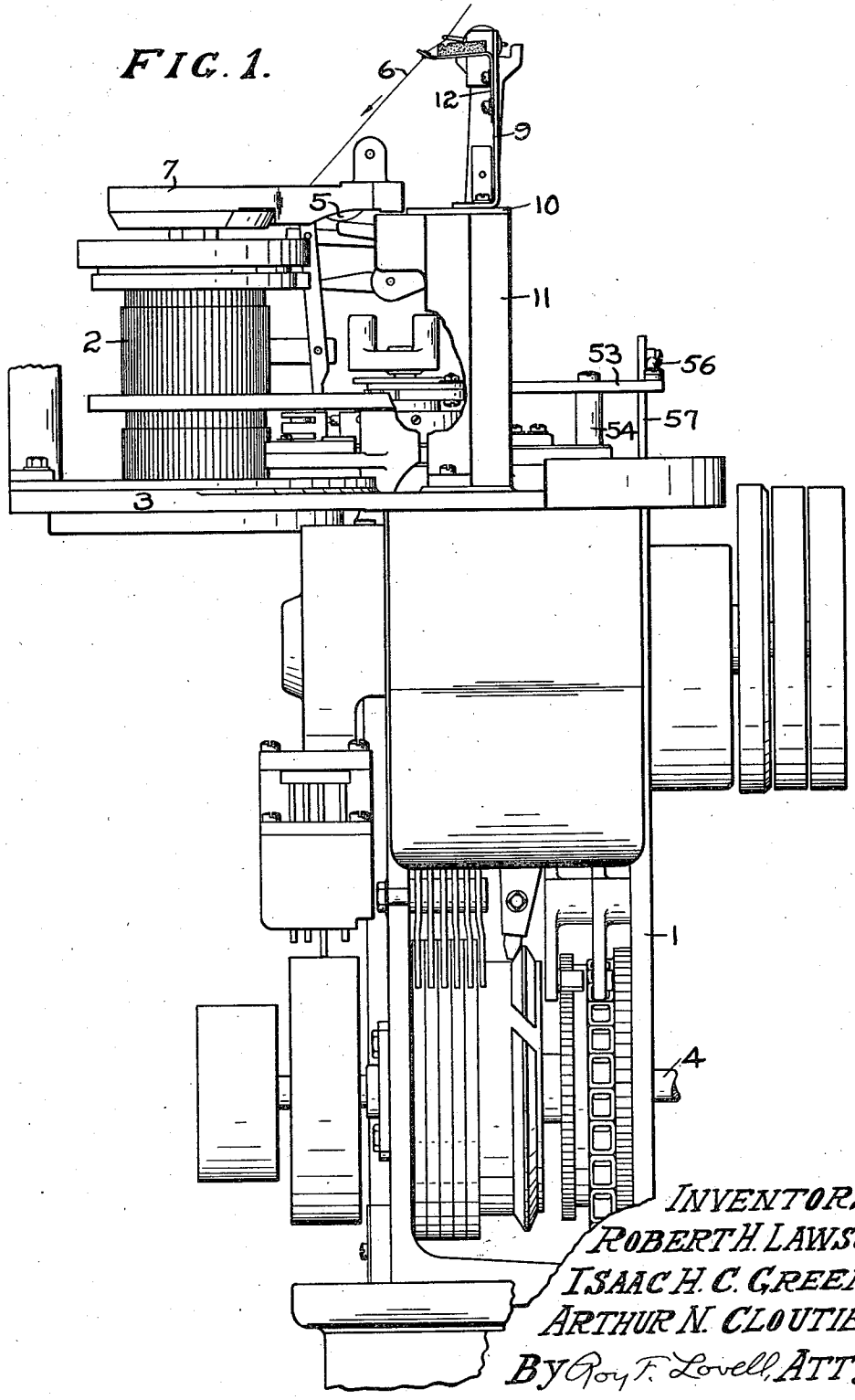
Aug. 15, 1939. R. H. LAWSON ET AL 2,169,699

DEVICE FOR FEEDING YARN

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FIG. 1.



