

Dec. 27, 1927.

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1,653,915

STOP MECHANISM FOR CIRCULAR KNITTING MACHINES

Filed Oct. 30, 1924

2 Sheets-Sheet 1

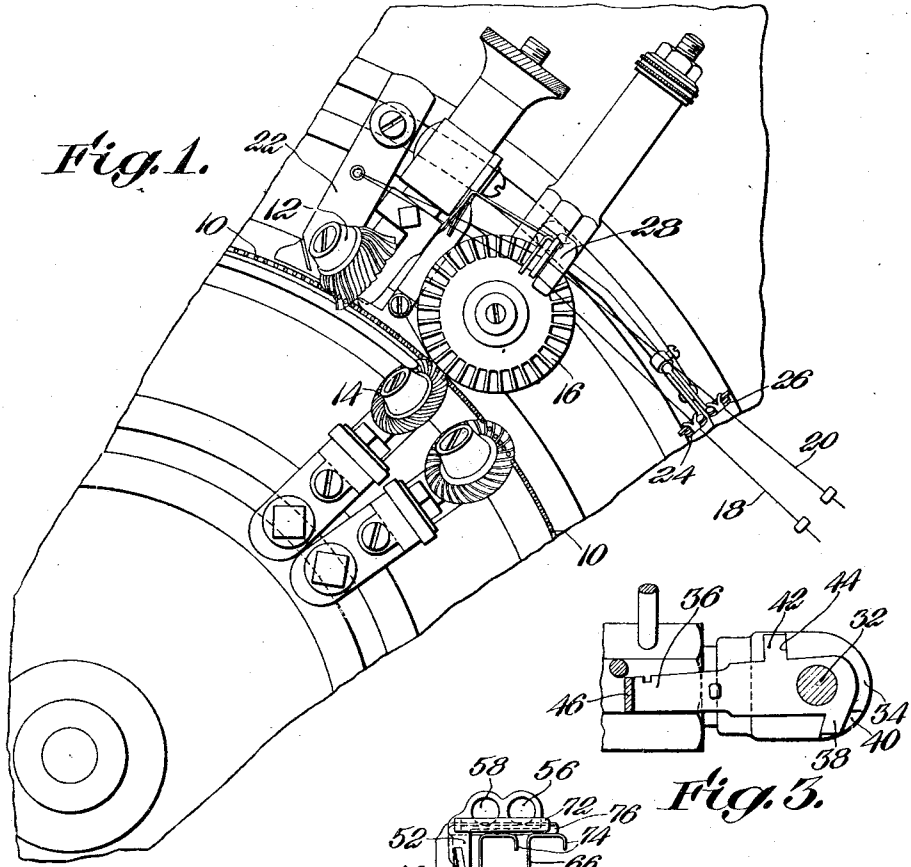


Fig. 1.

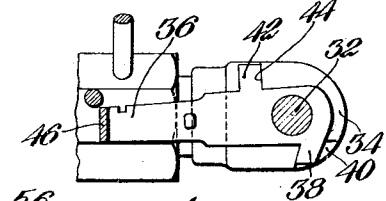


Fig. 3.

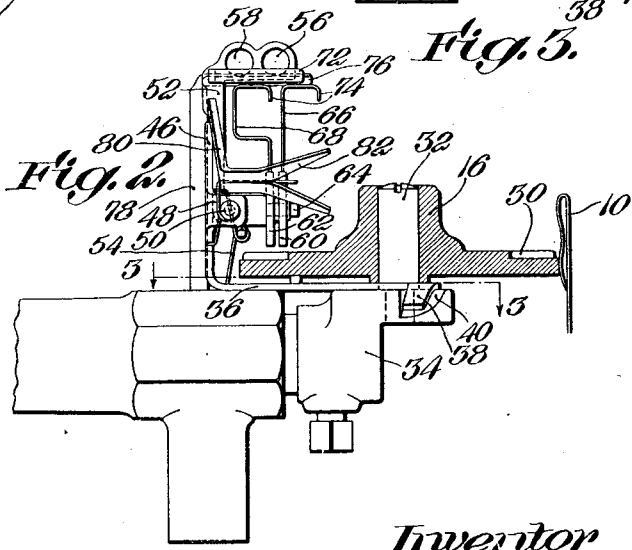


Fig. 2.

