obviously, if the frames in which these rolls are mounted were maintained in perfect alignment so that all of the bearings were continuously disposed along a perfectly straight and level axis, there would then be little or no operating trouble from the methods heretofore used of joining the component sections of the roll together. But since such alignments are adversely affected not only by the factors above described, but also by machine vibration, it is impractical, if not impossible, to maintain ideal conditions for any great length of time. Consequently, difficulties of the character above mentioned are common occurrences and their effects are serious in terms of quality of product, upkeep and maintenance.

The present invention deals especially with the conditions above described and the problems presented by them, and it aims to devise a thoroughly practical solution for them.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying draw-

ing, and the novel features will be particularly pointed out in the appended claims.

In the drawing,

Figure 1 is a longitudinal side elevation, somewhat diagrammatic in character, of a lower drafting roll mounted in bearings like those used in a spinning frame, the roll being broken away at points and some parts being shown in section;

Fig. 2 is a side elevation, partly in section, showing on a larger scale one of the joint structures illustrated in Fig. 1 where it couples together two adjacent ends of component sections of the drawing roll;

Fig. 3 is a vertical, sectional view approximately on the line 3—3, Fig. 2; and

Fig. 4 is a sectional view at one side of a roll stand through a drawing mechanism of a common type to which, for example, this invention is applicable.

The present invention accomplishes the objects above described by producing a lower drawing roll composed of sections of convenient lengths, disposed end to end, and connected to each other by joints or couplings adapted to transmit torque positively from one section to the next, while at the same time accommodating misalignment of adjoining sections.

Referring first to Fig. 1, a series of roll sections 2 are there shown connected together in end to end relationship by flexible couplings, the entire roll being supported in the bearing sockets of roll stands 3. As previously stated, these rolls are of great length and consequently, only a few roll sections and very few roll stands are shown in Fig. 1. Usually the stands are spaced apart by distances of not over two feet between centers. The roll sections may be of any suitable or usual construction except for those modifications required for the purpose of coupling them flexibly together in accordance with this invention.

In the construction shown in Figs. 1, 2 and 3, the adjacent ends of adjoining sections 2—2 are connected for rotation in unison by a universal joint of a well known type. It will be seen from an inspection of Fig. 2 that as the right-hand roll section revolves about its axis, it will carry the spider 5 of the joint structure in rotation with it since the pivot studs *a*—*a* of this member pass through holes in the arms 6—6 of the forked end of this roll section. The end of the left-hand roll section also is similarly forked and the other two pivot studs *b*—*b* of the spider 5 fit in holes formed for them in the arms 7—7 of this fork. While the sections are initially aligned in the bearing stands so that the axis about which the entire roll revolves very closely approximates a straight line, this condition will be disturbed later due to such factors as those above mentioned. When this occurs, however, any angular misalignment of adjoining sections is accommodated by the fact that the central element 5 of the joint, while itself a rigid member, is mounted for swinging movement relatively to the adjacent end portions of the roll sections with which it is connected about two radial axes intersecting each other at right angles. Thus angular misalignment is readily accommodated without disturbing the torque transmitting relationship of one section to its neighbor.

Also, by making the pivot studs of cylindrical form so that each has a capacity for limited transverse sliding movement in its respective fork, and in directions radially disposed with respect to the axis of the roll, this joint also will accommodate transverse misalignment of adjoining sections. Such transverse displacement may arise from several causes as, for example, more rapid wear of the journal section of one roll or its bearing than the other, or by lint accumulating more rapidly on one journal section, or in the bearing therefor, than on the other.

Thus each section is enabled to maintain substantially its normal relationship to the bearings in which it is supported, notwithstanding misalignment of an adjoining section of any degree likely to occur in a spinning frame. Also because the joints include rigid elements which overlap in a common path of rotation, and one or more of such parts have sufficient movement independently of the sections which they connect to accommodate such changes in alignment, their positive torque transmitting relationship to said sections is not disturbed. In a joint of the construction shown this relationship is maintained for both clockwise and counter-clockwise rotation.

