May 10, 1955 F. G. DE SANTIS 2,707,807

PRESSURE APPARATUS FOR THE DRAWING MECHANISM OF TEXTILE MACHINERY

Filed Nov. 14, 1951 4 Sheets-Sheet 1

Fig. 1

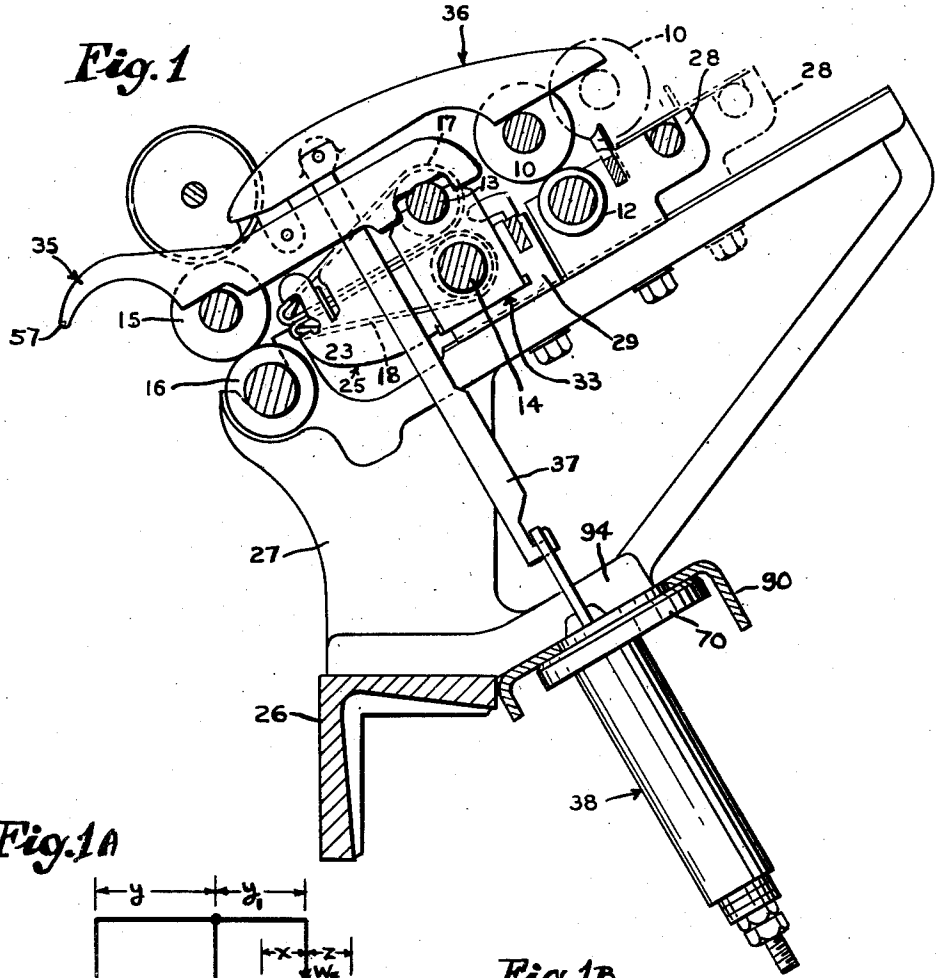


Fig. 1A

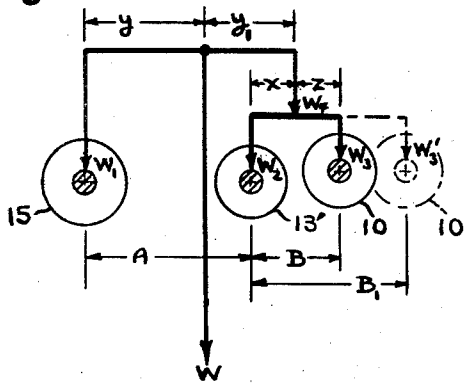
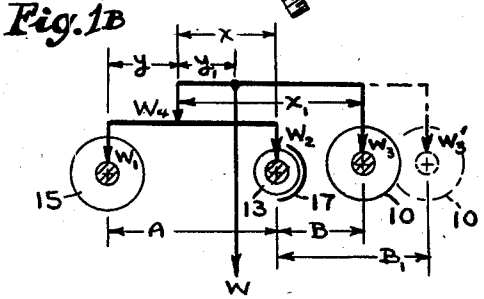


Fig. 1B



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4 Sheets-Sheet 2

Fig. 2

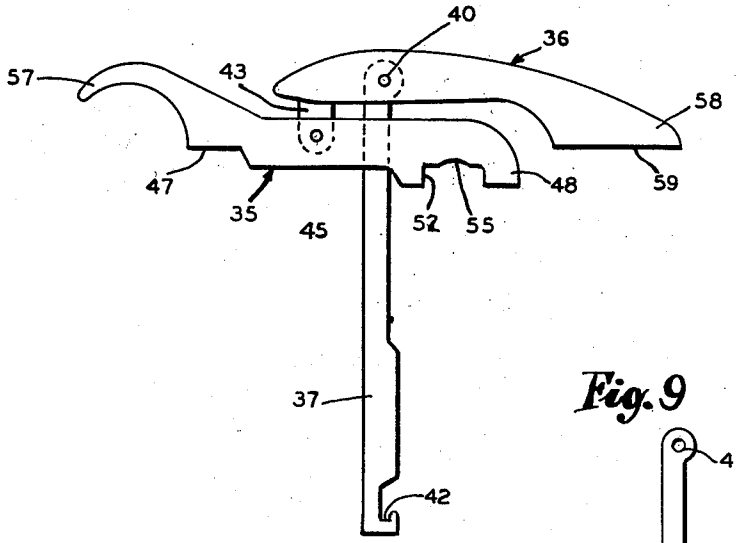


Fig. 9

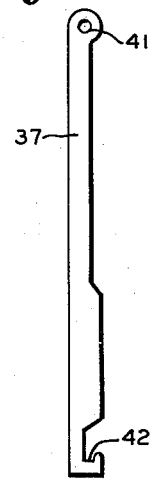


Fig. 10

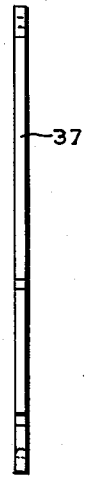


Fig. 3

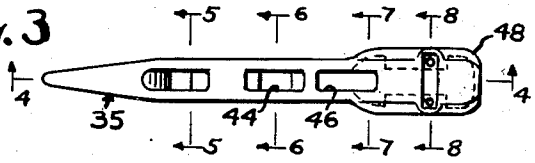


Fig. 4

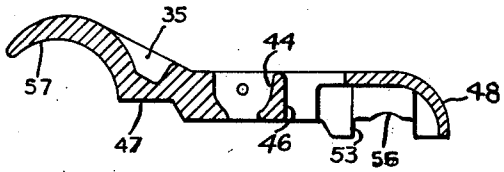


Fig. 5

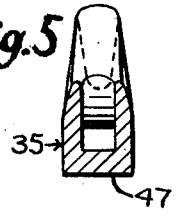


Fig. 6

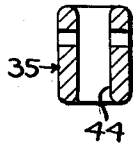


Fig. 7

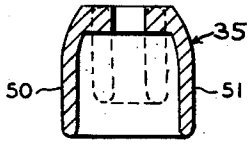
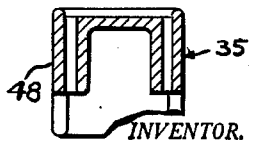