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DEVICE FOR FEEDING YARN

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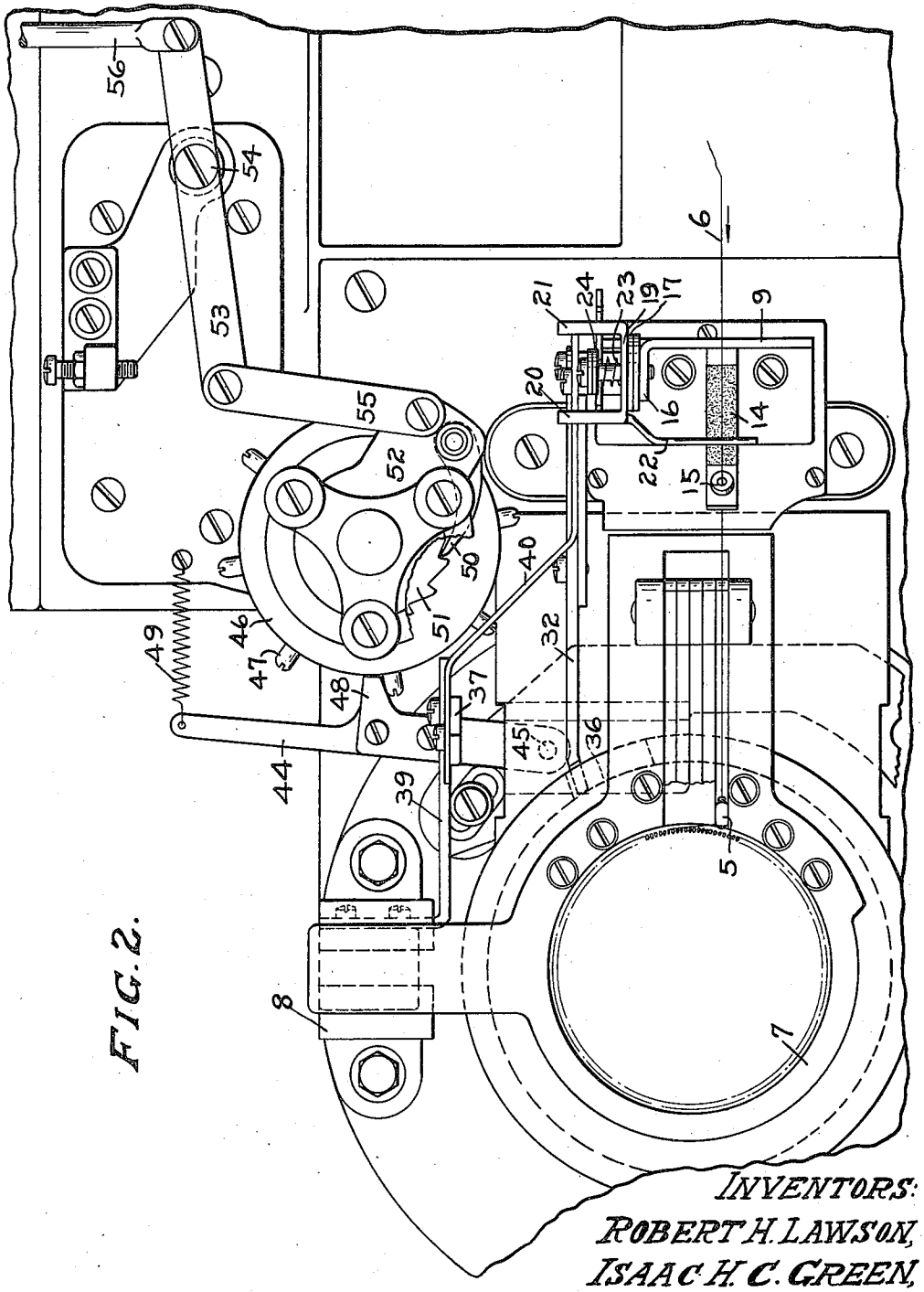


FIG. 2.

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DEVICE FOR FEEDING YARN

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FIG. 4.

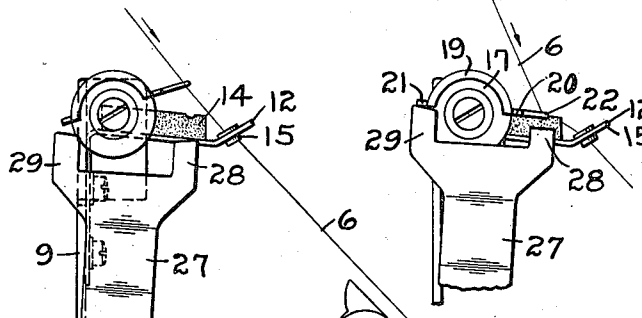


FIG. 5.

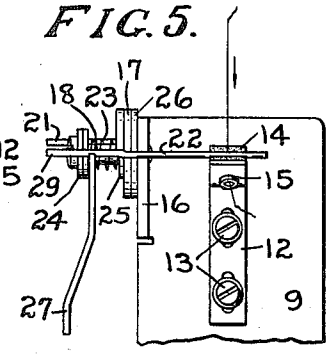
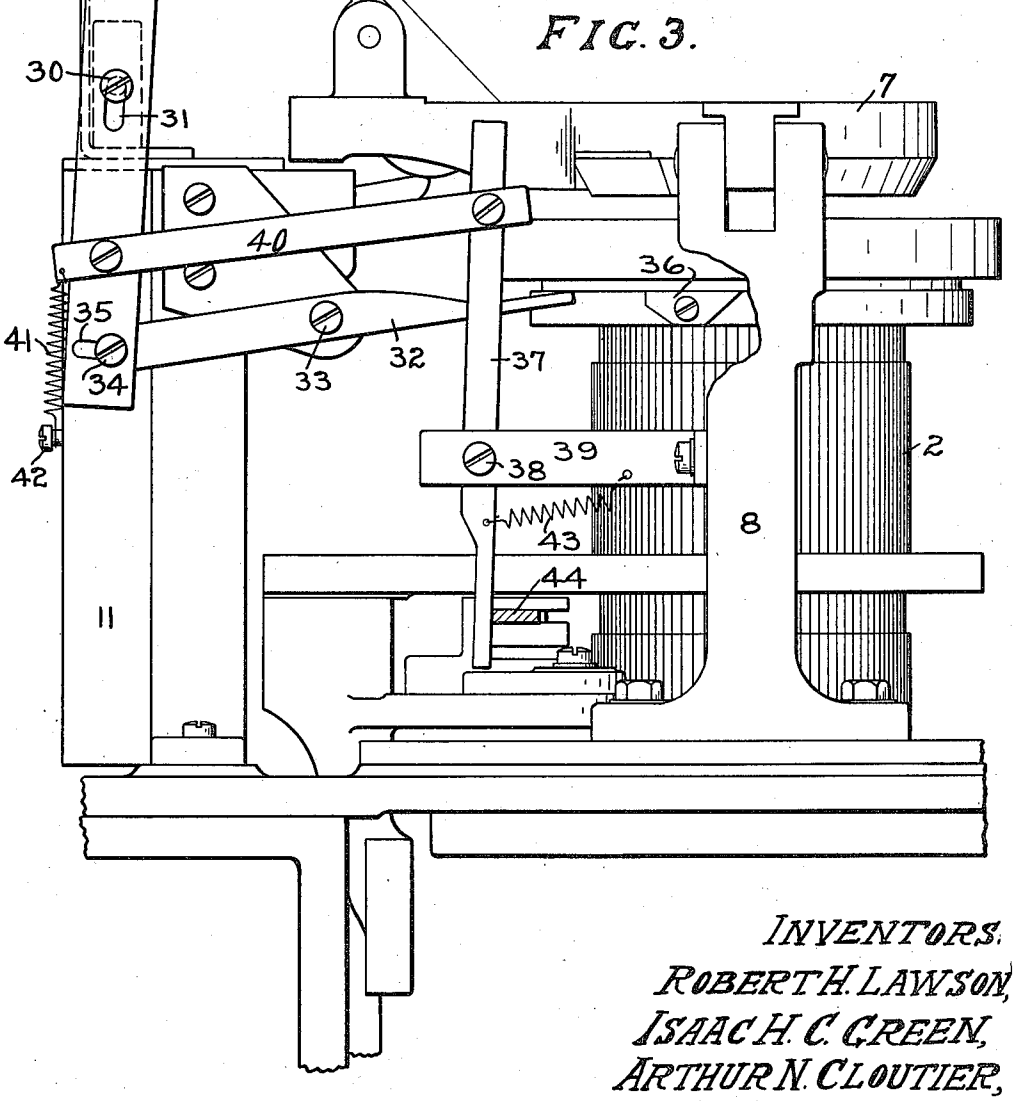


