

April 3, 1951

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2,547,485

DRAFT ROLLER PRESSURE CONTROL MECHANISM

Filed March 25, 1949

2 Sheets-Sheet 1

Fig. 1

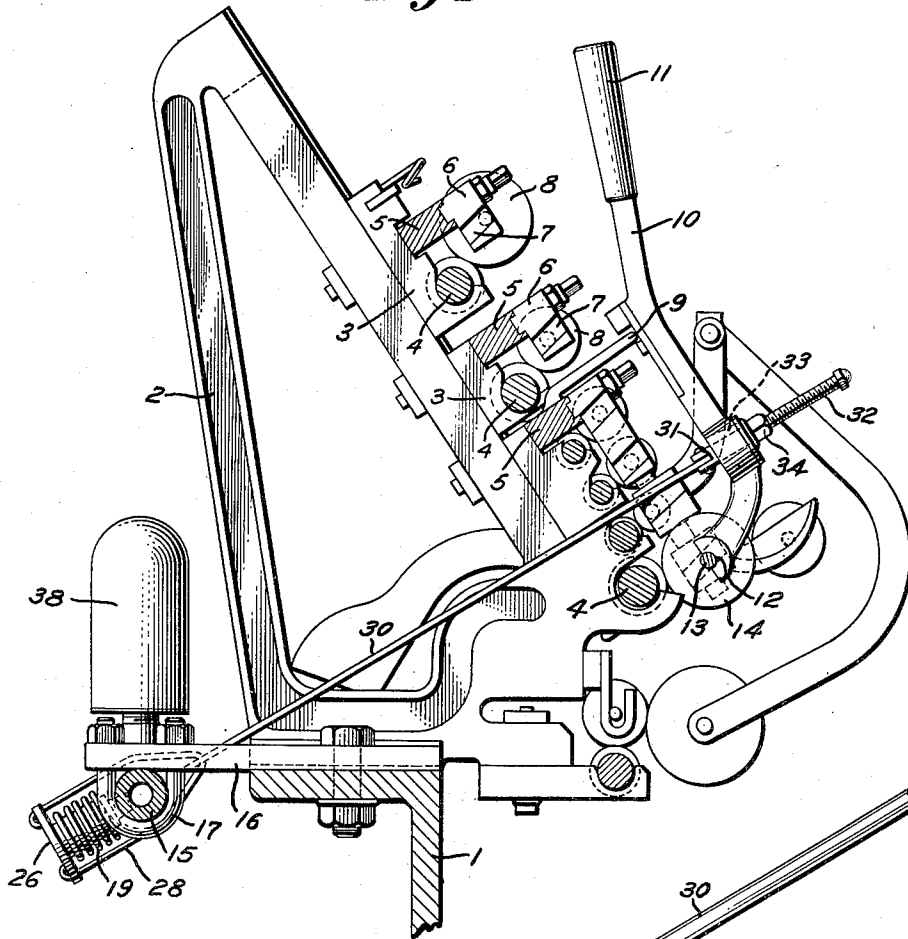
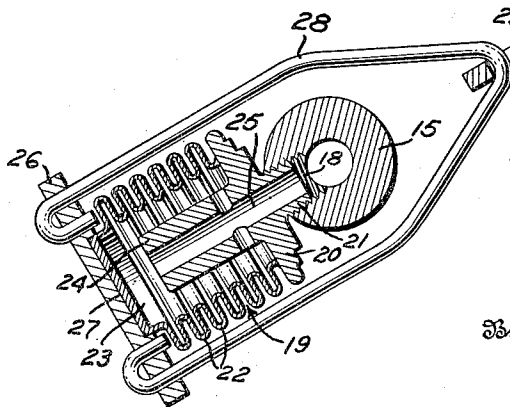