Fig. 8



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PRESSURE APPARATUS FOR THE DRAWING MECHANISM OF TEXTILE MACHINERY

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Fig. 11

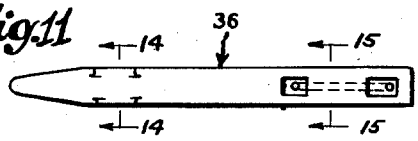


Fig. 12

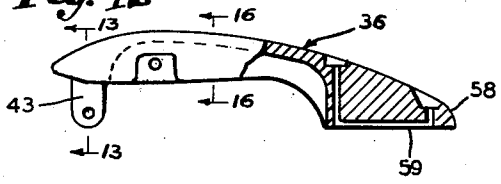


Fig. 13

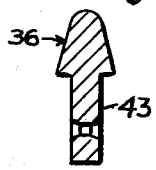


Fig. 14

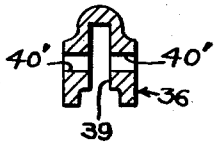


Fig. 15

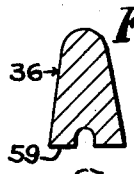


Fig. 16

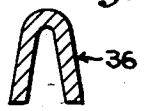
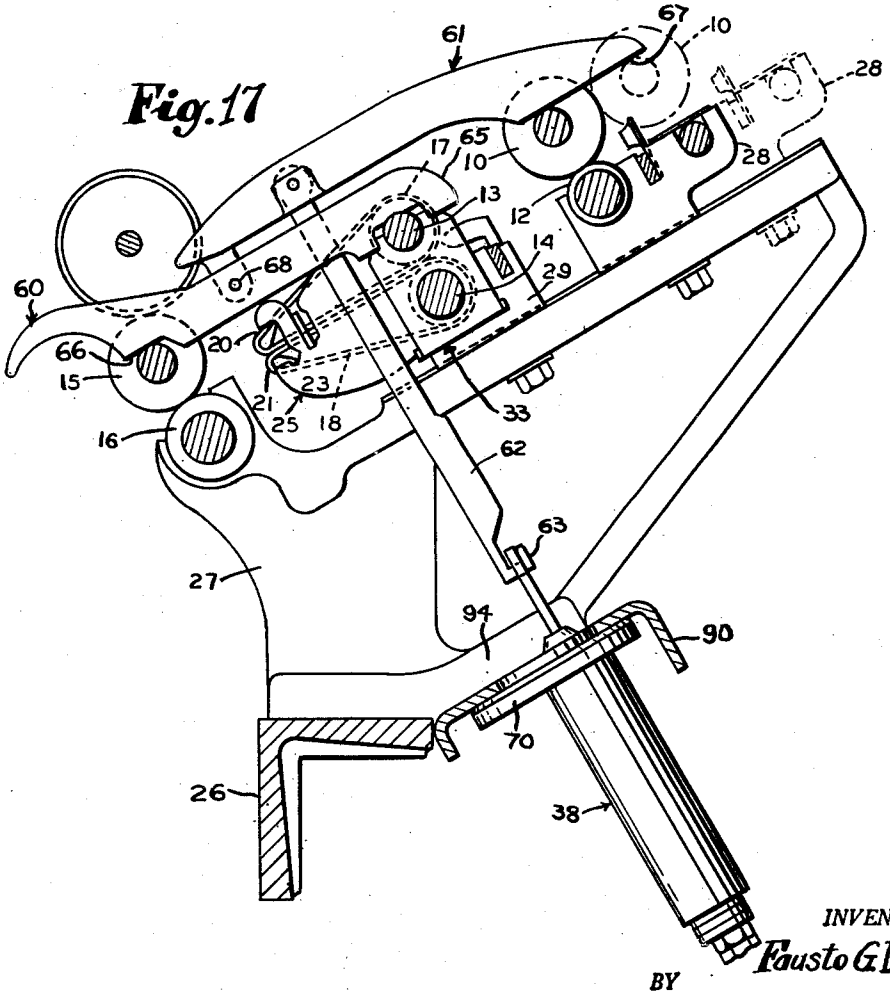