FIG. 3.



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DEVICE FOR FEEDING YARN

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FIG. 6

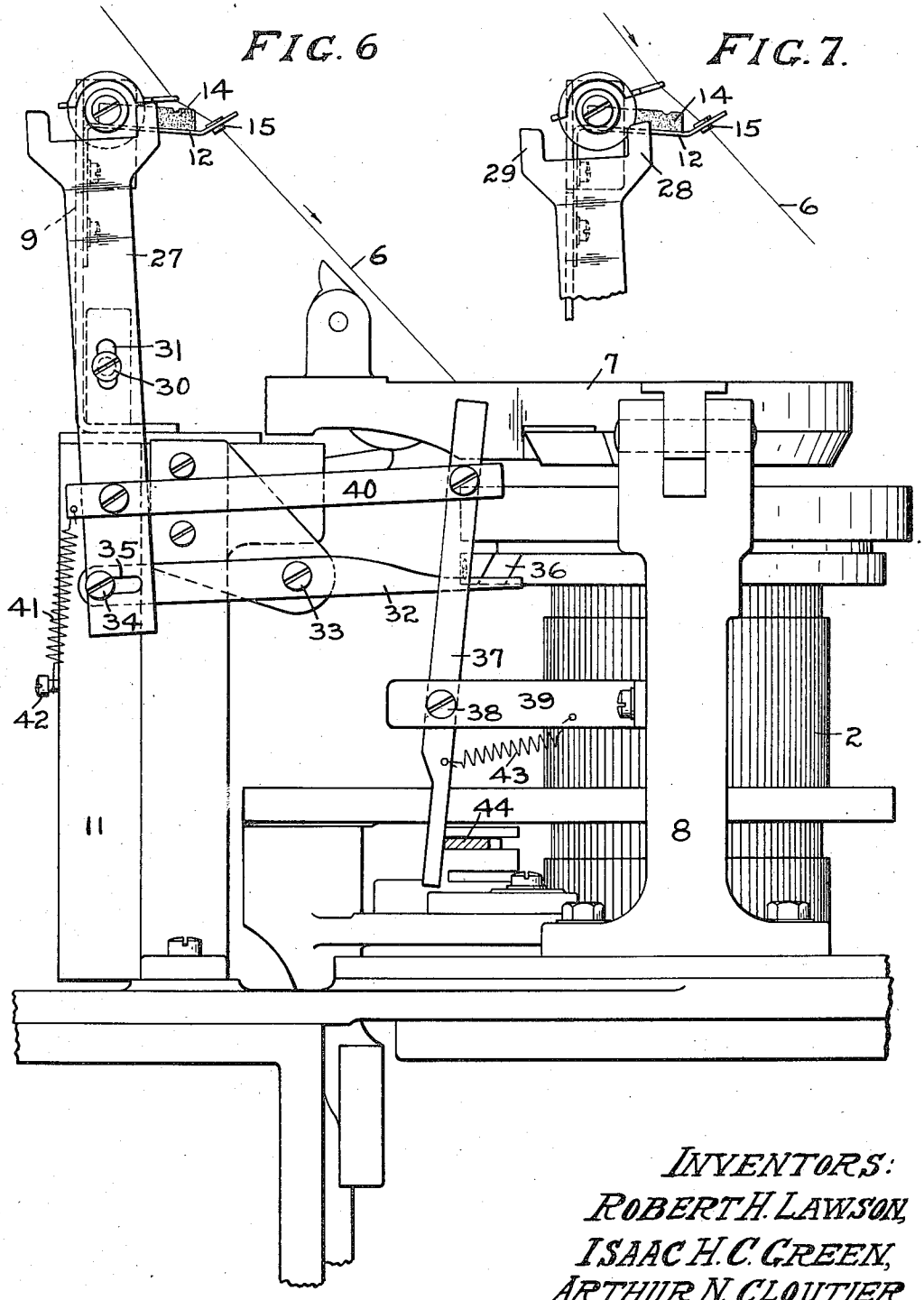


FIG. 7.