Fig. 3

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April 3, 1951

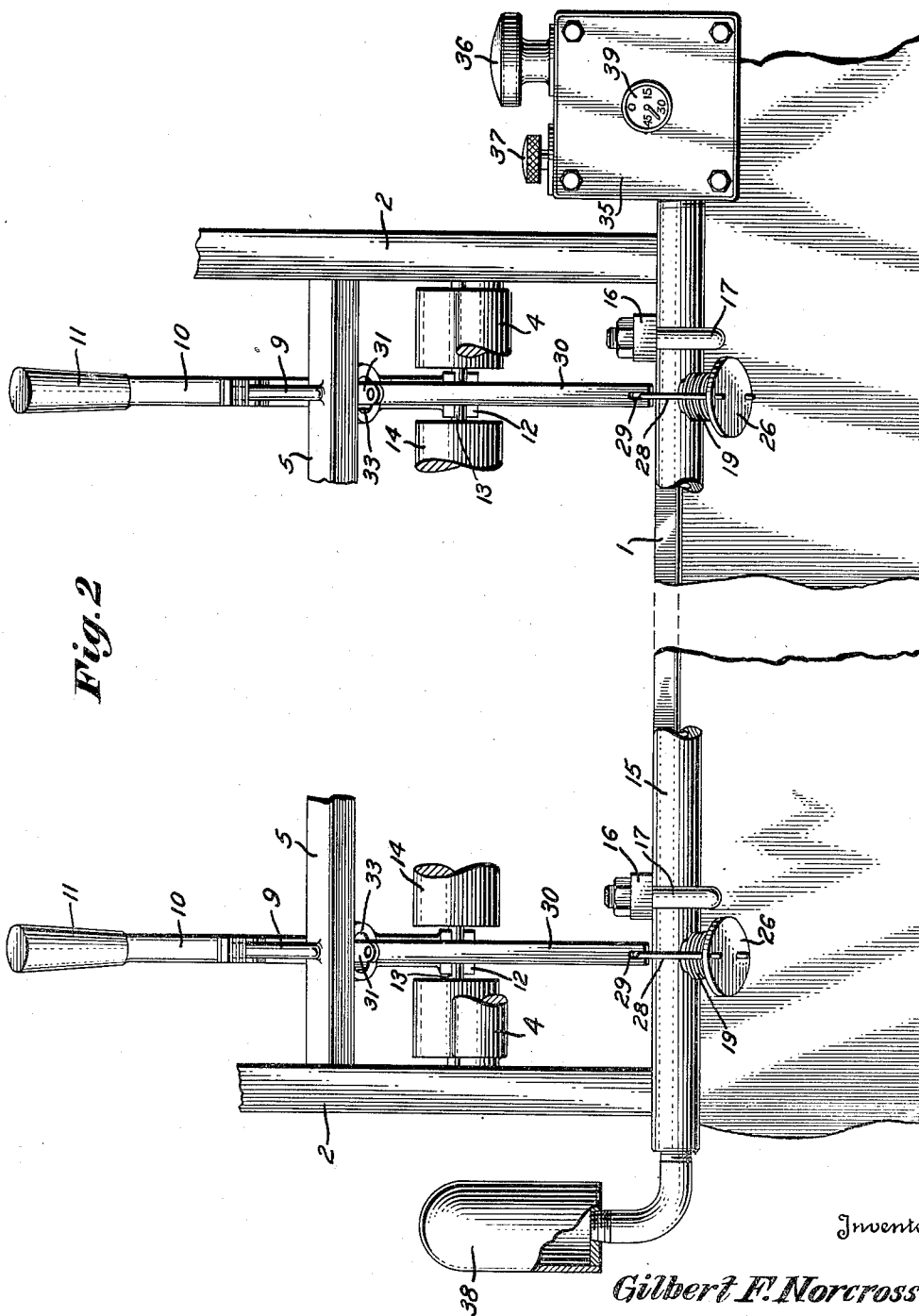
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Filed March 25, 1949

2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,547,485

DRAFT ROLLER PRESSURE CONTROL
MECHANISM

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Application March 25, 1949, Serial No. 83,386

6 Claims. (Cl. 19—135)

1

This invention relates to improved means for regulating and maintaining pressure upon the rollers of drafting mechanism, such as is employed in spinning machines, drawing frames, etc.

The drafting mechanisms with which the present invention is adapted to cooperate are usually in the form of spaced pairs of rollers, each pair comprising a driven roller and a weight or pressure roller, with each successive pair of rollers being rotated at an increased rate of speed. The speed differential between the roller pairs is not great, being just slightly more than is necessary to maintain tension on the sliver, except between the last two pairs. The last roller pair is rotated at a much higher rate of speed than the next adjacent pair, and it is between these pairs that the actual drawing takes place. Consequently, additional pressure is needed upon the last weight roller to provide the necessary grip upon the sliver to insure the sliver being drawn out. This, in the past, has been accomplished by the use of shiftable weights whereby different pressures could be obtained as needed. These systems required individual adjustment, and a change in pressure entailed considerable labor and a prolonged shutdown of the machine. In present day spinning machines, for example, there are some 200 spindles on each side of the machine, and as each pair of slivers is independently controlled a great number of adjustments are required to change the pressure. It has been proposed that means be employed for simultaneously changing the pressures on all of the units as disclosed in applicant's co-pending application S. N. 792,376, filed December 18, 1947. Such mechanisms employ mechanical means for controlling and maintaining the pressure; and, although quite effective in operation, it is impossible to obtain the nicety of control and uniformity of operation obtained through the use of the present invention.