Thus the adverse effects of faulty alignment which necessarily occurs in mechanisms of this type while they are in use, are practically eliminated by this invention. In addition, the cost of manufacture of the rolls is substantially reduced by the replacement of the usual joining means with flexible joints of the general type above referred to. It will be understood, however, that the same advantages may be obtained by using other forms of joints or flexible couplings.

Fig. 4 shows the general arrangement of the upper and lower rolls of a three-roll drawing mechanism, such as those commonly used in spinning and roving frames. Where this invention is used in such an arrangement the lower rolls 2′ will be replaced with others made like the roll 2 shown in Fig. 1. The series of upper rolls 4 will cooperate with the rolls 2 in the same manner that they do with the older forms of bottom rolls.

While I have herein shown and described a typical embodiment of my invention, it will be evident that it may be embodied in other forms without departing from the spirit or scope thereof.

Having thus described my invention, what I desire to claim as new is:

1. In a spinning frame, the combination of a bottom drawing roll comprising a series of drafting sections, bearings supporting said sections at intervals spaced longitudinally of the roll, and joints flexibly connecting said sections together in said bearings in end to end relationship, said joints serving to positively transmit torque from one section to the next adjacent section and comprising parts relatively slidable radially in directions at right angles to each other, whereby the joints accommodate misalignment between the sections connected by them.

2. In a spinning frame, the combination of a bottom drawing roll comprising a series of drafting sections, bearings supporting said sections at intervals spaced longitudinally of the roll, and joints flexibly connecting said sections together at said bearings in end to end torque transmitting relationship, each of said joints including a part slidable radially in directions at right angles to each other, the roll sections and said part connecting them being relatively movable angularly to accommodate angular misalignment of said sections, while said radial movement accommodates a lateral misalignment of them, said

joints serving to transmit torque positively from each section to the next adjoining section.

3. In a drawing mechanism for spinning frames, the combination of a bottom drawing roll comprising a series of drafting sections positioned end to end, bearings supporting the adjacent ends of adjoining sections, positive torque transmitting universal joints in said bearings connecting said sections together, said joints being constructed to drive each section positively from the preceding one and including rigid parts positively transmitting torque but relatively movable to accommodate misalignment of adjoining sections.

4. In a drawing mechanism for spinning frames, the combination of a bottom drawing roll comprising a series of drafting sections, bearings supporting said sections end to end at intervals spaced longitudinally of the roll, and flexible joints connecting said sections in torque transmitting relationship in said bearings, the adjacent ends of adjoining sections having portions resting in a bearing common to the two sections, and the joint connecting them including an intermediate rigid part through which torque is transmitted from one of said sections to the other, said part being so associated with said ends and with said bearing as to accommodate misalignment of the adjoining sections while constantly maintaining its positive torque transmitting relationship to both sections.

5. In a drawing mechanism for spinning frames, the combination of a bottom drawing roll comprising a series of drafting sections, bearings supporting said sections end to end at intervals spaced longitudinally of the roll, and positive torque transmitting joints connecting said sections in said bearings, said joints including parts overlapped in a common path of rotation through which they may transmit torque positively in either direction of rotation from one section to the next adjacent section but being relatively movable to accommodate misalignment of one section relatively to an adjoining section.

6. In a drawing mechanism for spinning frames, the combination of a bottom drawing roll comprising a series of drafting sections positioned end to end, bearings supporting the adjacent ends of adjoining sections, and universal joints in said bearings connecting said sections together in torque transmitting relationship, said joints being constructed to drive each section positively from the preceding one in both clockwise and counter-clockwise directions, said joints being capable of accommodating misalignment of adjoining sections without disturbing their torque transmitting relationship to their respective sections.

7. In a drawing mechanism for spinning frames, the combination of a bottom drawing roll comprising a series of drafting sections positioned end to end, bearings supporting the adjacent ends of adjoining sections, joints in said bearings connecting said sections together in torque transmitting relationship, said joints being constructed to drive each section positively from the preceding one and each including a rigid torque transmitting member connected positively with both said sections for rotation therewith but having a movement independent of them transversely of its path of rotation serving to maintain the two sections operatively connected together for rotation in unison notwithstanding misalignment of one section relatively to the other.

LOUIS M. COTCHETT.