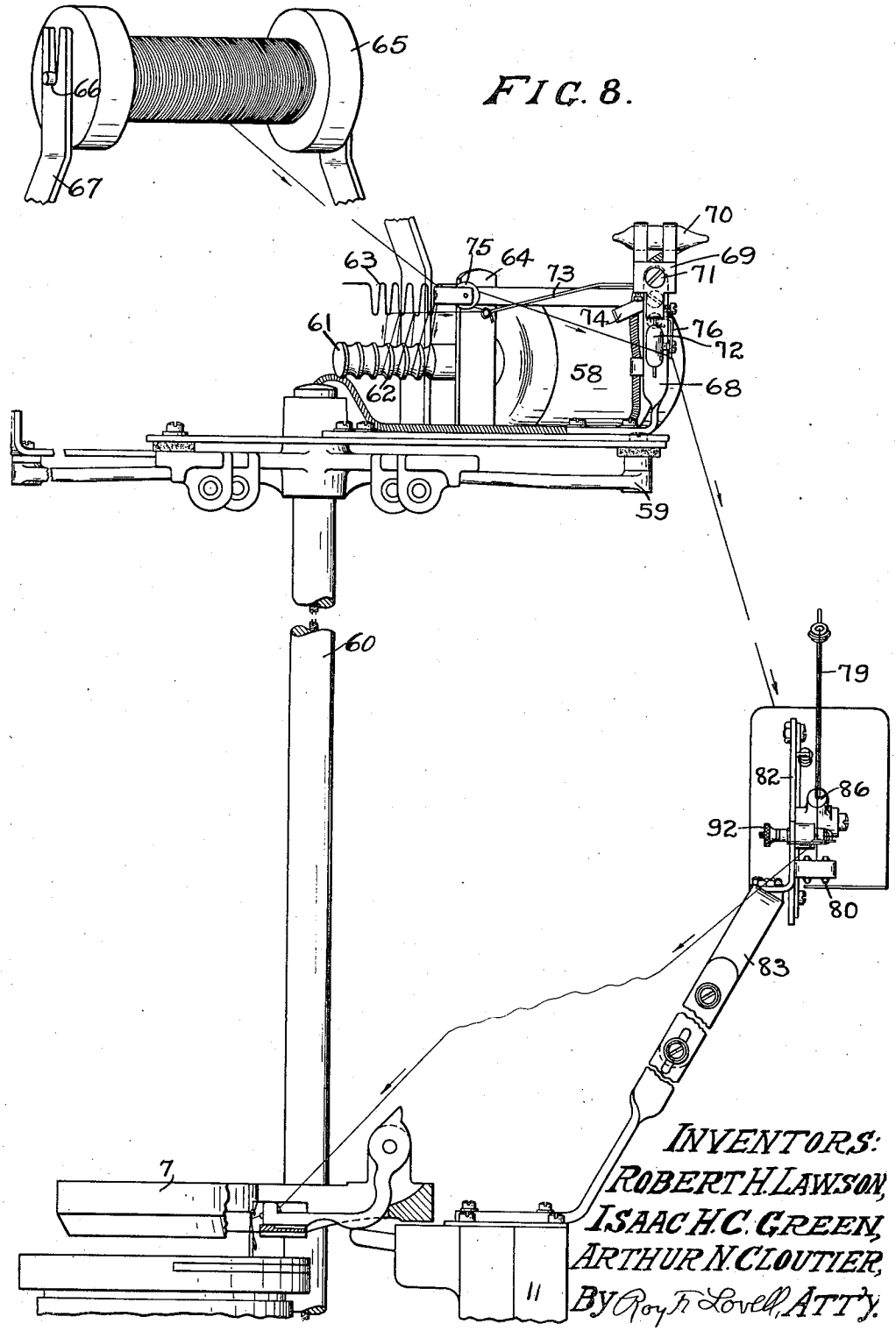
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DEVICE FOR FEEDING YARN

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FIG. 8.



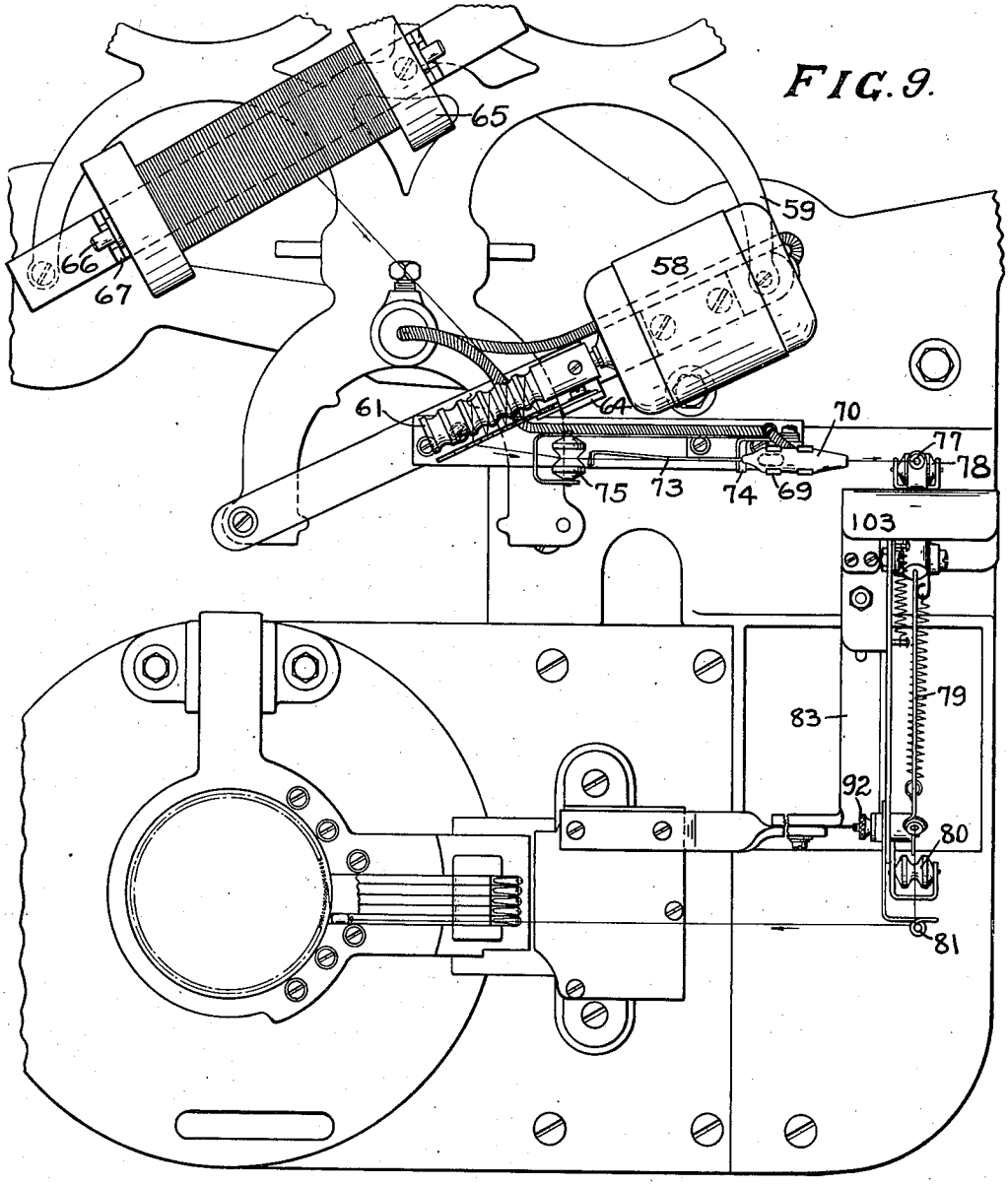
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DEVICE FOR FEEDING YARN

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FIG. 9.



