

May 18, 1954

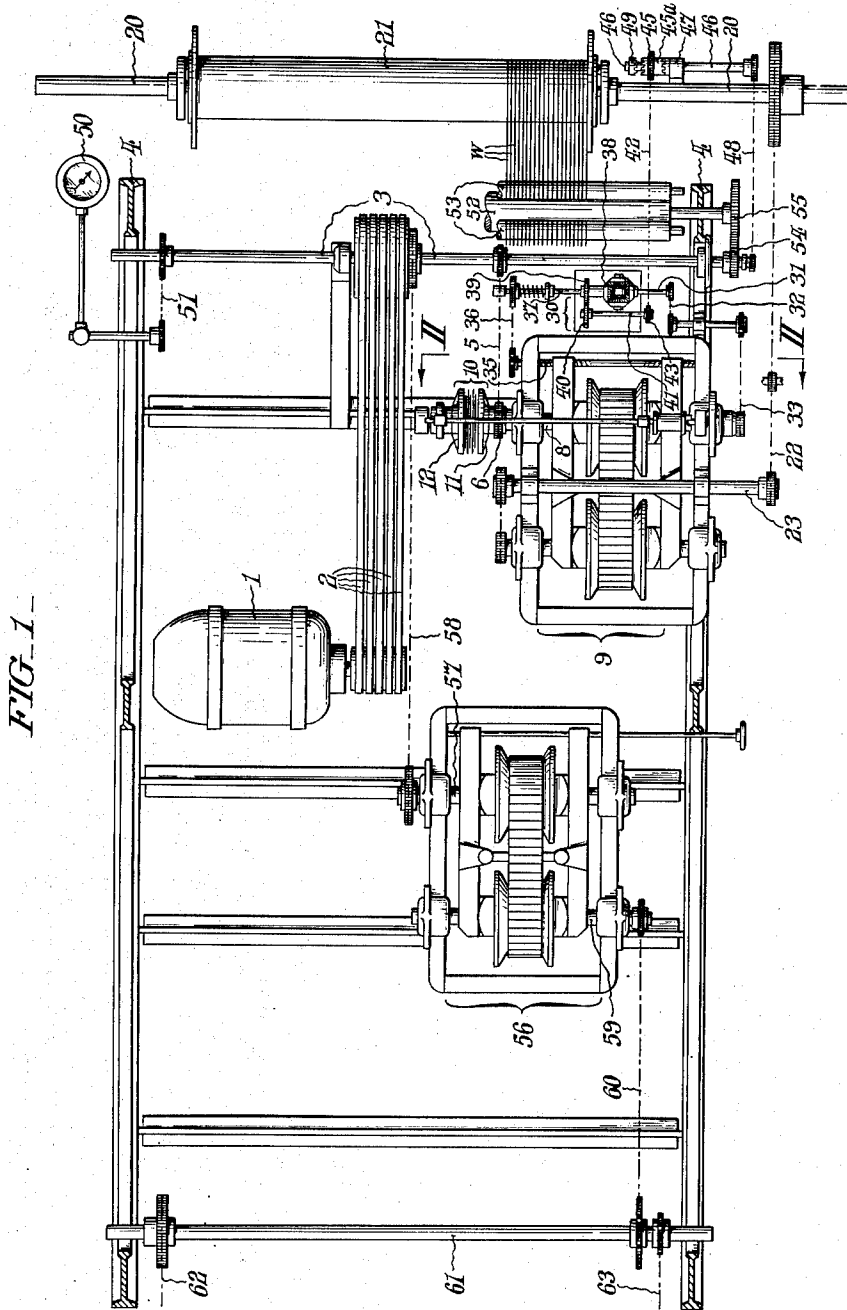
G. H. BROWNE

2,678,485

DRIVING MECHANISM FOR TEXTILE MACHINES

Filed April 3, 1951

2 Sheets-Sheet 1



INVENTOR:
Godfrey H. Browne
BY *Paul & Paul*
ATTORNEYS.