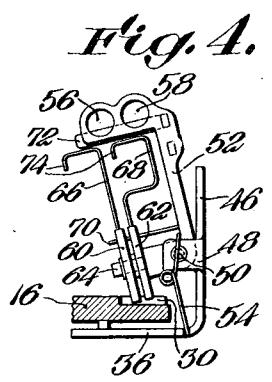


Fig. 4.

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2 Sheets-Sheet 2

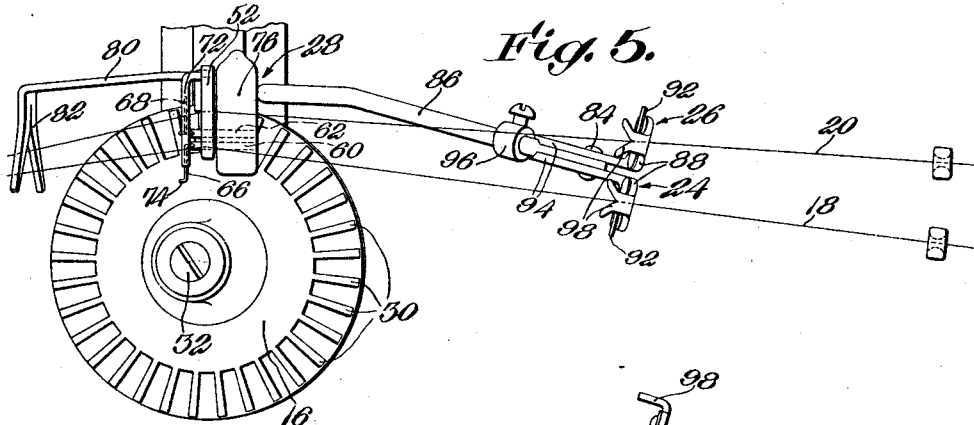


Fig. 5.

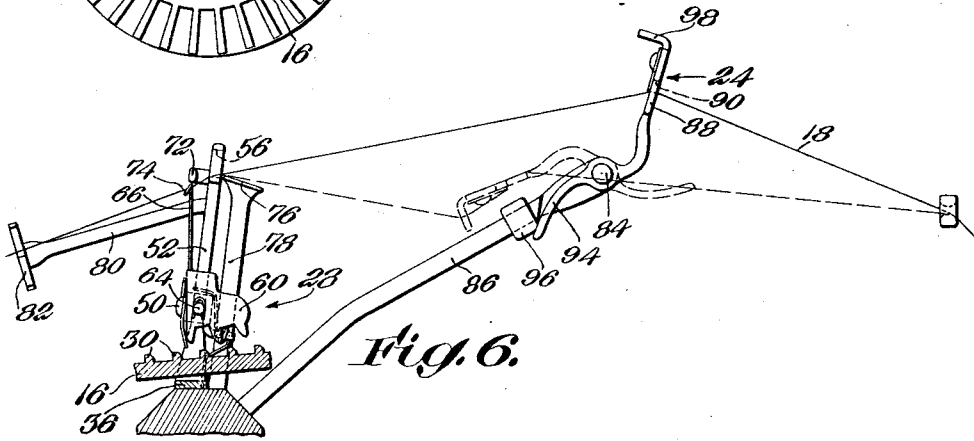


Fig. 6.

Fig. 8.

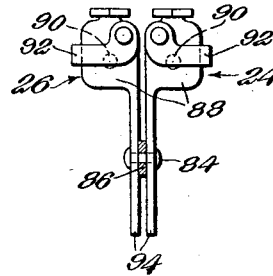
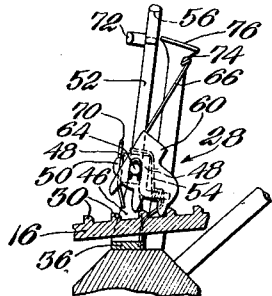


Fig. 7.



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STOP MECHANISM FOR CIRCULAR-KNITTING MACHINES.

Application filed October 30, 1924. Serial No. 746,789.

