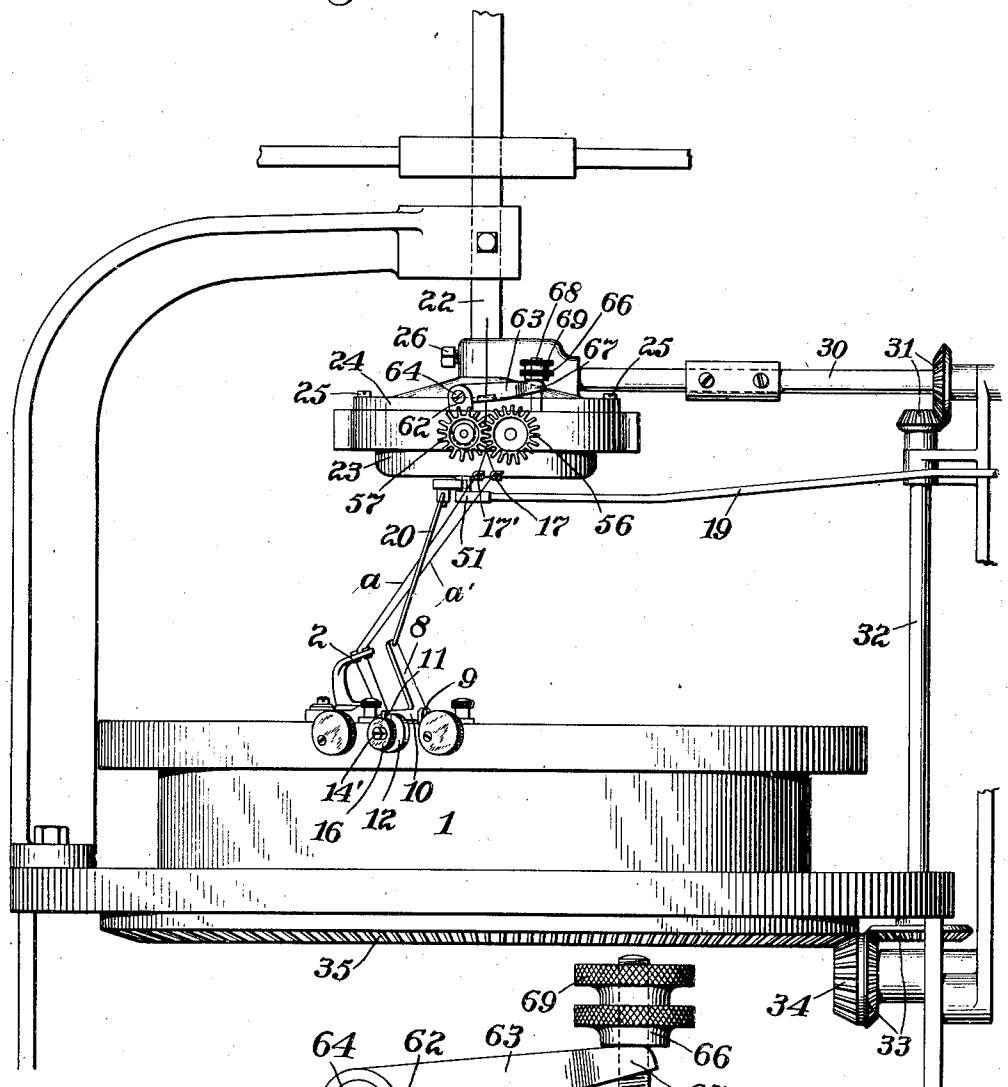
April 13, 1926. 1,581,093

K. HOWIE

YARN FURNISHING AND CONTROLLING MECHANISM FOR KNITTING MACHINES

Original Filed Jan. 3, 1922 3 Sheets-Sheet 1

Fig. 1.



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Fig. 3.