May 18, 1954

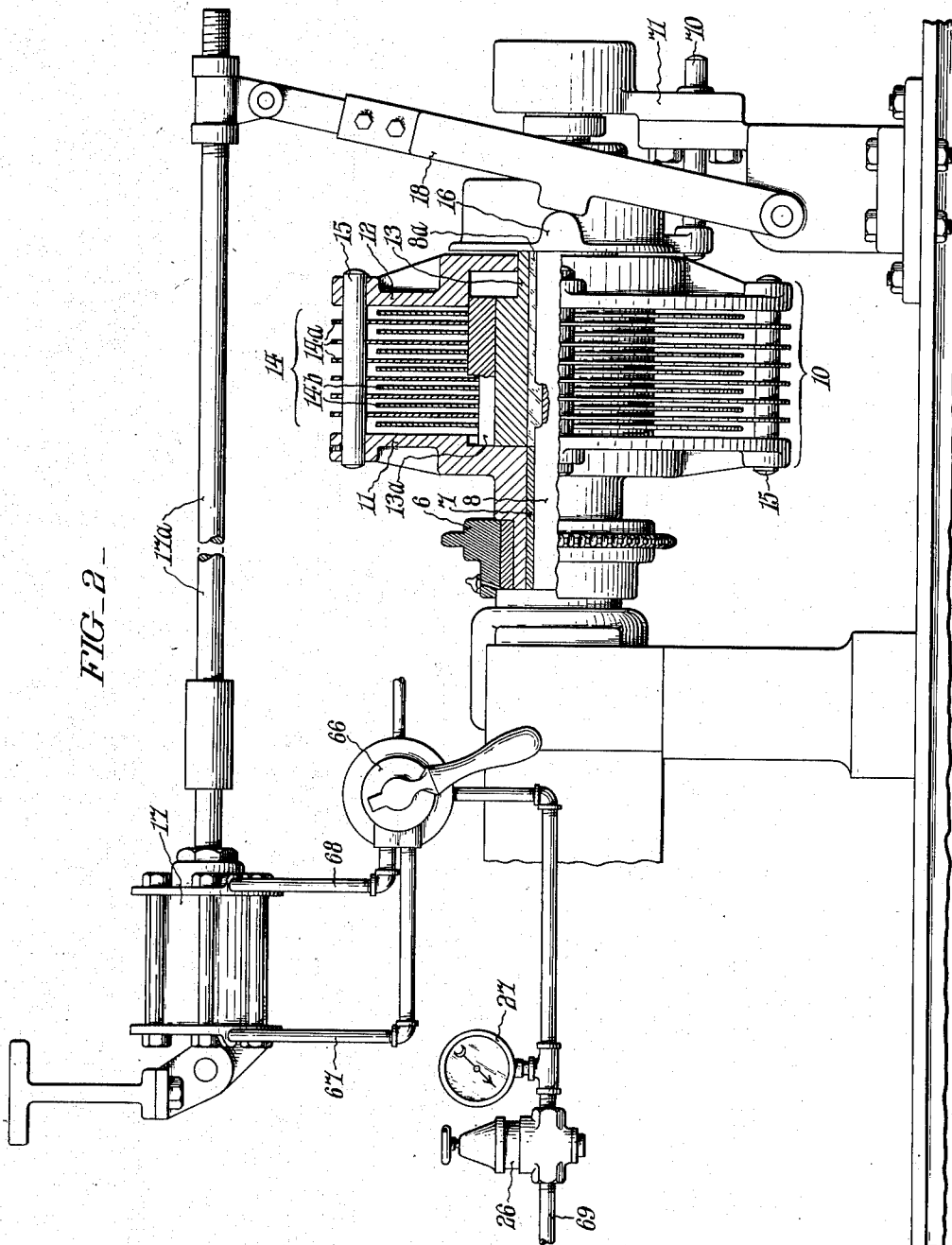
G. H. BROWNE

2,678,485

DRIVING MECHANISM FOR TEXTILE MACHINES

Filed April 3, 1951.