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DEVICE FOR FEEDING YARN

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FIG. 10.

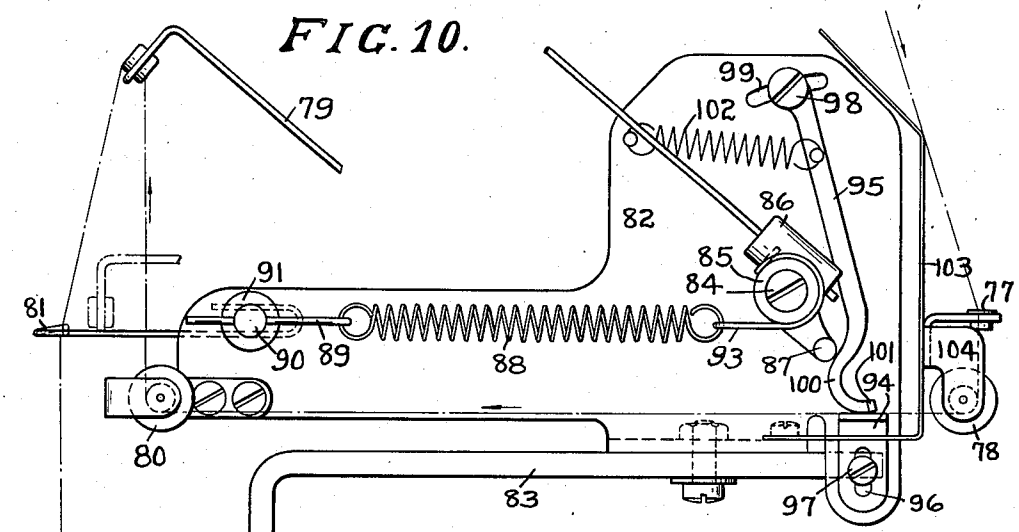
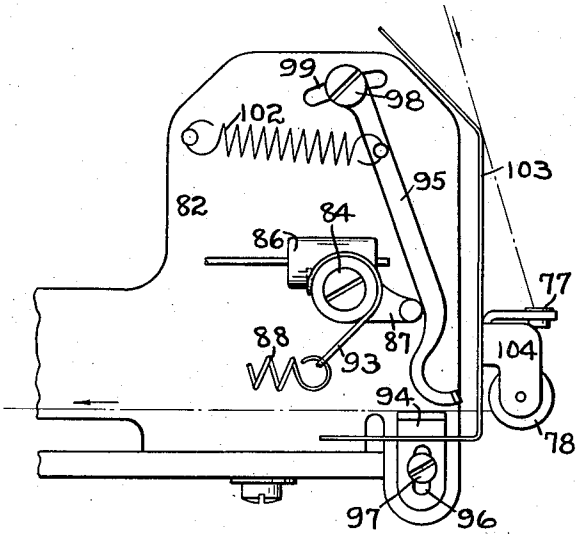
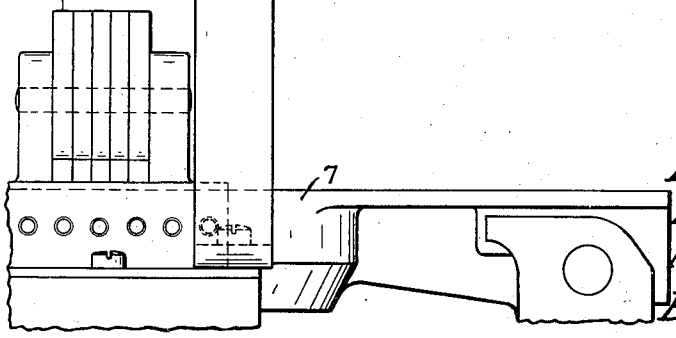


FIG. 11.





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UNITED STATES PATENT OFFICE

2,169,699

DEVICE FOR FEEDING YARN

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Application May 1, 1936, Serial No. 77,398

8 Claims. (Cl. 66—132)

This invention has for its object the feeding of rubber yarn to be knitted into fabrics with or without other yarns, and further, provides means for regulating the supply of yarn as it is fed to the machine producing the fabric.

In the drawings:

Fig. 1 is an elevation of a typical hosiery knitting machine showing one form of the invention applied thereto;

Fig. 2 is a plan of as much of the hosiery machine as is necessary to illustrate the application of the invention thereto and the mechanism for operating the same;

Fig. 3 is an elevation showing the back of the machine and illustrating the invention, parts being shown in one position;

Figs. 4 and 5 are detail views showing the rubber yarn clamping and releasing device as it has clamped a yarn;

Fig. 6 is a view similar to Fig. 3 but shows the parts in another position;

Fig. 7 is a detail showing the clamp after it has released the rubber yarn;

Fig. 8 is a view showing in elevation a modified form of the invention employing yarn clamping and releasing means, but also having positive feeding means for operating upon the rubber yarn;

Fig. 9 is a plan view showing the mechanism of Fig. 8;

Fig. 10 is a detail showing the rubber yarn clamping and releasing device employed with this form of the invention, the clamp being shown in position to bind the yarn; and

Fig. 11 shows a fragment of the binding and releasing mechanism but illustrates the position of the parts when yarn is free to be drawn therethrough.