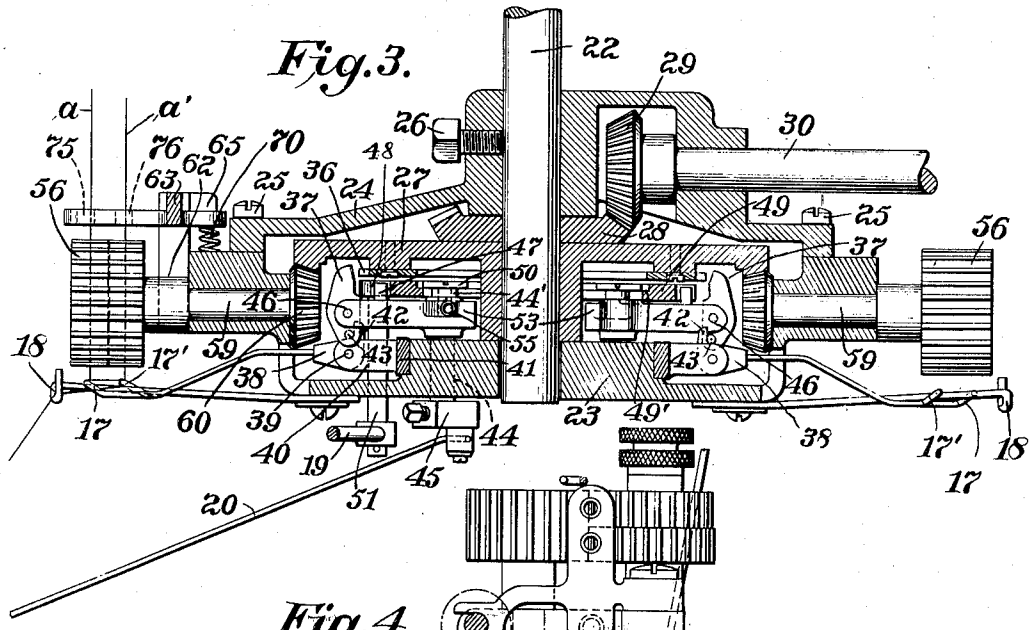


Fig. 4.