Fig. 17



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PRESSURE APPARATUS FOR THE DRAWING MECHANISM OF TEXTILE MACHINERY

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Fig. 18

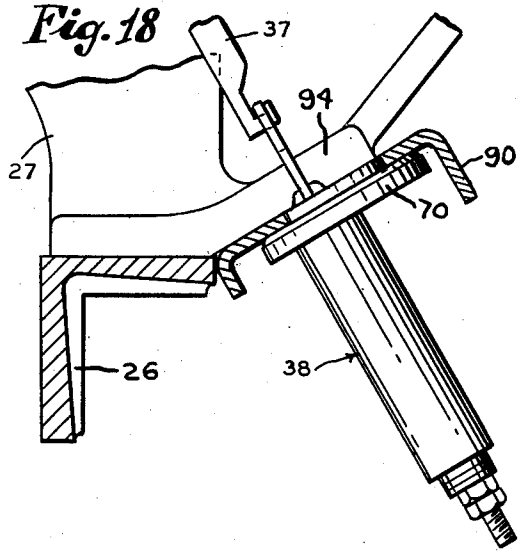


Fig. 20

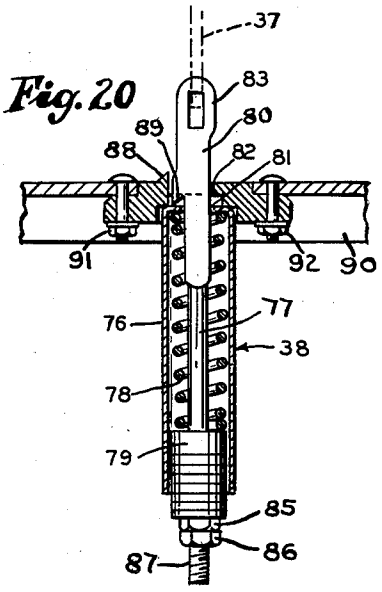


Fig. 19

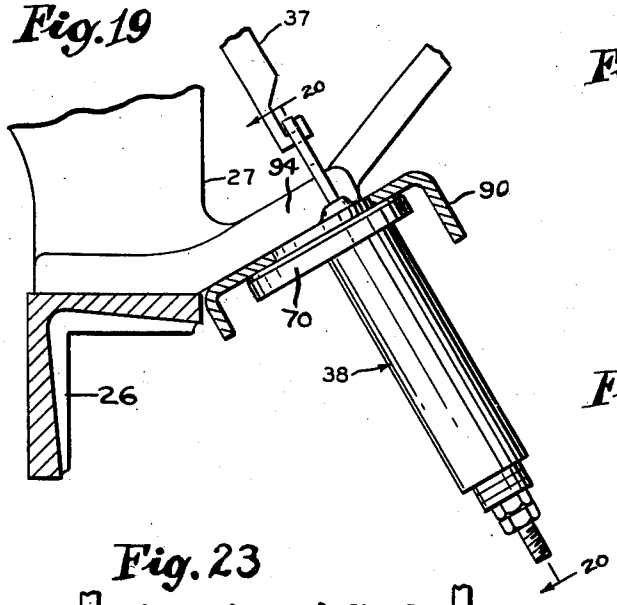


Fig. 21

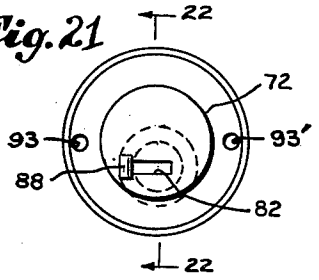


Fig. 22

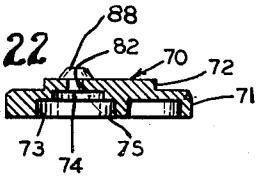
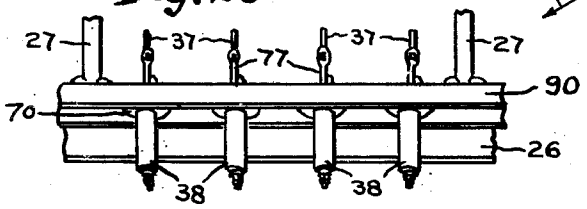


Fig. 23



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United States Patent Office

2,707,807

Patented May 10, 1955

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PRESSURE APPARATUS FOR THE DRAWING MECHANISM OF TEXTILE MACHINERY

Fausto G. De Santis, Quincy, Mass., assignor, by mesne assignments, to Whitin Machine Works, a corporation of Massachusetts

Application November 14, 1951, Serial No. 256,195

4 Claims. (Cl. 19—135)

This invention relates, in general, to drawing mechanisms of textile machinery, such as spinning frames, roving frames, and the like, and more particularly to an improved pressure system and apparatus for weighting or applying pressure to the top rolls of drawing mechanisms used in textile machines of the class above-mentioned. This application is a continuation-in-part of my application, Serial No. 204,717, filed January 6, 1951, for "Gear Cover or Guard for Textile Drafting Apparatus," now Patent No. 2,618,025, granted November 18, 1952.

In textile drawing mechanisms of the type above-indicated, the drafting operation is performed by successive pairs of drafting and top rolls, or equivalent drafting devices in one or more principal draft stages thereof, between which the rovings or slivers, as the case may be, are fed and advanced; and the loading or weighting of the top rolls to put upon them additional pressure beyond the dead weight of the top rolls themselves required for securing the proper drafting pressure and operation of the rolls, has been customarily accomplished by means of pressure saddles or hooks bearing upon the top rolls and carrying depending stirrups or pressure-transmitting connector rods drawn down by springs, weights, or weighted levers, which apply the desired degree of drafting pressure to the rolls. The front rolls of such drawing mechanisms are arranged to rotate faster than the intermediate rolls which, in turn, rotate faster than the rear or feed rolls so that the rovings will be drawn out or stretched in passing between the different rolls in its forward movement through the drawing mechanism. In order to obtain a yarn or thread which is uniform, it is essential that each pair of rolls should grip the roving and prevent it from being delivered therefrom faster than it would be fed by the rotation thereof; in other words, the weight or drafting pressure should be so distributed on the various rolls that the rovings will not be drawn between the rolls of any pair by the pair ahead.

In conventional three-roll spinning systems, i. e., those employing three lines of pairs or sets of upper and lower rolls for the drawing mechanism, the top roll saddle mechanism most commonly used is one composed of two pressure saddle members, arranged one above the other, of which the under or rear one rests on the shaft portions of the rear and intermediate top rolls, while the upper or front member rests at one end on the shaft portion of the front top roll and has the rear part bearing upon the under saddle member, and in which the drafting pressure is applied to the upper or front saddle member through the medium of a stirrup which is hung directly therefrom and operatively connected at its lower end either to a weighted lever or to a spring device.

With the system of weighting just described employing a top roll saddle mechanism of the above described construction, the greater portion of the weight or pressure transmitted by the stirrup is borne by the front top roll when the saddle members are sufficiently loaded so as to apply the proper pressure to the intermediate and rear top rolls. Furthermore, when using rolls thus weighted with fibers below 1¼ inch and proper roll settings from center-to-center approximately equal to the average length of fibers having staple lengths nominally classed in the array as ⅞ inch, 15/16 inch and 1 inch, it is found that within the usual range of adjustments in roll settings required to suit the specific fiber distribution of the above fiber lengths in the particular array used, there is produced only a slight shift in the distribution of the portion of the loading which is taken by the intermediate and rear top rolls. However, when longer fibers are to be run and the rolls are set wider apart at settings best adapted for working such fibers in lengths respectively classed within the range as 1¾-inch staple up to and through 4½-inch staple such as, for example, synthetic fibers, the above referred to fixed distribution relationship of the portion of the loading on the intermediate and rear top rolls no longer holds true and instead there results a very great variation in pressure or shift in loading from the rear top rolls to the intermediate top rolls, viz., an approximate pressure increase of 36% on the intermediate rolls accompanied by an approximate decrease of 40% in pressure applied to the rear rolls when the roll distances center-to-center are varied from narrow to wide spacings as the particular operating conditions require in the range for drafting the longer fibers falling within the above staple limits. Since many of the modern spinning frames currently developed and manufactured are so arranged as to allow wide variations in adjustment of the roll settings in order to work not only cotton fibers or blends below 1¼-inch staple but also the longer synthetic staples or other long fibers, it is self-evident from the foregoing discussion that the conventional form of weighting system and saddle device above described is quite unsuited for use in such universal types of machines and would be extremely troublesome in the maintenance of proper pressure on the rolls when the settings are varied because of frequent changes from cotton to synthetic staples, or vice versa, or to blends, where such a wide range of fibers are to be run in the course of the manufacturing operations of a textile mill.