2 Sheets-Sheet 2



INVENTOR:
Godfrey H. Brounse,
BY *Paul & Paul*
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,678,485

DRIVING MECHANISM FOR TEXTILE MACHINES

Godfrey H. Browne, Gastonia, N. C., assignor to
Cocker Machine & Foundry Company, Gas-
tonia, N. C., a corporation of North Carolina

Application April 3, 1951, Serial No. 219,027

6 Claims. (Cl. 28—39)

1

This invention relates to driving mechanism for textile machines, such as slashers or warpers, the same being an improvement upon a generally similar construction disclosed in U. S. Patent No. 2,142,544, granted to Ernest K. Whitener and Thomas F. Suggs on January 3, 1939. This invention is also an improvement upon the apparatus represented in the copending application of Price E. Sherrill, Jr., and Godfrey H. Browne, Ser. No. 204,116, filed January 3, 1951, of which this application is a continuation-in-part.

In the foregoing co-pending application, spring means are employed for regulating the degree of friction between the plates of the friction clutch which constitutes one element of the textile machine drive mechanism. While such construction is advantageous and has proved commercially successful, it has been observed that as the friction plates wear and become thinner, the spring pressure urging them together has a tendency to decrease, thus producing a corresponding decrease in tension on the yarn. Therefore the tendency of the plates to wear requires periodic resetting of spring tension. Moreover it is frequently desired to run yarns of different types through a slasher or warper from time to time, with application of different degrees of tension to the different yarns. Prior to this invention there has been no adequate means provided to reestablish with accuracy a degree of tension previously used, after the tension applied to the yarn had been altered in order to process a yarn of different type.

It is accordingly an object of the invention to provide drive means for a textile machine including control apparatus for maintaining substantially uniform tension on the yarn handled by the machine, independently of the wear of the elements of the drive mechanism. It is another object of the invention to provide friction clutch control means which may be regulated to reestablish with accuracy the degree of tension applied to the yarn in a previous run.

It is conventional, as indicated in the aforementioned co-pending application, Ser. No. 204,116, to provide a toothed clutch on the beam spindle serving to disengage the beam from the drive in order to relieve the tension on the warps preparatory to cutting the yarn and removing a full beam. It is another object of the invention to provide apparatus eliminating such toothed clutch from the mechanism driving the beam without sacrificing convenience or speed in disengaging a full beam, installing an empty beam, or rotating the newly installed empty beam

2

to provide the initial wrap of yarn on the beam barrel preparatory to winding. Other objects and advantages of the invention, including the simplicity and economy of the same, and the ease with which it may be applied as an attachment to existing textile machines, will appear in further detail hereinafter.

In summary, the foregoing and other advantages are attained by the combination, with a textile machine driving mechanism, of pneumatic means effective against the friction plates of the clutch element to hold the plates in yielding contact, together with means for energizing and deenergizing such pneumatic means.

Of the drawings:

Fig. 1 is a fragmentary diagrammatic plan view of a slasher embodying the drive mechanism which constitutes one embodiment of this invention, and

Fig. 2 is an enlarged fragmentary view, with parts shown in section, of the friction control apparatus of the driving mechanism, taken as indicated by the lines and arrows II—II which appear in Fig. 1.

With more specific reference to these illustrations, 1 designates a reversible electric motor which, through belting 2, constantly drives a transverse jack shaft 3 suitably journaled in the side frames 4 of the slasher. In accordance with my invention, rotary motion is constantly communicated from the shaft 3 by means of a sprocket chain 5, to a sprocket 6 keyed to head plate 11 of the friction clutch 10. Said head plate 11 has a bushing 7 permitting it to revolve freely on the shaft 8 which constitutes the output shaft of friction clutch 10 and the input shaft of a variable speed device 9.