The present invention relates to knitting machines and more particularly to a stop mechanism for circular knitting machines in which the presser wheel is rendered operative so that cast-off is prevented upon breakage or exhaustion of the yarn. Circular knitting machines of the type to which the invention is applicable ordinarily employ a plurality of stitch forming mechanisms with suitable yarn feeds for each mechanism so that the throwing out of any one presser wheel merely decreases the output of the machine temporarily without injuring the fabric or endangering the machine itself.

One object of the present invention is to secure a uniform and efficient operation of the devices for preventing cast-off in the event of breakage or exhaustion of the yarn. Another object of the invention is to provide means for detecting the presence of a bunch or other enlargement in the yarn, with means for rendering the presser wheel inoperative and causing stoppage of the yarn feed upon the actuation of the detecting means.

A further object of the present invention is to provide a knitting machine feeding two or more yarns at any point, in which stoppage of the feed of all the yarns is effected upon the occurrence of an abnormality in any one of them, such as by breakage of the yarn or the appearance of a bunch or other enlargement therein.

With this and other objects in view, as will hereinafter appear, the present invention consists in the knitting machine hereinafter described and particularly defined in the claims.

In the accompanying drawings Fig. 1 is a plan view of a portion of a tubular knitting machine illustrating the application of the present improvements thereto; Fig. 2 is an elevation partly in section of the presser wheel and the actuating means; Fig. 3 is a section of line 3—3 of Fig. 2; Fig. 4 is a rear elevation of the actuating means in the position to which it is moved upon operation of a bunch detector; Fig. 5 is a plan view of the presser wheel with the actuating means for rendering the presser wheel inoperative, and the bunch detecting devices; Fig. 6 is a side elevation of the parts shown in Fig. 5;

Fig. 7 is a side elevation of the breakage detector; and Fig. 8 is a front elevation of the bunch detecting devices.

The present invention is hereinafter illustrated and described as embodied in a spring needle knitting machine such as is used for knitting tubular fabric. The machine is provided with the usual plurality of stitch forming and cast-off devices, only one set of which is shown in the drawings. The spring beard needles 10, which are carried in the usual needle cylinder, cooperate with a stitch wheel 12, a landing wheel 14 and a presser wheel 16 in the usual manner. Two yarns 18 and 20 lead through a stationary guide 22 to the stitch wheel, first passing through bunch catchers or detectors 24 and 26 which indicate the presence of an enlargement in either yarn, and a breakage detector, indicated generally at 28, which also serves as the actuating means for throwing the presser wheel out of engagement with the needles in case an abnormality is indicated in either yarn.

The presser wheel 16, which has a series of pawl-engaging teeth 30 near its periphery, is freely rotatable on a stud 32 mounted on a presser block 34, the wheel being rotated by its engagement with the beards of the needles. The actuating means for rendering the presser wheel inoperative comprises a frame 36 mounted on the stud 32 and having a downwardly inclined cam projection 38 which engages with a similarly formed surface 40 of the presser block. In its normal position, as illustrated in Fig. 2, the frame 36 is stationary, but if for any reason the frame is caused to rotate in the direction of the presser wheel, the cam 38 rides over the surface 40, thus lifting both the frame and the presser wheel and carrying the presser wheel out of engagement with the beards of the needles. Accidental rotation of the frame in the reverse direction is prevented by means of a projection 42 which abuts against a shoulder 44 on the presser block. The frame 36 has an upright arm 46 provided with two ears 48 upon which is pivoted at 50 a pawl carrier 52. The pawl carrier is normally maintained in an upright position by means of a spring 54 coiled about a projection on one of the ears and taking against the frame 36 and the