It is accordingly one of the objects of the present invention to avoid the aforementioned disadvantages and difficulties and to provide an improved pressure system and a novel top roll pressure saddle mechanism which is so arranged that the loading will be distributed on the three top rolls in such a manner that each will bear its proper portion thereof and will partake of increases or decreases in the loading upon the front saddle member and in the portion thereof applied on the front and intermediate top rolls of less than 10% where changes in the spacing of these rolls from minimum to maximum settings, and vice versa, are made.

Another object of the invention is to provide a pressure system and apparatus that will be suited especially for use with drawing mechanisms of spinning frames wherein the rolls are arranged for very wide adjustments and extreme variations in the roll settings, and in which the above-stated objectionable features of the conventional weighting system and pressure saddle mechanism are avoided.

A further object of the invention is to provide an improved method and pressure mechanism for applying downward pressure or weight to the top rolls of an "apron" type long-draft spinning frame having three pairs of drafting instrumentalities involving top and bottom rolls and wherein the rolls are capable of adjustment to extremely wide settings, in which the loading or weighting is distributed to the rolls by means of a novel construction of saddle and stirrup device incorporating a pressure saddle to cooperate with both the front and intermediate top rolls and a second pressure saddle to cooperate with

the rear top roll, in combination with a spring tension device which is suspended between and by a pair of adjoining roll stands with its pull rod positioned in line with and connected to the stirrup of said saddle device to exert a downward pull thereon and draw down the saddles on the top rolls.

A still further object of the invention is to provide a pressure mechanism in which the downward pressure or weight is applied to the top rolls by means of a spring tension device, and in which the manner of applying the loading to the rolls throughout the extreme limits of their settings for cottons and for longer fibers such as, for example, synthetic staples, is obtained by the interchange and alternate use in similar relationship with the rolls of two sizes of saddle and stirrup devices, one being of the so-called "short-type" having pressure saddles of lengths adapted for use where adjustments of the roll settings within a narrow range are to be made and the other being of the so-called "long-type" having similar construction but with longer pressure saddles for use where wider adjustments in the roll settings are to be made, and wherein use is made of the same spring tension device which will be operative with either size of saddle and stirrup device upon reversal of the position of the spring tension device relative to its support whereby in either position it will apply the pressure in line with the stirrup to the top saddle and in a direction substantially perpendicular to the latter when either the "short-type" or the "long-type" saddle and stirrup device is in use.

According to the invention, a front saddle bears upon the central axis portions of the front and intermediate top rolls to load such rolls, and a back saddle rests upon and loads the central axle portion of the back roll. The top roll saddle and stirrup device is made in two sizes each of similar construction and interchangeable one for the other, one being of the "short-type" to be used where the roll settings are varied within the range of from $1\frac{15}{16}$-inches to $3\frac{3}{16}$-inches for working fibers from $1\frac{3}{4}$-inch minimum staple to 3-inch maximum staple, and the other being of the "long-type" to be used where the roll settings are adjusted and set within the range of from $3\frac{3}{16}$-inches through $4\frac{11}{16}$-inches for working fibers from 3-inch minimum staple to $4\frac{1}{2}$-inch maximum staple. In both forms of the saddle and stirrup device just-described, the construction comprises a pair of articulated pressure saddle members arranged one above the other the lower or front saddle member having forward and back bearing portions resting upon the front and intermediate top rolls respectively, and the upper or rear saddle member having a roll bearing portion at its rear part. The rear saddle member is pivotally connected at its forward part to the front saddle member, and the downward pressure is applied to the saddle device and through it to the top rolls, by means of a pressure-transmitting bar or stirrup which is hung from the upper saddle member and has its lower end connected to a pull rod operatively connected with the expansion spring of a spring tension device. A weighting beam runs from roll stand to roll stand at the back thereof and is supported thereby, the weighting beam supporting a plurality of spring tension devices one for each pair of spindles. Each spring tension device is of the individual cartridge type and separately removable from the weighting beam and capable of being initially set or preloaded for different spring pressures. Each of the spring cartridges is supported individually by an eccentric mounting member attached to the weighting beam and so arranged as to be revolved therein through a 180° angle from one position into a second position whereby the position of the pull rod in either rotated position of the eccentric mounting member will be always in line with the position of the stirrup of either the "short-type" or the "long-type" saddle device, as the case may be, without removal or adjustment in the position of the weighting beam, and thus maintain the line of pull of the stirrup perpendicular to the plane of the top rolls where either

saddle device is used and the same spring device employed therewith.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a vertical sectional view of a three-roll "apron" type drawing mechanism of a spinning frame equipped with the improved top roll pressure mechanism according to the invention incorporating a "short-type" pressure saddle and stirrup device, and illustrating the relationship of the parts when the back rolls are spaced at their narrowest and at their widest settings;

Fig. 1A is a diagrammatic representation of a conventional weighting system as applied to a three-roll drawing mechanism of a spinning frame;

Fig. 1B is a diagrammatic representation of the weighting system of the present invention and illustrated in Fig. 1 as applied to a three-roll "apron" type drawing mechanism of a spinning frame.

Fig. 2 is a side elevation of the novel pressure saddle and stirrup device;

Fig. 3 is a top plan view of the form of front saddle employed in the Fig. 2 device;

Fig. 4 is a central longitudinal vertical sectional view taken along the line 4—4 in Fig. 3;

Fig. 5 is a vertical transverse section taken on the line 5—5 in Fig. 3;

Fig. 6 is a vertical transverse section taken on the line 6—6 of Fig. 3;

Fig. 7 is a vertical transverse section taken on the line 7—7 in Fig. 3;

Fig. 8 is a vertical transverse section taken on the line 8—8 in Fig. 3;

Figs. 9 and 10 are side and rear elevational views respectively of the stirrup employed in the Fig. 2 device;

Fig. 11 is a top plan view of the form of back saddle employed in the Fig. 2 device;

Fig. 12 is a side elevation, partly in section, of the back saddle;

Fig. 13 is a vertical transverse section taken on the line 13—13 in Fig. 12;

Fig. 14 is a vertical transverse section taken on the line 14—14 in Fig. 11;

Fig. 15 is a vertical transverse section taken on the line 15—15 in Fig. 11;

Fig. 16 is a vertical transverse section taken on the line 16—16 in Fig. 12;

Fig. 17 is a vertical sectional view of a three-roll "apron" type drawing mechanism of a spinning frame equipped with a top roll pressure mechanism according to the invention incorporating a "long-type" pressure saddle and stirrup device, and illustrating the relationship of the parts when the back rolls are spaced at their narrowest and at their widest settings;

Fig. 18 is a fragmentary view, partly in side elevation and partly in section, showing the position occupied by the spring tension unit when the "short-type" pressure saddle and stirrup device is used in the pressure mechanism;

Fig. 19 is a fragmentary view, partly in side elevation and partly in section, showing the position occupied by the spring tension unit when the "long-type" pressure saddle and stirrup device is used in the pressure mechanism;

Fig. 20 is a central longitudinal section taken on the line 20—20 of Fig. 19;

Fig. 21 is a top plan view of a rotatable holder for a spring tension unit;

Fig. 22 is a vertical section taken on the line 22—22 of Fig. 21; and

Fig. 23 is a fragmentary rear elevation of a spinning frame showing a portion of the roller beam having mounted thereon a pair of roll stands which support the

weighting beam extending therebetween and carrying a plurality of spring tension devices.