As shown, the clutch 10 is of a well known type comprising a head plate 11, a mating head plate 12 which is axially slidable on the reduced end of a collar 13 connected by key 8a to the shaft 8, and a plurality of interposed friction disks 14 which surround the main or large diameter portion of said collar 13. The alternate disks 14a of the group 14 are held against independent rotation relative to the plates 11 and 12 by virtue of passage through them, adjacent their peripheries, of guide studs 15 which are anchored in plate 11 and which project laterally from the plate 11. The intermediate disks 14b of the group 14, on the other hand, are held against independent rotation relative to the collar 13 through engagement of key lugs thereon with a slot 13a in said collar. The air cylinder 17 working through rod 17a and yoke 18 applies

3

pressure to the thrust collar 15 which through the inner race of a ball bearing (not shown) urges the plate 12 yieldingly toward the plate 11 to maintain the disks 14a, 14b in yielding frictional contact with one another and with said plates. The thrust collar 16 is prevented from rotating by means of a stud 70 inserted through a hole in the bearing housing 71. The force of the air cylinder 17 is adjustable by means of a pressure regulating valve 26 which receives air under pressure from a source, not shown, through pipe 69. 27 is an air pressure gauge, which may conveniently, if desired, be graduated in pounds of tension, 66 is a four way valve for selectively introducing air through a line 67 to one side of air cylinder 17 or through a line 68 to the other side of the air cylinder. For convenience, heads 11, 12 and the disks 14a may be referred to as constituting the "constant" side of the clutch, and the shaft 8, collar 13 and the disks 14b as the "slip" side of said clutch.

The shaft 28 of the beam 21 (Fig. 1) upon which the warps W are collected, is connected through a chain 22 to the output shaft 23 of the variable speed unit 9.

The means for governing the effective speed ratio of the variable speed device 9 includes a differential gear unit 30 whereof one side, i. e., the shaft 31, is driven through sprocket chains 32 and 33 from the input shaft 8 of said variable speed device 9 while the regulating shaft 35 of said variable speed device 9 is actuated by a sprocket chain 36 from the other side, i. e., the shaft 37 of said differential gear unit.

Rotatively free on the shaft 37 and secured to the bevel pinion 38 of the differential gear unit 30 is a spur wheel 39 which meshes with a mating spur wheel 40 on a countershaft 41. By means of a chain 42, a sprocket pinion 43 affixed to the shaft 41 is connected to a sprocket pinion 45 on a sleeve 45a free on still another transverse shaft 46 which is rotatively supported in a fixed bearing 47 and driven through a chain 48 from the powered jack shaft 3. The sleeve of sprocket pinion 45 is provided at opposite ends with teeth for selective engagement respectively with the corresponding teeth of collar 49 on shaft 46, or with corresponding teeth on the fixed bearing 47. The purpose of the arrangement will be presently disclosed. The speed indicator shown at 50 in Fig. 1 is driven through a chain connection 51 from jack shaft 3.

The main roll 52 of the group 53, by which the warps W are calendered enroute to the beam 21, is positively driven from the jack shaft 3 by means of the intermeshing spur gears indicated at 54, 55. Here, as in patent application No. 204,116 hereinbefore referred to, a second variable speed device 56 is embodied in the slasher. The input shaft 57 of said variable speed device 56 is driven, through a sprocket chain 58, from the jack shaft 3, and the output shaft 59 connected by a sprocket chain 60 to a transverse shaft 61, which through other sprocket chains 62 and 63 drives other parts of the machine (not shown).

Operation

To install an empty beam 21 into the machine, preparatory to winding the warp W thereon, air is introduced through line 67 into the front of the air cylinder 17, permitting the plates 14a, 14b of the friction clutch 10 to separate and thus permitting the beam 21 to be freely rotated for the initial wrap of warp yarn W require for grip for the subsequent winding. The four way valve

4

66 is then turned and air under pressure is introduced through the line 68 to the rear of the air cylinder 17, thus closing the plates 14 of the clutch 10. At any time, either before or after the introduction of air through the line 68, the air pressure may be adjusted, by means of the pressure regulating valve 26, to the desired value as indicated on the air pressure gauge 27. The gauge indication is correlated to the desired warp tension.