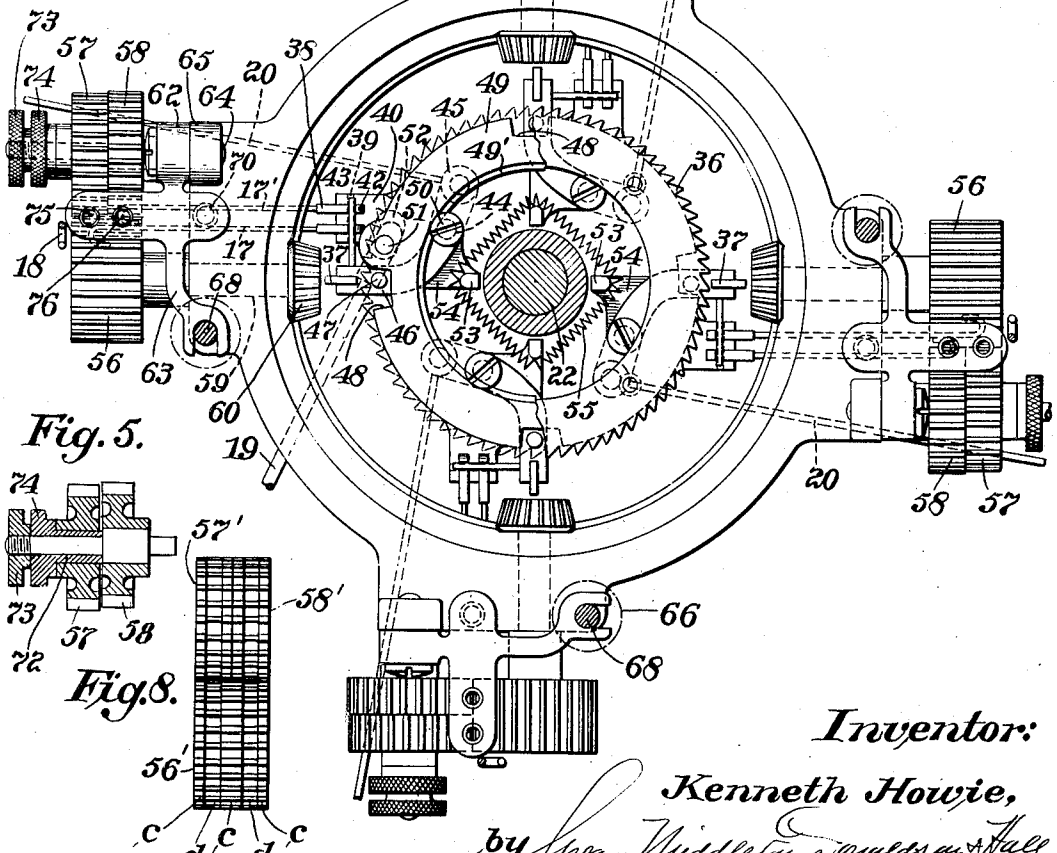


Fig. 5.

Fig. 8.

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Fig. 6.

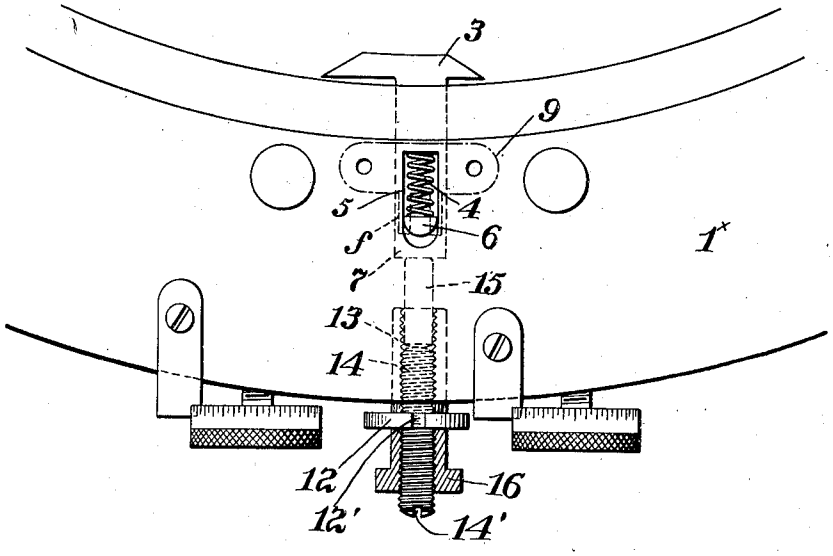
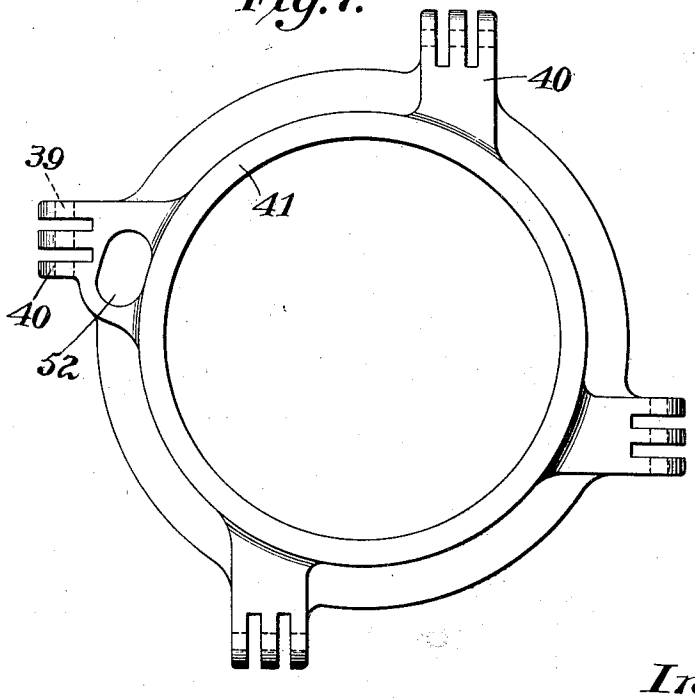


Fig. 7.