Referring first to Fig. 1, the construction there shown comprises a series of pairs of upper and lower rotatable drafting instrumentalities arranged to feed and draft roving, sliver or the like, hereinafter referred to as "sliver." These drafting instrumentalities comprise upper and lower back or feed rolls 10 and 12, upper and lower intermediate or apron driving rolls 13 and 14, and upper and lower front or drawing rolls 15 and 16 respectively.

Endless upper and lower long draft aprons 17 and 18 have their rear loops mounted on the intermediate set of rolls 13 and 14 respectively, and their front loops guided over the cross arms 20 and 21 (see Fig. 17) of a single U-shaped guide bar or tensor member which is held by the aprons against the forward recessed edge portions of the vertical side frame members 23 of the cradle frame unit 25. The aprons 17 and 18 thus are restrained from lateral or axial displacement by the side frame members 23 of the cradle frame unit and also are supported so that the portions engaging the fibers have generally parallel cooperating runs closely adjacent to each other and in operative position for gripping and drafting the textile fibres while delivering them to the front set of rolls 15 and 16.

The usual roller beam 26 carries a plurality of spaced roll stands 27 in which the bottom rolls 12, 14 and 16 are supported, and these rolls are connected and driven positively by suitable gearing mechanism, not shown, for rotating them at successively higher surface speeds from rear to front, as is usual in drawing mechanisms of this type. Usually the bottom front roll 16 is supported directly in the roll stand castings, as shown, while the bottom rear and intermediate rolls 12 and 14 are supported respectively in the usual bearing blocks 28 and 29, adjustably mounted on the roll stands, one each of these bearing blocks being shown in Fig. 1. The bottom rolls 12, 14 and 16 are each of the customary sectional construction, being made of steel and built up of a series of short roll sections joined together end-to-end to form a long continuous roll which when mounted in the roll stands extends lengthwise of the spinning frame for substantially its entire length. The front and rear bottom rolls 12 and 16 are each provided at closely spaced intervals therealong with a series of longitudinally fluted bosses (not shown) for gripping the sliver as it is conveyed and drafted while the lower intermediate or apron driving roll 14 is provided with a series of roughened or knurled bosses (not shown) for actuating a plurality of endless lower long-draft belts or aprons 18.

The top rolls 10, 13 and 15 are held in cooperative relationship with their companion bottom rolls 12, 14 and 16 respectively in any convenient manner as, for example, by the usual cap bars (not shown). The front and rear top rolls 15 and 10 are of conventional design being relatively short and each is formed with a pair of cylindrical bosses having an outer covering of cork, leather or other yielding material, and they bear upon and are driven by their companion lower rolls 12 and 16 respectively. The intermediate or apron driving top roll 13 also is of relatively short length and is provided with two axially spaced, roughened or knurled bosses (not shown) for actuating a pair of endless upper long-draft belts or aprons 17, one of which is here shown, as is customary in apron systems of this nature.

The upper intermediate or apron driving top rolls 13 are positively driven from their companion lower apron driving roll 14 by means of suitable gearing (not shown) fixed to central shaft portion of the roll 13 and the opposite shaft portion of the lower roll 14 respectively, and act to drive the associated upper and lower long draft aprons 17 and 18 at the same surface speed.

The gears for driving the upper apron roll from the lower apron rolls preferably are enclosed within a removable gear casing or guard unit indicated at 33 in Fig. 1, which resembles an open top box-like structure having a removable bottom cover, and side wall members opposite the flanks of the meshed gears suitably shaped to removably receive the respective shafts of the upper and lower gear-connected rolls 13 and 14. The casing unit 33 rests upon and is supported on the shaft of the lower apron roll 14, and has its top end closed by being inserted within the interior of a recess which is directly inwardly from and is open at the bottom of the enlarged rear part of the front pressure saddle member of the saddle and stirrup device disclosed in my copending application, Serial No. 204,717, filed January 6, 1951. The specific structure of the gear cover or guard unit above-described "per se" forms the subject of the invention described in detail and claimed in my copending application, Serial No. 204,717, filed January 6, 1951 now Patent No. 2,618,025, granted November 18, 1952. However, the specific structure of the saddle and stirrup device disclosed in the aforesaid copending application, Serial No. 204,717, forms a feature of the top roll pressure mechanism of the present invention presently to be described.

Referring more particularly to Figs. 1 and 2, the top roll pressure mechanism according to this invention involves a saddle and stirrup device having a construction in which two pivotally connected pressure saddle members 35 and 36 are arranged one above and partly behind the other with the front saddle member 35 thereof bearing upon the respective central shaft portions of the front top roll 15 and the upper apron roll 13 to load or weight these rolls, and the back saddle member 36 of the device carrying a stirrup or pressure transmitting member 37 and bearing upon the central shaft portion of the back top roll 10, in combination with a novel mounting arrangement of a spring tension device 38 by which the necessary pressure is applied to said saddle members through the stirrup 37. The stirrup or pressure-transmitting member 37 may be in the form of a flat strip of metal of suitable length having the form shown in Figs. 9 and 10 and pivotally held at its upper end within a slotted portion 39 at the forward bottom portion of the back saddle 36 by a cross pin 40 having its ends secured in suitable holes 40' in the opposite side walls of the slot 39 and its body part inserted through a suitable aperture 41 in the upper extremity of the stirrup. The lower extremity of the stirrup 37 is provided with a hooked connecting portion 42 adapted for detachable connection to the pull rod of the spring tension device 38 hereinafter to be described in detail.

As previously mentioned, the front and back saddle members 35 and 36 respectively are pivotally connected together with the latter behind and above the former, the construction being shown in Figs. 1 and 2 in which the pivoted connection is provided by a relatively short finger 43 projecting downwardly from the bottom face of the forward end part of the back saddle 36 at a point close to but in advance of the point of attachment thereto of the stirrup 37. The finger 43 projects into a slotted opening 44 extending vertically through the body of the front saddle 35 (see Fig. 3) and is secured in place and pivoted upon a cross pin 45 having its ends secured in suitable apertures in the front saddle 35. The upper part of the shank of the stirrup 37 extends longitudinally through a vertical slot 46 in the body of the front saddle 35 and situated close behind the slot 44 thereof (see Fig. 3).