The slasher may now be started by energizing the motor 1, the main calender roll 52 being driven at substantially constant speed by direct gearing and warp beam 21 being driven at variable speed corresponding to the speed of rotation of shaft 23. As the diameter of the warp accumulation on the beam 21 increases during operation of the slasher, the ratio between the speeds of the power shafts 31, 41 of the differential unit 30 will gradually change, the speed of countershaft 41 being substantially constant and the speed of shaft 31 varying with the speed of output shaft 8 of friction clutch 10. This causes counter-clockwise rotation of the shaft 37 of said differential unit 30, with attendant adjustment, through the chain 36, of the regulating shaft 35 of the variable speed device 9. As a consequence, the speed of the output shaft 23 of the variable speed device 9 will be progressively decreased as will also that of the beam 21 by reason of the chain connection 22. This gradual speed reduction is occasioned through slippage of the clutch 10 since there is a tendency of the warps to accelerate in linear speed due to the diametral growth of the warp accumulation on the beam 21. Accordingly the rotative speed of the beam is accurately coordinated with the build up of the winding, so that a uniform tension is maintained on the warps throughout the processing period with preassurance of an even density of the latter and attainment of uniform cloth subsequently woven from the warps.

If desired or deemed necessary during the operation of the slasher, the differential unit 30 may be re-set simply by temporarily unclutching the sprocket pinion 45 from the collar 49 on shaft 46 and clutching it to the stationary bearing 47. Under these conditions the bevel gear pinion 38 of the differential unit 30 will be held from rotating, and the regulating shaft 35 of the variable speed device 9 will be turned reversely through induced movement of shaft 37 of said unit. The same procedure is resorted to in resetting the variable speed device 30 after each run of the slasher.

After the beam is filled, or whenever it is desired to doff a beam, air is again introduced through line 67 into the front of the air cylinder 17 thus separating the plates 14a, 14b of the clutch 10, relieving the tension of the warps W between the calender rolls 53 and beam 21, permitting the cutting of the warps preparatory to doffing without danger of tangling. When the next beam is started and the air is introduced into the back of the cylinder, the tension, controlled by the air pressure, will automatically return to the previous set value. Any wear in the plates of the slip friction clutch will be automatically adjusted for by a compensating movement of the piston of the air cylinder; the air pressures, as determined by the pressure regulating valve 26, remaining constant with a resulting constant unit pressure between the plates 14, 14a of the slip friction clutch 10.

It will be appreciated that equivalent yieldable

5

fluids may be substituted for compressed air in the cylinder 17, in accordance with this invention. It will further be appreciated that the yieldable force of the compressible fluid may be exerted upon either the constant side or the variable side of the friction clutch with advantage. While one embodiment of the invention has been selected for illustration in the drawings, equivalent elements may be substituted for the illustrated features in accordance with the invention. It will also be appreciated that parts may be reversed and certain features of the invention may be used independently of the use of other features, all within the spirit and scope of the invention.

Having thus described my invention, I claim:

1. Drive mechanism for a textile machine having a yarn collecting beam, comprising rotary power means, a friction clutch element having an input side connected to said power means and a variable speed output side in friction contact with said input side, variable pressure yieldable fluid actuated means effective upon said friction clutch element to urge said input and output sides together, regulating means for controlling the fluid pressure of said variable pressure fluid means, a variable speed device driven by the output side of said friction clutch element, the output of the variable speed device being connected to drive the yarn collecting beam, compensating control means responsive to said friction clutch element for regulating the ratio of input speed to output speed in said variable speed device, and a re-setting indicator associated with said regulating means, whereby the yarn tension is correlated to the regulated fluid pressure and the regulating means may be re-set to duplicate a yarn tension previously used.

2. Drive mechanism for a textile machine having a yarn collecting beam, comprising rotary power means, a friction clutch element having an input side connected to said power means and a variable speed output side in friction contact with said input side, variable pressure yieldable fluid means effective upon said friction clutch element to urge said input and output sides together, regulating means for controlling the fluid pressure of said variable pressure fluid means, a variable speed device driven by the output side of said friction clutch element, the output of the variable speed device being connected to drive the yarn collecting beam, and a compensating control means whereof one side is operated from the input side of the friction clutch and the other side is operated by the variable speed output side of the friction clutch, said compensating control means being connected to said variable speed device to regulate it automatically to decrease the speed of the collecting beam compensatively with increase in the diameter of the yarn accumulation on the beam, and a re-setting indicator associated with said regulating means, whereby the yarn tension is correlated to the regulated fluid pressure and the regulating means may be re-set to duplicate a yarn tension previously used.