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Patented Apr. 13, 1926. 1,581,093

UNITED STATES PATENT OFFICE.

KENNETH HOWIE, OF NORRISTOWN, PENNSYLVANIA, ASSIGNOR TO WILDMAN MFG. CO., OF NORRISTOWN, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

YARN FURNISHING AND CONTROLLING MECHANISM FOR KNITTING MACHINES.

Application filed January 3, 1922, Serial No. 526,669. Renewed September 28, 1925.

To all whom it may concern:

Be it known that I, KENNETH HOWIE, a citizen of the United States, and resident of Norristown, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Yarn Furnishing and Controlling Mechanism for Knitting Machines, of which the following is a specification.

One object of the invention is to provide a yarn furnishing mechanism, combined in one unit wth stop motion mechanism to stop the machine, and with mechanism for controlling knitting devices at the various feeds, to eliminate any one of said feeds upon the failure of the yarn leading thereto.

The yarn is led from bobbins through the yarn furnishing devices and thence through dropper devices to the yarn guide at the needles. The fall of any one of the droppers, upon the failure of the yarn passing in contact therewith, will operate the stop motion devices, and at the same time a connection leading from the stop motion head to the knitting devices will be operated, for instance to withdraw the cam of the needle beard pressers, so that the needles will stop knitting and the work will not be pressed off or run off, despite the fact that only a short length of the yarn is left to be used up by the needles.

The knitting device which is operated may be the needle beard presser cam, or it may be a raising cam, but in any case the feed, where the yarn failure takes place, is immediately thrown out of operation by the cessation of the stitch forming function of the needles at this point.

Other objects of the invention will be clear from the following description. The invention may be used with either a spring beard needle machine or a latch needle machine.

In the drawings—

Figure 1 is a view in the nature of a diagram of a knitting head and adjacent frame parts with the invention in place.

Fig. 2 is a detail side view of the yarn furnishing devices.

Fig. 3 is a vertical sectional view of the stop motion head.

Fig. 4 is a plan view of Fig. 3, with the cover portion removed and parts broken away.

Fig. 5 is a detail view of adjusting means for the furnishing wheels.

Fig. 6 is a plan view of part of the knitting head showing means for adjusting and operating the presser cam.

Fig. 7 is a plan view of the ring for supporting the dropper devices, and

Fig. 8 is a view of a modified form of yarn furnishing wheels.

1 is the cam ring of the knitting head within which the needle cylinder revolves. 2 is the yarn guide and there is one of these for each feed, of which there may be any number, only one being shown.

The particular embodiment of the invention shown being of the spring beard needle type, though the invention may be applied to the latch needle type, a presser cam 3 is employed to press the needle beards through individual pressers, not shown.

It is well understood that if the presser cam is withdrawn from action, the needles, in passing this particular feed, will not knit, and means are provided whereby this presser cam will be automatically retracted from the needle beards if the yarn leading to the needles, passing this cam, fails. For this purpose the presser cam is under the influence of a spring 4 bearing at one end against the wall of an opening 5, of the cam ring 1^x, and at the other end against a stud 6 extending up from the shank 7 of the presser cam into the opening.