As illustrated in Figs. 2 and 4, the front saddle member 35 includes a lower flat forward bearing portion 47 which rests upon and bears on the central shaft portion of the front top roll 15 and a hollow enlarged rear portion 48 open at its bottom which forms a recessed cover within which is inserted the open top end portion of the gear casing or guard unit 33. The lower edges of the opposite side wall members 50 and 51 respectively of the enlarged recessed rear portion 48 of the front saddle member 35 are deeply notched as indicated at 52 and 53 (see Figs. 2 and 4) for straddling the upper part of

the central shaft portion of the top apron roll 13 when disposed opposite the flanks of the driving gear thereof. As shown in Figs. 2 and 4, the inner portions of the notches 52 and 53 respectively are formed with slightly concave bearing surfaces 55 and 56 for resting upon the cylindrical shaft portion of the apron roll 13. At its front end extremity, the front saddle member 35 terminates in a finger hook 57 which is formed integral with the saddle member and provided to enable the lower flat bearing portion 47 of the front saddle member to be raised manually to permit inspection of the front roll bearings or even removal of the upper front top roll 15 without requiring dismantling of the mechanism.

The back saddle member 36 constitutes a simple form of lever that has its articulation point near its forward end and from which it extends rearwardly in a generally horizontal direction over and slightly beyond the rear limits of the front saddle and thence curves downwardly to terminate in a rear foot portion 58 having a divided flat bottom bearing surface 59 which is adapted to rest on the central shaft portion of the upper back top roll 10 of the drafting mechanism.

From the foregoing, it will be evident that the construction of the saddle and stirrup device will permit all desired adjustments and ordinary variations in settings or spacings of the pairs of adjustable rolls, i. e., the apron rolls 13, 14 and the back or feed rolls 10, 12 to be made on the roll stands to the settings best adapted for drafting fibers of staple lengths within the range group for the particular size of saddle device employed. When applied to the top rolls of the drafting mechanism the initial position of the entire saddle and stirrup device is self-locating and determined by the capping of the gear housing 33 by the hollow rear portion 48 of the front saddle as it rests astride the gear on the upper apron roll 13, the flat bearing surfaces 47 and 59 of the front and back saddle members 35 and 36 respectively having suitable length as to be supported by the top rolls during the various changes in settings of the apron rolls 13 and 14 and the back rolls 10 and 12 on the roll stands throughout the particular range of minimum and maximum settings which experience has determined as practical and best adapted for properly drafting fibers falling in the particular range of staple lengths to be worked. Thus, the "short-type" saddle arrangement shown in Figs. 1, 2, 3, 4, 11 and 12 accommodates any desired adjustment of the setting of the apron rolls and the back rolls on the roll stand relative to the front rolls for drafting fibers of staple lengths in a range of from 1¾-inches up to 3-inches maximum staple.

However, when the rolls of the drawing mechanism are set to draft longer fibers, viz., those falling in a range of staple lengths of from three inches through four and one-half inches maximum staple then the longer size or "long-type" saddle and stirrup device is employed in the pressure mechanism as illustrated in Fig. 17. The construction of this "long-type" saddle and stirrup device is similar to that of the Fig. 2 device but differs therefrom only by having its front and rear pressure saddle members 60 and 61 respectively of longer length than the corresponding front and rear saddle members 35 and 36 of the Fig. 2 device in order to accommodate the wider settings or spacings between the rolls where longer fibers are to be drafted. The stirrup 62 used in the "long-type" saddle construction is identical with the stirrup 37 of the Fig. 2 device and is provided with a hooked portion 63 at its lower extremity having detachable connection with the upper end of the pull rod of the spring tension device 38, the positions of the stirrup and the pull rod, however, being changed from that shown in Figs. 1 and 18 to the new positions shown in Figs. 17 and 19 by reversing the position of the spring tension device in order that the direction of transmission of force or pressure transmitted by the pull rod to the stirrup 62 will be in a straight line in the new positions of these members. In this arrangement, the hollow rear cover portion 65 of the front saddle 60 also straddles the driving gear and the shaft of the top apron roll 13 and the flat bearing surfaces 66 and 67 of the front and rear saddle members 60 and 61 respectively are of sufficient length for bearing upon the central shaft portions of the front and rear top rolls 15 and 10 respectively and for accommodating any desired adjustments of the apron and the back rolls relative to the front rolls on the roll stand. The point of articulation as indicated at 68 of the front and rear saddle members 60 and 61 while shown as being situated slightly more rearwardly in position over that of the "short-type" saddle and stirrup assemblage shown in Fig. 2, however, is so placed in the Fig. 17 device as to obtain a similar pressure distribution effect on the respective rolls throughout the normal adjustments and changes in their settings within the minimum and maximum range thereof.

The construction of the spring tension device 38 is illustrated in detail in Fig. 20 and as there shown comprises a base member 70 of stepped formation (see Fig. 22) having a lower cylindrical flanged portion 71 from which rises a coaxial cylindrical head portion 72 of smaller diameter. As shown in Figs. 21 and 22, the underside of the flanged portion 71 is provided with an inwardly directed shouldered recess 73 formed by the inner cylindrical bore 74 within the head portion 72 and the cylindrical counterbore 75 within the flanged portion 71. The recess 73 has its longitudinal axis extending in a direction substantially parallel with but offset from the longitudinal axis of the base member 70. The diameter of the cylindrical counterbore 75 is such as to loosely receive the upper end extremity of the outer shell or casing member 76 of the spring tension device 38. Slidable within the casing member 76 is the spring pressed pull rod 77 which extends longitudinally through the expansion spring 78 and the casing member 76 and carries near its lower extremity a cylindrical plug 79. As shown in Fig. 20, the pull rod 77 is formed with a flattened upper portion 80 which is guided for movement in the lateral vertically aligned rectangular slots or apertures 81 and 82 formed in the upper end wall of the casing member 76 and in the base member 70 respectively. The upper extremity of the flattened portion 80 is provided with an enlarged slotted head portion 83 adapted for detachable connection with either the hooked portion 42 of the stirrup 37 or the hooked portion 63 of the stirrup 62 depending upon whether the "short-type" or the "long-type" of saddle and stirrup device is employed as part of the pressure mechanism.