The feeding of rubber or elastic yarn, either covered or uncovered, necessitates mechanism other than that employed for feeding the usual textile materials to knitting machines if satisfactory results are to be realized. Such elastic yarns are frequently fed to the needles of knitting machines to be knitted at spaced courses, that is, with a course or perhaps several courses intervening between those courses in which the rubber is knitted, and this necessarily demands mechanism on the machine for controlling the rubber yarn so that it may be held from advancing at times and then allowed to run more or less freely at times when it is to be inserted. The form of the invention illustrated in Figs. 1–7 comprises a binder and releasing device which maintains rubber yarn clamped when it is not being knitted but releases it to run freely whenever the yarn is to be knitted or otherwise incorporated in a fabric.

Referring to these Figs. 1–7 mechanism will be described which is automatically controlled to bind a rubber yarn for any desired interval of courses and then to release the same for a predetermined number of courses. The pattern control for this binding and releasing device may be varied so that all desirable combinations of knitting and of skipping courses may be obtained. A typical knitting machine has been illustrated in Fig. 1, having a frame 1, cylinder 2, base 3, main cam shaft 4, and other conventional parts which need not be described or mentioned in this case. A series of yarn guides, one of which is illustrated at 5 for feeding a rubber yarn 6 are pivoted as usual in an extension to the latch ring 7 which is pivoted on latch ring post 8. The other yarn guides may be employed to feed the usual yarns knitted throughout the leg and foot of a stocking and preferably although not necessarily the rubber yarn will be knitted in conjunction with one of these other yarns although it is quite possible to knit the rubber yarn alone if desired. The rubber yarn may also be inlaid or may be knitted throughout partial courses and inlaid or floated throughout the remainder of said courses.

A bracket 9 has been attached to the cover 10 of the yarn change lever bracket 11 and carries adjacent its upper end an angular piece 12 adjustably attached by means of screws 13 passing through slots in the piece. This angular piece 12 has a felt pad 14 against which the rubber yarn may be clamped and also carries a porcelain guide 15 through which the yarn is threaded. The bracket 9 has an ear 16 turned at right angles thereto and carries a washer 17 which is free to turn upon a screw 18 threaded into the ear 16. This washer 17 has a yoke-like element fixed thereto which consists of a semi-circular part 19 and two extending pieces 20 and 21. The extension 20 also carries a wire 22 projecting in the opposite direction to overlie the felt pad and to clamp the rubber yarn against the pad when in one position. This assembly of elements 17 and 19—22 is free to turn upon the screw 18 as before stated, but is frictionally restrained from doing so by means of a spring 23 held between washers 24 and 25 and serving to force the washer 17 up against another similar washer 26. By increasing or decreasing the number of washers at either side of the spring the movable part of this clamping assembly may be more or less firmly held in one of its positions.

A lever 27 having forked ends 28 and 29 has been pivoted at 30 to be rocked through a definite arc and also to be moved vertically on the pivot throughout the length of slot 31. It is the purpose of this forked lever to contact extensions 20 or 21 and to move the clamping wire 22 down on to the felt pad for binding a yarn or in the opposite direction for releasing it at the desired intervals. To accomplish this mechanism is provided for periodically moving said lever in a vertical direction as provided and at the same time for rocking the lever about its pivot according to a predetermined requirement dependent upon the number of courses in which the elastic yarn is to be knitted and upon the number of courses over which it is to be floated or otherwise incorporated. Forked ends 28 and 29 are spaced so that as said lever is rocked to the right, Fig. 3, a vertical movement of the lever will contact extension 21 and will push wire 22 down into clamping engagement with the yarn as illustrated in Fig. 4. In this position the frictional resistance to movement of the clamping assembly will prevent its releasing the rubber until the lever 27 is rocked in the opposite direction, Fig. 6, and upon subsequent upward movement of the same, the forked end 28 will engage extension 20 and release the yarn.

According to the particular construction of the mechanism as herein illustrated the lever 27 will be moved upwardly once for every rotation of the needle cylinder, that is, once for every course of knitting. The rocking movement of said lever may be varied in accordance with the requirements for incorporation of the elastic yarn in the fabric and it is evident that once the rubber yarn is released to be knitted, said lever will not be rocked in the opposite direction until the knitting or incorporating of the rubber yarn is to be discontinued, and likewise, when the yarn is clamped, the next rocking movement will be imparted to the lever just before the rubber yarn is again to be released for knitting.

A lever 32 is pivoted at 33 to a fixed part of the machine and engages the lower end of the rocking lever 27 by means of a connecting screw 34 working in a slot 35. The free end of lever 32 is arranged to be engaged by a cam 36 fixed to the sinker head so that it may engage and move the lever and consequently the lever 27 once for each revolution. It is possible that more than one cam 36 might be employed if change within the course were required; normally such yarns are knitted or incorporated in some manner throughout at least one complete course and will not be incorporated again until after a complete course or courses have intervened.

Another lever 37 has been pivoted at 38 on an extension 39 fixed to the latch ring post 8 and this lever is connected to the rocking lever 27 by means of a link 40 so that a rocking movement imparted to lever 37 by means presently to be described will result in a periodic movement of the lever 27 from one side to the other at the necessary time. A spring 41 has been connected to the end of link 40 and to a screw 42 attached to lever 11 for returning the forked lever 27 to its lower position after it has been raised by cam 36. Likewise, the mechanism which moves the lever from one side to the other functions in one direction only and return movement is accomplished by another spring 43 attached as shown to lever 37 and to extension 39.