The presser cam is held to its work against the retracting influence of the spring by a catch lever 8 pivotally mounted in a bracket 9 fixed to the cam ring. This catch lever has an arm 10 having a hook 11 engaging a flange 12 of a sleeve 13 which is seated in the cam ring having a plain cylindrical exterior and a screw threaded interior. The flange 12 has a notch 12′ which receives the hooked end of the lever and thus the lever holds the sleeve against longitudinal movement and also against turning movement when engaging the notch of the flange. The sleeve receives a rod 14 screw threaded thereinto and this rod bears upon a plain pin 15 seated in the opening of the cam ring and

this pin bears upon the end of the shank of the presser cam, and thus the latter is held to its work. The screw pin or rod 14 is locked in any position to which it may be adjusted by a jam nut 16, and for adjusting the screw rod and consequently adjusting the presser cam in relation to the needle beards the screw rod has a kerf 14′ to receive a screw driver by which it may be turned after loosening the jam nut.

The adjustment of the presser cam in relation to the needle beards or individual pressers does not affect the position of the flange 12 in relation to the catch lever which will hold the cam in its adjusted position until failure of the yarn at this particular feed takes place, whereupon the catch lever will be operated to release the flanged sleeve and permit the spring 4 to exert its force and retract the presser cam from the needle beards, or from the individual beard depressors, if these are used.

The yarn from the bobbins, not shown, passes between furnishing wheels 56, 57, 58, one set for each feed, and thence to the yarn guide at this feed, and provision is made for delivering two yarns to each feed, one of which is a plating yarn.

On their way from the furnishing wheels to the yarn guide the yarns pass through guide ends of dropper fingers 17 and 17′ and fixed guides 18 adjacent thereto. These dropper fingers control stop motion means and also means for operating the catch lever 8 of the particular feed affected by the failure of either one of its yarns.

The connection for operating the let off from the stop motion head for stopping the machine automatically on failure of the yarn is shown at 19, and the connection for operating the catch lever 8 for preventing the needles, passing this feed, from performing their knitting functions is shown at 20.

Stop motion head.

This consists of a casing fixed by a set screw 26 to the center rod 22. The casing consists of a body part 23 and a cover member 24, attached thereto by screws 25. Within this casing there is a gear wheel 27 turning loosely on the stationary suspension rod 22, and driven through bevel gearing 28, 29 from a shaft 30 which is driven in unison with the needle cylinder through gearing 31, a vertical shaft 32, and gearing 33, 34, the latter gear 34 being on the drive shaft of the machine and driving the gear 35, which is connected with the needle cylinder.

The gear 27 within the stop motion head carries a ring having teeth 36 with which a pawl or dog 37 engages when the yarn fails belonging to this feed. For instance, the pair of yarns *a* and *a′* pass down from the bobbins between the furnishing wheels and thence through the hooked or guide ends of the dropper wires 17, 17′ and through fixed guides 18. As long as the yarns feed properly the dropper wires will be held up by the draft of the yarns, but if either yarn fails then its dropper wire 17, or 17′, as the case may be, will fall by gravity. Each wire is carried by a member 38 pivoted at 39 in ears 40 of a ring 41, which is secured to the bottom wall of the casing 23. Each pivoted member 38 has an upstanding projection 42 engaging a pin 43 extending laterally from the lower end of the pawl or dog 37 so that upon the falling of either one of the pair of dropper wires 17, 17′ the dog 37 will be turned and its upper end made to engage the toothed ring. The dog 37 is pivotally mounted on a horizontally swinging lever or arm 46 which is mounted upon or formed with a shaft 44 extending vertically and journalled in a suitable bearing in the bottom wall of the casing. The lower end of this shaft carries an arm 45 to which is connected the rod or wire 20, above mentioned, leading to the devices which control the needle beard depressor cam. The lever 46 also has a pin 47 extending up therefrom into a notch or recess 48 of a ring 49 which is supported and guided in its slight circumferential movement by the upper end of the shaft or fixed pin portion 44′ of the lever 46. This ring on its interior has a rib or shoulder 49′ engaged by the head 50 of a screw which is threaded into the pin 44′, and the head of this screw overlies the rib or shoulder, so as to hold the ring 49 down in place, but yet permit it to have rotary motion.

This ring 49 carries a depending pin 51, to which the rod 19 is connected. The pin 51 passes down through an opening 52 in the ring 41 and through an opening in the bottom of the casing.