The upper end of the spring 78 engages the inner face of the upper end wall of the casing member 76 and the lower end of the spring engages the inner end of the cylindrical plug 79. The plug 79 is loosely slidable upon the pull rod 77 and its endwise movement thereon is limited by the nuts 85 and 86 threadingly connected with the screw threaded lower end portion 87 of the pull rod 77. The expansion of the spring 78 forces the plug 79 against the nut 85 thereby drawing down the pull rod, the stirrup and the saddles to apply downward pressure upon the rolls. The base member 70 is provided with an upstanding angular lug 88 adjacent one end of the slot 81 and adapted for detachable engagement with the reentrant catch portion or hook 89 formed by cutting away a strip from the lower part of one side edge of the flattened upper portion 80 of the pull rod 77 thus enabling the pull rod to be held in a raised extended position against the expansion of the spring 78 when it is desired to relieve the rolls of the weighting pressure or when making a change of saddle and stirrup devices, and also to act as a stop for the pull rod against the top end of the casing as would occur when the pull rod is in a retracted condition when disconnected from a saddle stirrup, the spring action holding the assembly together as a unit to the base member. The adjustment of the pressure applied by the spring tension de-

vice 38 to the saddle and stirrup device, and to the top rolls, can be readily effected by appropriate adjustment of the nuts 85 and 86 lengthwise of the threaded portion 87 of the pull rod 77 to raise or lower the position of the plug 79 thereon against the thrust of the spring to place the spring 78 under a desired degree of compression as well as to vary the distance that it projects outwardly from the casing 76. Graduations are provided on the outer cylindrical surface of the plug 79 at suitably arranged intervals therealong to cooperate with the bottom edge of the casing 76 in response to the different adjusted positions of the plug so as to afford a visual indication of the particular pressure being applied to the saddle and stirrup assemblage by the spring 78 as it is regulated or set to the required pressure by appropriate adjustment of the plug 79.

The manner of application of the spring tension device 38 to the spinning frame is illustrated in Figs. 1, 17, 18, 19 and 23 wherein the spring tension device is free from attachment to the roller beam 26 or other frame parts and is supported only by the roll stands 27 and by a lengthy channel-shaped weighting beam 90 which is suitably secured thereto and runs lengthwise of the machine in back of and for substantially the entire length of the roller beam, there being a series of spring tension devices 38 carried or supported by the weighting beam 90 with several of the spring tension devices being situated in each span between two adjoining roll stands as shown in Fig. 23. To this end, the weighting beam 90 is provided at spaced intervals along its length with a series of holes each of a size for accommodating the cylindrical head portion 72 of the base member 70 of an individual spring tension device 38. As shown in Fig. 20, after the head portion 72 has been inserted into a selected hole in the weighting beam 90, the base member 70 is secured in place by two bolts 91 and 92 which pass through suitable holes 93 and 93' respectively disposed at diametrically opposite locations on the flanged portion 71. The roll stands 27 are shown provided with upwardly inclined rear foot extensions 94 to which the weighting beam 90 is bolted or otherwise secured whereby the spring tension devices carried thereby are supported at an oblique angle behind and clear of the roller beam.

tables all forces or pressures are expressed in pounds (#), and all lever arms of force and all center-to-center distances between rolls are given in inches (") and fractions of an inch or decimal equivalents thereof where:

A=the center-to-center distance between the front and the second rolls;

B=the center-to-center distance between the second and the back rolls when the back roll is moved to its closed position to the second roll;

B_1=the center-to-center distance between the second and the back rolls when the back roll is moved to its widest position to the second roll;

W=the total force or pressure applied to the stirrup;

W_1=the portion of W or force acting upon the front roll;

W_2=the portion of W or force acting upon the second roll;

W_3=the portion of W or force acting upon the back roll at its minimum position;

W_3'=the portion of W or force acting upon the back roll when at its maximum position;

W_4=the portion of W or force acting upon the back saddle where the Fig. 1A weighting system is used;

W_4'=the portion of W or force acting upon the front saddle where the Fig. 1B weighting system is used;

x, x_1, y, y_1, z and z_1=lever arms of force.

1. Using Fig. 1A form of conventional weighting:

Table I

Narrow Range 3" Maximum Staple				
A=3.625" W=53#	x=.939" y=2.578" y_1=1.986"		z=B−x=.9985" z_1=B_1−x=2.2485"	
	B=1 15/16"	B_1=3 3/16"	Variation in Pressure	Percent Var.
W_1	23.06#	23.06#	0	0
W_2	15.43#	21.12#	+5.69#	+36.88
W_3	14.51#	* * *	* * *	* * *
W_3'	* * *	8.82#	−5.69#	−39.21
W_4	29.94#	29.94#	0	0

2. Using Fig. 1B form of weighting system:

Table II

Short-Type Saddle Device					Long-Type Saddle Device				
Narrow Range 3" Max. Staple					Wide Range 4" Max. Staple				
A=3.625" W=53#	x=2.172" y=1.453"		x_1=2.983" y_1=1.125"		A=4.375" W=53#	x=2.625" y=1.750"		x_1=4.2345" y_1=1.578"	
	B=1 15/16"	B_1=3 3/16"	Variation in Weight	Percent Var.		B=3 3/16"	B_1=4 7/16"	Variation in Weight	Percent Var.
W_1	23.06#	25.09#	+2.03#	+8.80	W_1	23.17#	24.70#	+1.53#	+6.60
W_2	15.43#	16.78#	+1.35#	+8.75	W_2	15.44#	16.46#	+1.02#	+6.60
W_3	14.51#	* * *	* * *	* * *	W_3	14.39#	* * *	* * *	* * *
W_3'	* * *	11.13#	−3.38#	−23.29	W_3'	* * *	11.86#	−2.53#	−17.58
W_4'	38.49#	41.87#	+3.38#	+8.78	W_4'	38.61#	41.16#	+2.55#	+6.60

Typical values of pressure distribution and loading upon the front, second, and back rolls, and on the back saddle, of a three-roll type of drawing mechanism of a spinning frame are tabulated below where the values given in Table I are the calculated pressures for a conventional weighting arrangement as shown diagrammatically in Fig. 1A, and the values given in Table II are the calculated pressures for the weighting or pressure arrangement of the present invention and represented diagrammatically in Fig. 1B, the tables also listing the variations in weighting pressure and percent variation that result when the back roll in both arrangements is moved from the same minimum to the same maximum positions relative to the second roll. For the following

Referring to the above Table I it will be evident that on the conventional weighting system of Fig. 1A, the variation of force W_1 on the front top roll 15 is, of course, zero when the back top roll 10 is moved from setting B to B_1. However, the force W_2 on the second top roll 13' is increased 36.88% or 5.69 lbs. while the force W_3 on the back top roll 10 is reduced by 39.21% or 5.69 lbs. when the center-to-center distance between the back top roll and the second top roll is increased from B to B_1 by moving the back top roll to the new position shown in broken lines in Fig. 1A. The spacing A between centers of the front and second top rolls 15 and 13', however, remains the same for either position of the back roll 10.