Now referring to Fig. 2, mechanism for imparting the rocking movement at predetermined intervals will be described. A lever 44 is pivoted at 45 and engages against the lower end of lever 37, Figs. 3 and 6. A pattern element 46 rotating closely adjacent the lever 44 has projecting pins 47 which engage a toe or follower 48 attached to said lever 44. A spring 49 normally draws the lever 44 and the follower 48 in a direction to assure the return of the lever to its position shown in Fig. 2 after being moved by one of the pins 47. The pattern element carrying the pins or other cam-like formations is to be racked around by means of pawl 50 engaging teeth on the ratchet wheel 51. This pawl is in turn carried by an arm 52 which is oscillated about the same pivot that the elements 46 and 51 turn upon. This pawl is urged into engagement with the teeth of the wheel by the usual spring. The lever 53 free to rock upon stud 54 is connected to arm 52 by means of link 55. The opposite end of lever 53 has attached thereto a connecting link 56 which operatively engages with the upper end of a lever 57 similar to the lever 73 in Fig. 1 of Patent No. 2,052,777. This lever 57 is rocked in a known manner by means of cam elements on the 104-gear, any requisite number of these cam elements or pins being provided in accordance with the number of courses knitted and skipped in the fabric. Likewise, the pins 47 on pattern disc 46 may be spaced more closely or may be spaced at different intervals according to requirements. If necessary to insert the rubber yarn for more than one course at a time, the pins 47 may be replaced by cams having a sufficient length to maintain the rocking lever 27 in the position of Fig. 6 for two or more courses. Of course, the lever is continuously moved up and down once every course and will act upon either one or the other of extensions 20 or 21 depending upon which position it is in. If the lever rocks from one side to the other it will immediately change the position of the clamping element but further movement without any further rocking of the lever will not alter the function of the device.

This mechanism will be used in conjunction with positive feeding means such as illustrated in Figs. 8 and 9 or may be used simply as a lock and release for the yarn, not being dependent upon any other mechanism. When used with furnishing means it would take place of the take-up and lock shown in Figs. 10 and 11.

Referring to Figs. 8 and 9 we have shown a small motor driven furnishing device which is to be employed for drawing an elastic yarn from a supply and advancing it to the knitting needles of the machine whenever it is to be incorporated in the fabric. A take-up which functions as a take-up and also as a means for controlling the action of a lock and release for the rubber yarn has been shown in conjunction with this furnishing device. The furnishing device is further controlled by means of a yarn actuated switch which is extremely sensitive in its operation and is capable of controlling the furnishing device to operate throughout single courses and to stop the function of the same throughout those courses in which the rubber yarn is not to be incorporated.

The furnishing mechanism consists of a small electric motor 58 mounted on a support 59 carried at the upper end of a post 60. The electric motor has a yarn engaging and advancing roll 61 fixed to rotate therewith and about which several coils of the rubber yarn to be fed have been passed. These coils of yarn are maintained in

separation by means of raised flanges 62 on the yarn feeding element and also by means of bent wire guide 63 fixed to an upwardly extending bracket 64 closely adjacent the motor and the driving roller 61. This motor is driven at such a speed that the roller 61 always rotates at a surface speed slightly greater than the lineal speed at which the yarn is to be fed and driving engagement of the yarn is regulated by resistance at the supply and by the requirements for yarn at the needles of the machine.

The supply of elastic yarn is herein shown being wound on a spool 65 having more or less freedom of rotation on a spindle 66 held in grooves at the upper end of a supply holding bracket 67, shown broken away for purposes of convenience. It is not necessary to wind the elastic yarn on a spool of the type shown, but any yarn package from which such yarn may readily be drawn will suffice.

The motor controlling switch comprises a support 68 having a holder 69 for a conventional mercury switch 70 pivoted at 71. This holder 69 has an adjustable weight 72 depending therefrom which tends to maintain the freely pivoting parts in an upright position such as illustrated in Fig. 8, that is, in such a position that the mercury container 70 will be held in horizontal position. A wire arm 73 having an eyelet at the end thereof has been affixed to holder 69 in the position as shown in Figs. 8 and 9. The balance of the aforementioned parts will be disturbed by this arm to the extent of swinging all parts counter-clockwise, Fig. 8, until the wire 73 would strike a stop 74. By an adjustment of weight 72 this unbalance of the element is regulated to a nicety so that the elements will have a very slight tendency to move from horizontal position, or otherwise expressed, so that it will take a minimum of effort to swing the parts to the position shown in Fig. 8. The yarn after passing several turns about the roll 61 and wire guide 63 is carried over through the eyelet in the end of arm 73, then up about a freely rotating roll 75, then through a wire guide 76 and thence to the knitting needles of the machine or to a lock such as illustrated in Figs. 1–7 or such as illustrated in conjunction with Figs. 8 and 9.

The yarn will act upon arm 73 to move the switch 70 to a position for starting the motor 58 whenever tension in that yarn becomes sufficient to rock the elements about pivot 71 as shown in Fig. 8. Upon decrease in tension such as will be experienced when over feeding or when the yarn ceases to be taken at the needles, the switch will rock in the opposite direction to stop said motor and thus to prevent further advancing of the yarn by the furnishing device. A preferred form of the invention has been illustrated in these Figs. 8, 9, 10 and 11 but it is within the scope of the invention to employ other switches than the mercury switch shown, for instance, a mechanical switch might be employed which could be sufficiently delicate in its operation to be actuated by tension of the yarn itself.

After passing through guide 76, the yarn has been illustrated as passing down through an eyelet 77 about a freely rotating, grooved roller 78, then through a lock to a take-up arm 79 and about another freely rotated roller 80, guide 81 and thence to the needles of the machine. This lock and take-up have been generally indicated in Figs. 8 and 9, their approximate position with respect to the other elements of the machine being shown therein. The details are illustrated in Figs. 10 and 11 wherein the parts are shown in their full size.