The object of the present invention is to provide a control system whereby simultaneous adjustment of the pressure upon all units may be achieved by a single, simple operation.

A further object of the invention is to provide such means which does not depend for its operation upon the use of springs, or other yieldable mechanical contrivances, needing frequent adjustment and replacement.

Another object of the invention is to provide a control system in which any of the individual pressure points may yield to thickness irregularities of the sliver and in which increased or de-

2

creased pressure caused by the yielding of that unit will be equally distributed to all of the units, thus reducing to an infinitesimal amount the pressure change upon the individual unit yielding.

A still further object of the invention is the provision of an auxiliary cushioning means to further reduce the effect of pressure change caused by the yielding of an individual unit.

Other objects of the invention will appear from the following description of one embodiment of the invention when taken in conjunction with the drawings which accompany and form a part of this specification.

In the drawings:

Figure 1 is a vertical, transverse section through the draft section of a typical spinning machine, with the structure of the present invention shown in position thereon;

Figure 2 is a partial rear elevation of the structure shown in Figure 1, only the end sections of the control mechanism being shown and the conventional structure of the draft sections being shown in skeleton form; and,

Figure 3 is a section through one of the pressure control units, showing its manner of attachment to the control medium manifold and the linkage employed for connecting the control unit to the pressure application mechanism.

In general, the present invention contemplates the use of a manifold for a control fluid and a plurality of control units attached to the manifold and in communication therewith, the number of units being equal to the number of pressure points on the machine, and means for connecting each unit to its respective pressure point.

Referring to the drawings in detail, there is shown somewhat diagrammatically in Figures 1 and 2 a conventional draft mechanism used in connection with a spinning machine. The mechanism is shown as mounted upon a draft rail 1 and supported by a plurality of vertically positioned brackets 2 which are longitudinally spaced and mounted upon the draft rail 1. Bearing blocks 3 are carried by the brackets 2 and form journal supports for the lower driven rollers of the conventional draft roller pairs. Extending between the brackets 2 and supported upon the bearing blocks are the rails 5 which adjustably support the upper bearing blocks 6. Blocks 6 are provided with inclined grooves 7 to receive the trunnions of the upper or weight rollers 8. One of the rails 5 carries upstanding brackets 9 upon which the pressure levers 10 fulcrum, as in common practice each lever 10 is provided with a

3

handle 11 at its upper end and the lower end of the lever is formed as a seat 12, to rest upon the trunnions 13 of the lowermost pressure rollers 14.

The above-described structure is somewhat conventional, and it is well understood in the art that pressure applied to the levers 10 at a point midway between the fulcrum 9 and the point of engagement with the roller trunnions 13 will regulate the pressure with which the roller 14 bears upon the sliver passing between it and its driven roller 4.

The present invention is concerned with means for applying a force to the levers 10 to control the pressure which the levers exert upon the rollers 14. In practicing the invention, a tubular manifold 15 is secured to the rear of the draft section and is shown on the drawings as being supported from the draft rail 1. The manifold extends horizontally the full length of the draft section and supporting brackets 16 are bolted to the draft rail and project rearwardly. U-bolts 17 surround the manifold and have their ends secured to the projecting portion of the brackets 16. The manifold is drilled and tapped as at 18 in those transverse vertical planes which include the levers 10 and expansible members 19 threaded into the openings 18. Members 19 are shown as bellows or Sylphons, and comprise a head 20 having a threaded nipple 21 for insertion into the opening 18, and a body portion having annular corrugations 22. The body portion has a closed lower end which is in the form of an annular boss 23. The head 20 has an inwardly projecting portion 24 which forms a stop to limit the collapsing movement of the body portion. The head, nipple and the inwardly projecting portion are bored as at 25 to provide communication from the manifold 15 to the interior of the body of the Sylphon.

Plates 26 receive the lower ends of the Sylphons, the plates being recessed as at 27 to form seats for the bosses 23 at the bases of the Sylphons. Bails 28 are connected to the plates 26 and have their loop portions connected to eyes 29 in links 30. The opposite ends of links 30 are connected to coupling members 31 which are adjustably secured to the handles 10. Each coupling member terminates in a threaded portion 32 which passes through an opening 33 in the handle, and the threaded portions receive nuts 34 which bear upon the outer surfaces of the handles to adjust the length of the linkage connecting the Sylphons to the handles.

The manifold 15 is connected at one end to the pump and reservoir for fluid 35. The pump may be of any suitable type and is not shown in detail herein, but it will be understood that additional fluid may be pumped into the manifold by operation of the pump handle 36 to build up the pressure, and the pressure in the manifold may be reduced by operation of the release valve 37. The opposite end of the manifold may be closed by a plug, or as shown in the drawing may be connected to a closed air chamber 38.