In contrast to the weighting action of the Fig. 1A system just-described, the weighting or pressure system of the present invention, and in accordance with the Fig. 1B arrangement, has quite a different action in that variations in pressure or loading occur across all three lines of rolls as indicated in the above Table II wherein the percentage increase or variation of force W_1 on the front top roll **15** for the narrow range is 8.80% and for the wide range is 6.60% when the back top roll **10** is moved from its narrowest position relative to the second top roll **13** of spacing B to the second position of distance B_1. This change in position of the back top roll **10** is accompanied by a percentage increase of force W_2 on the top apron roll **13** of 8.75% for the narrow range, and of 6.60% for the wide range. There also results a percentage increase of force W'_4 applied upon the front saddle at the point of articulation therewith of the back saddle of 8.78% for the narrow range, and of 6.60% for the wide range. The percentage variation of force W'_3 on the back top roll is a decrease of 23.29% for the narrow range, and of 17.58% for the wide range, when the back top roll **10** is moved from the position having B distance from the apron top roll **13** to the B_1 position therefrom.

From the foregoing, it will be apparent that with the pressure system and apparatus of the present invention the percentage variations in the pressure or loading upon the front and second top rolls, and at the point of application of the force upon the front saddle by the rear saddle member will be uniform and substantially equal for each, as shown in Table II, and will partake of increase or decreases of less than 10% where changes in the position of the back rolls **10** and **12** relative to the intermediate apron rolls **13** and **14** from minimum to maximum settings, and vice versa, are made.

What is claimed is:

1. A spring weighting device for the drawing rolls in spinning and roving frames comprising a cylindrically stepped plate member arranged to seat in an aperture in a fixed perforated supporting member and to be detachably secured thereto and installed in either of two positions revolved a half a revolution from the other, the bottom of said plate having an inwardly extending cylindrical recess axially offset from the longitudinal axis of the plate member with the end wall of said recess having a lateral slot, a casing seated in said bottom recess in the casing member and extending downward therefrom, said casing having its lower end open and provided at the other end with a laterally extending slot which is aligned with the slot in said plate member, a pull rod extending axially through the casing to project at each end thereof, said pull rod having a flattened upper portion which is guided for movement in the lateral slots in the casing and in the plate member and also extends outwardly well beyond the top face of the plate member and arranged for detachable connection to the lower end of a saddle stirrup, a cylindrical plug fitting loosely within said casing and loosely slidable on said pull rod, means adjustable on the lower projecting end portion of said pull rod to limit the outward position of said plug thereon, a compression spring encircling said pull rod and bearing between the inner end of said plug and the slotted upper end wall of said casing, and means on the upper end portion of said pull rod for limiting the inward movement of said rod when retracted by said spring whereby said assembly is held together as a unit to said plate member by said spring action.

2. A spring weighting device as claimed in claim 1, which is further characterized by the plug being provided exteriorly with graduations for cooperating with the bottom edge of the casing in response to different adjusted positions of the plug by axial adjustment of its outward limiting means with respect to the pull rod, and means for holding the push rod lifted to effect release of the stirrup.

3. In a textile drawing mechanism of the apron type having front and rear pairs of upper and lower drawing rolls and an intermediate pair of upper and lower apron carrying rolls, and further including a horizontally extended roller beam and roll stands mounted thereon rotatably supporting the lower rolls of each pair of said rolls and upon which stands the lower apron roll and the rear drawing roll are adjustable from narrow to wide settings relative to the lower front drawing roll and to each other, and saddle and stirrup assemblies operatively arranged to apply pressure simultaneously to said upper rolls, that improvement in stirrup weighting means which comprises a perforated fixed elongated support member extending longitudinally alongside of said roller beam beneath all the roll stands, and spring tensioning devices one for each stirrup and supported by said fixed beam member, each of said spring tensioning devices comprising a cylindrically stepped plate member arranged to seat in an aperture in the fixed perforated supporting member and to be detachably secured thereto and installed in either of two positions revolved a half a revolution from the other, the bottom of said plate having an inwardly extending cylindrical recess axially offset from the longitudinal axis of the plate member with the end wall of said recess having a lateral slot, a casing seated in said bottom recess in the casing member and extending downward therefrom, said casing having its lower end open and provided at the other end with a laterally extending slot which is aligned with the slot in said plate member, a pull rod extending axially through the casing to project at each end thereof, said pull rod having a flattened upper portion which is guided for movement in the lateral slots in the casing and in the plate member and also extends outwardly well beyond the top face of the plate member and arranged for detachable connection to the lower end of a saddle stirrup, a cylindrical plug fitting loosely within said casing and loosely slidable on said pull rod, means adjustable on the lower projecting end portion of said pull rod to limit the outward position of said plug thereon, a compression spring encircling said pull rod and bearing between the inner end of said plug and the slotted upper end wall of said casing, and means on the upper end portion of said pull rod for limiting the inward movement of said rod when retracted by said spring whereby said assembly is held together as a unit to said plate member by said spring action.

4. In a textile drawing mechanism of the apron type having front and rear pairs of upper and lower drawing rolls and an intermediate pair of upper and lower apron carrying rolls, and further including a horizontally extended roller beam and roll stands mounted thereon rotatably supporting the lower rolls of each pair of said rolls and upon which stands the lower apron roll and the rear drawing roll are adjustable from narrow to wide settings relative to the lower front drawing roll and to each other, and saddle and stirrup assemblies operatively arranged to apply pressure simultaneously to said upper rolls, that improvement in stirrup weighting means which comprises an inclined perforated beam member extending longitudinally alongside of said roller beam in bridging relation to the feet of all of said roll stands and affixed thereto, and spring tensioning devices one for each stirrup and suspended by said fixed beam member, each of said spring tensioning devices comprising a cylindrically stepped plate member arranged to seat in an aperture in the fixed perforated supporting member and to be detachably secured thereto and installed in either of two positions revolved a half a revolution from the other, the bottom of said plate having an inwardly extending cylindrical recess axially offset from the longitudinal axis of the plate member with the end wall of said recess having a lateral slot, a casing seated in said bottom recess in the casing member and extending downward therefrom, said casing having its lower end open and provided at the other end with a laterally extending slot

which is aligned with the slot in said plate member, a pull rod extending axially through the casing to project at each end thereof, said pull rod having a flattened upper portion which is guided for movement in the lateral slots in the casing and in the plate member and also extends outwardly well beyond the top face of the plate member and arranged for detachable connection to the lower end of a saddle stirrup, a cylindrical plug fitting loosely within said casing and loosely slidable on said pull rod, means adjustable on the lower projecting end portion of said pull rod to limit the outward position of said plug thereon, a compression spring encircling said pull rod and bearing between the inner end of said plug and the slotted upper end wall of said casing, and means on the upper end portion of said pull rod for limiting the inward movement of said rod when retracted by said spring whereby

said assembly is held together as a unit to said plate member by said spring action.

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