A plate 82 is bent at an angle at its lower edge so that it is affixed to an angular bracket 83 which has been attached to some rigid portion of the machine. This plate carries a pivoting pin 84 upon which a hub 85 is carried having a boss 86 within which the take-up arm 79 is fixed. This hub 85 also has an extension or cam 87 projecting in the opposite direction from the take-up arm for actuating the movable part of the lock. The take-up arm assembly is normally maintained in a position such as shown in Fig. 10 by means of tension spring 88 adjustably attached to the plate 82 at one end, this spring being connected to a wire hook 89 which is clamped within a stud 90 projecting through a short bushing 91 and being retained by means of a thumb-nut 92, Fig. 9. The hook 89 may be moved within stud 90 after the thumb-nut has been loosened and will then be clamped in a different adjusted position by said thumb-nut. The other end of the spring is attached to a short wire element 93 which partially encircles the hub 85 and is then bent up around the boss 86. Movement of the take-up arm causes a corresponding movement of arm 93 thus elongating spring 88 and the tension in spring 88 will determine the amount of pull on the yarn which it will be necessary to exert before said take-up arm may be drawn down to a position for opening the lock as will be described.

The lock consists of a fixed element 94 over which the yarn is drawn after it passes about roller 78 and upon which it will be clamped by the movable arm 95. This fixed element 94 is slotted as shown at 96 and will be adjustably maintained in position by screw 97. The proper adjustment for this part 94 will be a position wherein its upper yarn contracting surface is at about the level of the yarn as it is drawn taut by the guide rollers 78 and 80.

The movable clamping member 95 is free to pivot about a shoulder screw 98 adjustably fixed in slot 99 and is formed in somewhat of a reverse curve at its lower end as illustrated at 100 and terminates in a laterally bent yarn engaging part 101 which overlies the angular portion at the upper end of element 94. When in the position shown in Fig. 10, the yarn will be tightly engaged by these two portions of the lock, spring 102 assuring that the movable part of the lock always swings toward the yarn to engage the same when not prevented by take-up 79 from so doing. It may be seen that once the yarn is engaged between the elements of the lock further pull in the direction of feeding will tend to clamp it more tightly.

As yarn is taken at the needles take-up arm 79 will be drawn down and cam 87 through its engagement with the curved part of the lever 95, will force it against the influence of spring 102 in a direction to release the yarn, Fig. 11. A plate 103 has been supported at one end of the assembly for keeping the yarn away from the lock and the take-up except if properly engaged by the same, in the event an excess of yarn should be fed by some improper operation of furnishing means or due to any other cause. This plate serves to support a bracket 104 which carries the guide roll 78 and the porcelain eyelet 77.

In operation the tension on the rubber yarn as it is drawn by the needles will operate take-up 79 in a manner to release it from the lock and when released, will be drawn under that predeter-

mined tension until the rubber yarn is to be floated or otherwise not incorporated in the fabric. As before stated, the tension spring 88 may be varied for the purpose of controlling the amount of resistance necessary to impose upon the yarn before opening the lock, and thus the amount of extension or stretch given to the yarn as it is incorporated in a fabric. As soon as said yarn begins to be drawn through the lock, it will operate the switch 70 and will start the furnishing device so that the yarn will be drawn from the supply and delivered under practically no tension except that imposed by the take-up, or by other tension means (not shown). The invention is defined in the appended claims.

We claim:

1. In a knitting machine, the combination of knitting instrumentalities, a supply of knitting yarn and yarn furnishing means comprising an electric motor and yarn engaging and advancing means driven by said motor for advancing yarn from the supply to the instrumentalities, and a yarn controlled switch for stopping and starting said motor in accordance with the demands for the yarn at said instrumentalities.

2. A yarn furnishing device including an electric motor and a yarn engaging and advancing roller driven by said motor, a switch comprising means for controlling the current flowing through said motor said switch being mounted on a pivot and having a tendency to swing in one direction, a yarn controlled arm projecting from said switch and functioning under the influence of tension in the yarn to rock the switch for starting and stopping the electric motor.

3. Yarn furnishing means for knitting machines including an electric motor, yarn engaging and advancing means driven by said motor, a source of current and a switch for controlling the flow of current to the motor, said switch comprising a pivoting holder, a mercury switch element carried by said holder, a weight for influencing said holder and element to be maintained in one position and an extending arm through which the yarn is to be threaded tending to offset the balance of said holder but movable under tension in said yarn to swing the holder and switch element from their unbalanced position.

4. In a knitting machine, the combination of yarn furnishing means for advancing a yarn and means for periodically starting and stopping said furnishing means in accordance with the demand for the yarn at the machine, and yarn binding and releasing means functioning with said furnishing means periodically to hold the yarn and then release the same in accordance with the active and inactive periods of operation for said furnishing means.

5. Yarn binding and releasing means including a pivotal element having means projecting therefrom to engage a yarn, a pad against which said means may clamp or bind the yarn, a lever moved in a direction to strike said pivotal element and change its position once during a cycle of movement and other means for swinging said lever to another position whereupon the first mentioned movement of the lever will alter the position of said pivotal element.

6. Yarn binding and releasing means including a pivotal element, means projecting therefrom for engaging a yarn and a pad against which said means may clamp or bind the yarn, a lever and a pivotal support for the same, said support also providing for movement of the lever along its length, a system of levers functioning under cam control for swinging said lever about its pivot and also for moving it along its length whereby it may strike said pivotal element at opposite sides thereof to change the position of the same from a yarn engaging and binding position and vice versa.

7. Yarn binding and releasing means including a pivotal element frictionally maintained in position, yarn engaging means projecting therefrom and overlying a pad against which it may bind a yarn, a lever having a forked end one fork of which is in alignment with a portion of said pivotal element when said lever is swung to one side and another fork of which aligns with another portion of said pivotal element as the lever is moved in the opposite direction, a pivotal support for said lever and a slot in the lever and engaging said support whereby the lever may be moved along its length, means for causing said lever to move along its length at timed intervals and other means for pivotally swinging it from one side to the other.

8. In a knitting machine, the combination of a yarn furnishing device operable periodically to advance a yarn in accordance with the demands for the same, and means for releasing the yarn prior to its engagement by knitting machine needles and binding the same after being withdrawn from the needles and in timed sequence with the advancing of the yarn by the furnishing means.

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