3. In driving mechanism for a textile machine having a yarn collecting beam, a powered shaft; a variable speed transmission device having an input shaft, an output shaft and a regulating shaft; positive gear connections between the output shaft of the variable speed device and the beam; gear connections, including a slip friction clutch having friction elements between the

6

powered shaft and the input shaft of the variable speed device; pneumatic means effective upon the friction elements of the clutch to engage and disengage said clutch; control means for regulating the effective pressure of said pneumatic means on said friction elements; said control means including a re-setting indicator for duplicating a pressure previously used, a differential gear unit automatically operated through connections respectively with the powered shaft and with the input shaft of the variable speed device, for actuating the regulating shaft of the latter to decrease the speed of the beam compensatively with the increase in the diameter of the yarn accumulation on the beam and thereby maintain a uniform tension on the yarns, which tension is correlated to the pressure indicated at said re-setting indicator.

4. In driving mechanism for a textile machine having a yarn collecting beam, power means, slip friction clutch means driven by said power means, said slip friction clutch having plates forming a variable side and a constant side, a double-acting pneumatic actuator connected to move said plates toward and from one another to engage and disengage the clutch, a variable speed device through which said yarn collecting beam is driven from the variable side of said slip friction clutch means, the output of the variable speed device being connected directly to the yarn collecting beam without any intervening clutch mechanism, compensating speed control mechanism one side of which is operated from the constant side of the clutch means and the other side of which is operated from the variable side of said clutch means, and geared clutch means for disconnecting said other side from said clutch means and maintaining it stationary.

5. Drive mechanism for a textile machine having a yarn collecting beam, comprising rotary power means, a friction clutch element having an input side connected to said power means and a variable speed output side in friction contact with said input side, variable pressure yieldable fluid means effective upon said friction clutch element to urge said input and output sides together, regulating means for controlling the fluid pressure of said variable pressure fluid means, a re-setting indicator associated with said regulating means to enable the fluid pressure to be re-set to a value previously used, a variable speed device driven by the output side of said friction clutch element, the output of the variable speed device being connected directly to the yarn collecting beam shaft without any intervening clutch, whereby the yarn tension is correlated to the regulated fluid pressure, compensating control mechanism in the form of a differential gear unit connected to said variable speed device to control its output speed, said differential gear unit having one side connected to the friction clutch output and another side connected through a toothed clutch element to a shaft driven directly by said rotary power means, and said differential gear unit being connected to said variable speed device to control the speed ratio of output to input thereof.

6. In driving mechanism for a textile machine having a yarn collecting beam, a motor; a jack shaft geared to the motor; a variable speed transmission device with an input shaft, an output shaft and a regulating shaft; positive gear connections between the beam and the output shaft of the variable speed device; gear connections,

7

including a friction clutch, between the jack shaft and the input shaft of the variable speed device; said friction clutch including sets of alternately arranged friction discs; pneumatic pressure means effective to urge said friction disc sets together; means for controlling the pneumatic pressure thus applied; a differential gear unit for actuating the regulating shaft of the variable speed device; and gear connections respectively between the jack shaft and one side of the differential unit, and between the output shaft of the variable speed device and the other side of said unit, whereby the speed of the beam is decreased compensatively with increase in the diameter of the yarn accumulation on the beam, with maintenance of a uniform tension upon the yarns, said tension being correlated to the pneumatic pressure applied to the friction disc sets.

8

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
779,806	Schumucker	Jan. 10, 1905
2,142,544	Whitener	Jan. 3, 1939
2,206,140	Van Derhoef	July 2, 1940
2,521,413	Scheuermann et al.	Sept. 5, 1950

OTHER REFERENCES

Advertisement appearing in "Textile World" July 1946 and "Cotton" August 1946—"Automatic Tension Control"—Reeves Pulley Co., Columbus, Indiana.

Reeves Automatic Production Control Booklet T-361, page 3—Reeves Pulley Co., Columbus, Indiana. (Copies in Div. 61.)