pawl carrier. At the top of the pawl carrier are two eyes 56 and 58 through which the separate yarns lead. Two pawls 60 and 62 are pivoted on the lower end of the pawl carrier at 64 and tend by their weight to move into the position shown in Fig. 7 to engage with the presser wheel teeth, but are normally supported in upright position by the yarns engaging with drop wires 66 and 68 attached to the pawls 60 and 62 respectively. The pawls are restrained from accidental forward movement by a stop wire 70 attached to the pawl carrier. As shown in Fig. 6, the yarns lead through the eyes 56 and 58 of the pawl carrier and thence under the drop wires, which are normally arranged sufficiently forward of the pawl carrier to permit the pawls to be supported by the yarns without placing excessive tension upon them. Attached to the pawl carrier and arranged above the drop wires in close proximity thereto is a lint guard 72 which serves to prevent the whipping of lint from the yarns about the drop wires. Each drop wire is formed with a depending tip 74 which retains the yarn under the drop wire, the tip being inclined forward so that any loops which may form around the drop wire may run off. A ledge 76 over which the yarns pass to the eyes 56 and 58 is secured to the machine by an arm 78 and is arranged directly in the rear of the pawl carrier. It will be seen that upon breakage or exhaustion of either yarn the corresponding pawl will drop into the position illustrated in Fig. 7 to engage with the teeth on the presser wheel. Continued rotation of the presser wheel by engagement with the needles therefore rotates the pawl carrier and also the frame 36, thereby lifting the presser wheel into a position to disengage it from the beards of the needles, as previously described. If breakage or exhaustion of one yarn only has been indicated, it is necessary to stop the feed of the other yarn also, in order that there may not be a feed of a single yarn to the stitch forming mechanism at this point. To this end a yarn gripper is provided, consisting of an arm 80 secured to the pawl carrier and having an inturned end 82 provided with a V-shaped notch. The yarns normally pass through the notch, as shown in Fig. 5, but out of actual contact with the gripper, so that the gripper has no effect during normal operation of the machine, but upon rotation of the pawl carrier by engagement of the pawls with the presser wheel the gripper also rotates to engage the yarns within the V-shaped notch, thus exerting a pull on the unbroken yarn and breaking it between the gripper and the stitch wheel.

It will be seen that the pawls 60 and 62 have provision for turning into engagement with the presser wheel about two axes at

right angles to each other, corresponding to the pivots 50 and 64, the movement about the pivot 64, as already described, being effected by failure of the yarn to hold the drop wire in upright position. The rotation of the pawl carrier about the pivot 50 is brought about through the cooperation of the bunch catching devices in the following manner: The bunch catchers 24 and 26 are pivoted at 84 upon an arm 86 attached to the machine, and are arranged out of the straight line between the guide 22 and the pawl carrier, so that the yarns pass angularly through the pawl carrier and have a tendency because of their tension to tilt the pawl carrier about its pivot 50 into the position shown in Fig. 4, this tilting movement, however, being prevented during the normal operation of the machine by the spring 54. Each bunch catcher comprises a stationary guide plate 88 having a guide opening 90 through which the yarn passes. An adjustable plate 92 pivoted to the guide plate determines the size of the guide opening and the size of an enlargement which it may be permissible to pass. Each bunch catcher has a tail 94 engaging with an adjustable collar 96 on the arm 86. The bunch catcher is made quite delicate in operation, so that the presence of a small bunch in the yarn may be sufficient to swing it into the position shown in broken lines in Fig. 6 without placing undue stress on the yarn. The readiness with which the bunch catchers tend to move may be adjusted by varying the position of the collar 96. When one of the bunch catchers swings forward it grips the yarn by means of a yarn gripper 98 having a V-shaped notch similar to that provided on the gripper 80. The engagement of the yarn by the gripper 98 places an increased tension on the yarn, which causes a sufficient straightening of the yarn between the bunch catcher and the stationary guide 22 to tilt the pawl carrier 52 against the action of the spring 54. This tilting of the pawl carrier causes engagement of the pawls with the presser wheel, thereby rotating the frame 36 with the presser wheel in exactly the same manner as occurs when either pawl drops into engagement with the presser by breakage or exhaustion of the thread. The presser wheel is thereby disengaged from the beards of the needles, thus preventing cast-off. In this case it is especially necessary that the yarn feed be stopped in order that the enlargement may not subsequently find its way into the fabric, and for this purpose the yarn gripper 80, by virtue of its connection with the pawl carrier, moves to break both yarns between the gripper and the stitch wheel.

I claim:

1. A knitting machine having, in combination, a plurality of needles, a stitch wheel,

a presser wheel, yarn feeding means, means normally out of engagement with the presser wheel and adapted to engage therewith upon the occurrence of an abnormality in the yarn feed, means operated by such engagement to prevent cast-off, and means for positively breaking the yarn.

2. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel normally rotated by engagement with the needles, yarn feeding means, means adapted to engage with the presser wheel and to be rotated thereby upon the occurrence of an abnormality in the yarn feed, means for preventing cast-off, and means for breaking the yarn upon the occurrence of such rotation.

3. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel normally rotated by engagement with the needles, means for feeding a plurality of yarns at any point, means adapted to engage with the presser wheel and to be rotated thereby in the event of abnormality in any yarn feed, means operated by such rotation for preventing cast-off, and means engaging with all of the yarns for positively breaking the same.

4. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel, yarn feeding means, a bunch detector, means normally out of engagement with the presser wheel and having provision for movement about two axes into engagement with the presser wheel, means permitting movement about one of the axes upon yarn breakage, means permitting movement about the other axis upon the occurrence of an enlargement in the yarn, means for preventing cast-off, and means for positively breaking the yarn upon engagement of said means with the presser wheel.

5. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel normally rotated by engagement with the needles, means for feeding a plurality of yarns at any point, a bunch detector, actuating means normally maintained out of engagement with the presser wheel and having provision for movement about two axes into engagement with the presser wheel, means permitting movement of the actuating means about one axis upon breakage of any yarn, means permitting movement about the other axis upon the occurrence of an enlargement in any yarn, means for preventing cast-off, and means for effecting stoppage of the feed of all such yarns upon engagement of the actuating means with the presser wheel.

6. A knitting machine having, in combination, a plurality of beard needles, a stitch wheel, a presser wheel normally rotated by engagement with the needles, yarn feeding

means, a bunch catcher, actuating means normally maintained out of engagement with the presser wheel and having provision for movement about two axes into engagement with the presser wheel, means permitting movement about one axis upon yarn breakage, means permitting movement about the other axis on actuation of the bunch catcher, and means for removing the presser wheel from engagement with the beards of the needles to prevent cast-off.

7. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel, yarn feeding means, a bunch catcher, actuating means normally maintained out of engagement with the presser wheel and having provision for engagement therewith by movement about two axes and adapted to rotate with the presser wheel while in engagement therewith, and means for removing the presser wheel from engagement with the beards of the needles upon rotation of the actuating means to prevent cast-off.

8. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel, yarn feeding means, and actuating means adapted to engage with the presser wheel and to be rotated thereby upon the occurrence of an abnormality in the yarn feed, said means having a cam surface cooperating with a stationary part of the machine to effect lifting of the presser wheel out of engagement with the needles to prevent cast-off.

9. A knitting machine having, in combination, a plurality of needles, a stitch wheel, yarn feeding means, a presser wheel, a stud upon which the presser wheel is mounted, a normally stationary frame mounted on the stud and having a cam surface cooperating with a stationary part of the machine to lift the frame and presser wheel upon rotation of the former, and means for rotating the frame upon the occurrence of an abnormality in the yarn feed.

10. A knitting machine having, in combination, a plurality of needles, a stitch wheel, yarn feeding means, a presser wheel, a stud upon which the presser wheel is mounted, a normally stationary frame mounted on the presser wheel stud and having a cam surface cooperating with a stationary part of the machine to lift the frame and presser wheel upon rotation of the former, and means carried by the frame normally out of engagement with the presser wheel and adapted to engage with the presser wheel to rotate the frame upon the occurrence of an abnormality in the yarn feed.

11. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel engaging with the needles and having a series of pawl-engaging teeth, yarn feeding means, a pawl normally

maintained out of engagement with the presser wheel and adapted to move into engagement therewith upon the occurrence of an abnormality in the yarn feed, means for preventing cast-off, and means for breaking the yarn upon engagement of the pawl with the presser wheel.

12. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel normally rotated by the needles and provided with pawl-engaging teeth, yarn feeding means, a pawl normally maintained out of engagement with the presser wheel, a normally stationary pawl carrier adapted to be rotated by the presser wheel upon engagement of the pawl with the presser wheel, means for causing engagement of the pawl and presser wheel upon the occurrence of an abnormality in the yarn feed, and means for moving the presser wheel from engagement with the needles and for positively breaking the yarn upon rotation of the pawl carrier.

13. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel normally rotated by the needles and having a series of pawl-engaging teeth, yarn feeding means, a bunch catcher, a pawl normally maintained out of engagement with the presser wheel and having provision for movement about two axes into engagement with the presser wheel, means permitting movement of the pawl about one axis upon breakage of the yarn, means permitting movement about the other axis upon actuation of the bunch catcher, and means for moving the presser wheel from engagement with the needles and for breaking the yarn upon such actuation of the pawl to engage the presser wheel.

14. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel normally rotated by the needles, yarn feeding means, a pawl carrier, a pawl pivoted to the pawl carrier, a drop wire secured to the pawl and adapted to maintain the pawl out of engagement with the presser wheel by the yarn, means for mounting the pawl carrier having provision for a lateral tipping movement of the carrier to engage the pawl with the presser wheel, a bunch catcher operating upon the occurrence of an enlargement in the yarn to effect the tipping movement of the pawl carrier, the pawl carrier being adapted to rotate with the presser wheel upon engagement of the pawl with the presser wheel, and means for lifting the presser wheel from engagement with the needles and for breaking the yarn upon such rotation of the pawl carrier.

15. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel rotated by the needles and having a series of pawl-engaging teeth,

means for feeding a plurality of yarns at any point, a normally stationary pawl carrier, a pawl for each yarn pivoted upon the pawl carrier and having a drop wire for normally supporting the pawl out of engagement with the presser wheel, means for mounting the pawl carrier having provision for a lateral tipping movement of the carrier to permit engagement of the pawls with the presser wheel, the pawl carrier being adapted for rotation with the presser wheel upon engagement of any of the pawls therewith, a bunch catcher, means for effecting the tipping movement of the pawl carrier upon actuation of the bunch catcher, means for lifting the presser wheel out of engagement with the needles, and means for breaking all of the yarns at that point upon rotation of the pawl carrier.

16. A knitting machine having, in combination, a plurality of needles, stitch forming devices, yarn feeding means, means for preventing cast-off acting upon the occurrence of an abnormality in the yarn feed, and a yarn gripper normally out of the path of the feed and adapted to be actuated by the cast-off preventing means for positively breaking the yarn.

17. A knitting machine having, in combination, a plurality of needles, stitch forming devices, means for feeding a plurality of yarns at any point, cast-off preventing means acting upon the occurrence of an abnormality in any yarn; a yarn gripper normally out of the path of the yarns, and means for actuating the yarn gripper for effecting stoppage of the feed of all such yarns.

18. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel, yarn feeding means, a breakage detector, a bunch detector, a yarn gripper normally out of the path of the feed, and means for actuating the yarn gripper to break the yarn between the presser wheel and the stitch wheel upon actuation of the breakage detector or the bunch detector.

19. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel, means for feeding a plurality of yarns at any point, a breakage detector and a bunch catcher for each yarn, a yarn gripper normally out of the path of the yarns, and means for operating the yarn gripper to engage the yarns for effecting stoppage of the feed of all such yarns upon actuation of the breakage detector or the bunch catcher in any feed.

20. A knitting machine having, in combination, a plurality of needles, stitch forming devices, yarn feeding means, means for detecting the presence of an abnormality in the yarn feed, a yarn gripper comprising an arm having a V-shaped notch normally maintained out of the path of the feed, and

means for actuating the gripper upon detection of an abnormality for positively breaking the yarn.

21. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel normally rotated by the needles, yarn feeding means, means for detecting the presence of an abnormality in the yarn feed, a yarn gripper normally out of the path of the feed, and means for engaging the yarn gripper with the presser wheel to rotate the former to grip and break the yarn upon indication of an abnormal yarn feed.

22. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel, yarn feeding means, actuating means adapted to engage the presser wheel and to be rotated thereby upon the occurrence of an abnormality in the yarn feed, means for removing the presser wheel from engagement with the needles upon rotation of the actuating means, and a yarn gripper connected with the actuating means and adapted to grip and break the yarn.