After the mechanism has been assembled as shown and described, each of the units is preliminarily adjusted by means of the nut 34 to remove the play from the linkage system so that each of the units will react immediately and uniformly to pressure changes within the manifold and Sylphons. After this preliminary adjustment, the entire system is ready for use and the required pressure may be put upon the rollers 14 by operation of the handle 36 of the pump unit 35. The pump will force fluid through the

4

manifold completely filling the manifold and Sylphons and compressing the air in the system within the air chamber 38. Continued operation of the pump will cause expansion of the Sylphons and each of these members will move an identical amount drawing down on its linkage system and its lever 10 to apply pressure to its particular roller 14. The gauge 39 may be conveniently placed upon the pump unit so that the pumping operation may be stopped when any predetermined pressure is reached.

As the pressure medium is fluid, any of the pressure applying units is free to move when a knot or thickened portion or a thin portion of the sliver passes between the rolls. This yielding movement will cause a slight compression of the Sylphon body driving a portion of the fluid back into the manifold, or a slight expansion of the Sylphon admitting more fluid; but, as this merely adds to or takes from the fluid in the remainder of the system, the fluid volume change will be equally divided among all of the units so that no noticeable or appreciable pressure change will be imposed on any of the rollers. This holds true for the unit which has yielded as well as the others as this unit will be under the same pressure as the others. By reason of this, the pressure upon the sliver is maintained substantially constant throughout the entire drawing operation, regardless of irregularities which may be present in the sliver.

This same effect is had when for any reason one of the handles is operated to release its roller so that it may be removed. In this instance, however, the removal of the roller takes away the pressure point upon which the Sylphon for the particular roller was operating. The tendency would be for the pressure within the system to expand this Sylphon beyond its normal length, destroying its usefulness, and lowering the pressure in the remainder of the system. Due to the construction of the bail 28, when the Sylphon expands but a small amount the bail engages the manifold 15 preventing further expansion of the Sylphon and maintaining the pressure within the system.

The use of the air chamber 38 further minimizes pressure changes for, although the fluid within the system is incompressible, the air within the chamber 38 is not, and the cushioning action of the air will to some extent act as a compensator to stabilize the system to minimize the effect of volume changes in the system when one unit yields.

From the above, it will be apparent that the present invention provides a system of pressure control which may be adjusted quickly, and with nicety, and in which the various control units may yield without having the entire pressure change caused by the yield borne by that particular unit, but rather distributing the change among all of the units to reduce the effective change on any unit to an inconsequential amount.

While in the above, one practical embodiment of the invention has been disclosed, it will be obvious that the invention may take forms other than that specifically shown and disclosed without departing from the scope of the invention as defined by the appended claims.

What is claimed is:

1. Fluid control means for regulating the pressure upon the weight rollers of each of a plurality of pairs of draft rollers to control the friction upon the slivers passing between the rollers of each pair comprising, a manifold, means to force

incompressible fluid to said manifold, a plurality of expansible chambers each having one end fixed to and in communication with said manifold, and linkage connecting the opposite end of each said expansible chamber to its respective weight roller, whereby pressure may be applied equally and simultaneously to all of said weight rollers and pressure changes upon a weight roller due to yielding of that weight roller to thickness irregularities in the sliver will be minimized by distribution to all weight rollers.

2. Fluid control means for regulating the pressure upon the weight rollers of each of a plurality of pairs of draft rollers to control the friction upon the slivers passing between the rollers of each pair comprising, a fulcrumed lever for each weight roller having a portion to bear upon said weight roller, a manifold, a means to force incompressible fluid to said manifold, a plurality of expansible chambers each having one end fixed to and in communication with said manifold, and linkage connecting the opposite end of each said expansible chamber to its respective fulcrumed lever, whereby pressure may be applied equally and simultaneously to all of said weight rollers and pressure changes upon a weight roller due to yielding of that weight roller to thickness irregularities in the sliver will be minimized by distribution to all weight rollers.

3. In fluid pressure control means as claimed

in claim 2, means to preliminarily adjust the linkage.

4. In fluid pressure control means as claimed in claim 1, an air chamber in communication with said manifold.

5. In fluid pressure control means as claimed in claim 2, an air chamber in communication with said manifold, and means to preliminarily adjust said linkage.

6. In fluid pressure control means as claimed in claim 2, said linkage including a bail surrounding said manifold and having its free ends attached to said expansible chamber, whereby said bail may engage said manifold when its fulcrumed lever is released to prevent undue expansion of said expansible chamber.

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