23. A knitting machine having, in combination, a plurality of needles, a stitch wheel, yarn feeding means, a presser wheel provided with pawl-engaging teeth, a pawl carrier, a pawl pivoted upon the pawl carrier and having a drop wire normally supported by the yarn to hold the pawl out of engagement with the presser wheel, a bunch catcher, means for engaging the pawl with the presser wheel upon actuation of the bunch catcher, the pawl carrier being adapted to rotate with the presser wheel upon engagement of the pawl and presser wheel, and a thread gripper secured to the pawl carrier and adapted to grip and break the thread upon rotation of the pawl carrier.

24. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel normally engaging with the needles, means for feeding a plurality of yarns at any point, actuating means adapted to engage with the presser wheel and to be rotated thereby upon the occurrence of an abnormality in any yarn, means for lifting the presser wheel from engagement with the needles, and a yarn gripper connected with the actuating means and adapted to grip and break any unbroken yarns at that point upon rotation of the actuating means.

25. A knitting machine having, in combination, a plurality of needles, a presser, a yarn feed, a drop wire normally supported by the yarn, means for rendering the presser inoperative upon failure of the yarn to support the drop wire, and a lint guard arranged above the drop wire and in close proximity thereto to prevent whipping of lint from the yarn around the drop wire.

26. A knitting machine having, in combination, a plurality of needles, stitch form-

ing devices, yarn feeding means, a bunch catcher having provision for placing an increased tension on the yarn upon the occurrence of an enlargement in the yarn, means actuated by such increased tension for preventing cast-off, and means for breaking the yarn.

27. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel, yarn feeding means, a bunch catcher having provision for placing an increased tension on the yarn upon the occurrence of an enlargement in the yarn, actuating means normally out of engagement with the presser wheel and operated by such increased tension to move into engagement with the presser wheel, means for rendering the presser wheel inoperative, and means for effecting stoppage of the yarn feed.

28. A knitting machine having, in combination, a plurality of needles, stitch forming devices, yarn feeding means, a bunch catcher having provision for placing an increased tension on the yarn upon the occurrence of an enlargement in the yarn, an actuating device through which the yarn passes angularly from the bunch catcher to the stitch forming devices and adapted to be tipped laterally by the increased yarn tension, a presser wheel normally out of engagement with the actuating device and adapted to be engaged thereby when the latter is tipped, and means for preventing cast-off and for breaking the yarn.

29. A knitting machine having, in combination, a plurality of needles, stitch forming devices, means for feeding a plurality of yarns at any point, a guide through which the yarns pass to the stitch wheel, a bunch catcher for each yarn adapted to place an increased tension on the yarn upon the occurrence of an enlargement therein, an actuating device through which the yarns pass angularly from the bunch catchers to the guide and adapted to be tipped laterally by an increase in tension on any yarn, a presser wheel normally out of engagement with the actuating device and adapted to be engaged thereby when the latter is tipped, means for preventing cast-off, and means for effecting stoppage of the feed of all such yarns upon engagement of the actuating device with the presser wheel.

30. A knitting machine, having, in combination, a plurality of needles, a stitch wheel, a presser, an arm attached to the machine, a guide pivoted to the arm and having an opening sufficient to pass yarn of normal size therethrough, the guide being adapted to be swung forward upon the occurrence of a bunch in the yarn, a yarn gripper on the guide adapted to engage the yarn when the guide is swung forward to place an increased tension on the yarn, and means operated by

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such increased tension for rendering the presser wheel inoperative.

31. A knitting machine having, in combination, a plurality of needles, a stitch wheel, a presser wheel having a series of pawl-engaging teeth, yarn feeding means, a bunch catcher through which the yarn passes, a pawl normally supported by the yarn out of engagement with the presser wheel, a pawl carrier through which the yarn passes angularly from the bunch catcher and adapted for a lateral tipping movement to engage

the pawl with the presser wheel, the bunch catcher being adapted to place an increased tension on the yarn upon the occurrence of an enlargement in the yarn to effect the lateral tipping movement of the pawl carrier, means for rendering the presser inoperative upon engagement of the pawl therewith, and a yarn gripper for breaking the yarn.

In testimony whereof I have signed my name to this specification.

OLIVIER LA ROCHE.