Now when the dog 37 is thrown into engagement with one of the teeth 36 of the rotating ring, it will be carried along with it and therefore the lever 46 will be turned and both of the connections 19 and 20 will be operated, the connection 19 operating the let-off to stop the machine, and the connection 20 operating to cause the cam of one set of knitting devices to be thrown out of operation to stop the knitting while the machine is coming to rest. The swinging of the lever 46 as above described will cause pin 47 to strike the wall of the notch 48 and turn the ring 49, causing pin 51 to draw upon rod 19, and the turning of the lever will also cause shaft 44 to be turned, together with arm 45, thus drawing upon rod 20.

The degree of movement of the lever 46 is comparatively small because, as it turns about the axis of shaft 44, its arc of movement is such that the dog 37 will soon release

itself from the teeth 36, which continue their travelling movement.

There is one of the levers 46 with its pivoted dog for each feed, also a pair of dropper wires 17, 17'. There is also one of the connections 20 for each feed, but only one pin 51. This pin 51, as before stated, depends from the ring 49 which will be operated when either one of the levers 46 is operated.

The levers 46 are cast with pins 53 on arms or extensions 54 and these pins are embraced by a spring band 55 which will return any one of the levers, which may have been operated, back to normal position in resetting the stop motion head.

The yarn furnishing mechanism comprises a broad toothed wheel 56 and two narrow wheels 57, 58. These wheels have long teeth, as shown in Fig. 2, intermeshing so as to measure off the yarn passing between them in suitable and accurate lengths or sections to properly supply the needles to which the yarn is led without being subjected to any variable tension, there being no tension devices employed between the furnishing wheels and the needles.

The toothed wheel 56 is mounted on a shaft 59 bearing in the casing of the stop motion head and this shaft has a bevel gear 60 on its inner end meshing with the bevel gear 27, before mentioned, so that the furnishing wheels will be driven in unison with the needle cylinder, because, as above described, the gear 27 is driven from the same gear train which rotates the needle cylinder.

One of the yarns of each pair a, a' at each feed passes between the furnishing wheels 56 and 57 and the other yarn passes between said wheel 56 and the wheel 58. These wheels 57 and 58 are carried by a swinging bracket consisting of the depending arm 62 and the substantially horizontal arm 63, the bracket being pivotally mounted at 64 to an ear or post 65 on the frame of the stop motion head. The bracket is adjustable by means of a nut 66 bearing on its forked end 67, said nut being on the screw threaded post or pin 68 mounted in the frame of the stop motion head. A jam nut 69 holds the parts in adjusted position. A spring 70 maintains the bracket up against the nut 66, but the bracket may yield to allow for variations in the yarn, or for the passage of lumps which, however, will be taken care of by any suitable detector means at the needles. The adjustment of the bracket will vary the depth of mesh of the teeth and thus vary the lengths of yarn furnished the needles in exact accord with the demands of the needles, which, of course, may be made to draw longer or shorter loops. Besides the adjustment of both wheels 57 and 58 relative to the wheel 56, it is to be noted that the wheel 57 is adjustable relative to wheel 56 independently of wheel 58, so that the furnishing of one yarn may be regulated in degree in respect to the amount of yarn furnished by the other wheel in order to get the proper relation during plating.

For this purpose the wheel 58 is mounted on a pin 71 carried by the swinging bracket and the other wheel is mounted on an eccentric sleeve 72 turnable on a reduced part of the pin 71 and held by a nut 73 screw threaded upon the pin. The eccentric sleeve can be turned by the finger piece 74 and when so turned it will cause the wheel 57 to mesh more or less deeply with the wheel 56.

There is one set of these yarn furnishing devices for each feed. The swinging brackets have guide eyes 75, 76 for the pairs of yarns.

Instead of driving the furnishing wheels 57, 58 from the wheel 56 through the same teeth which do the yarn furnishing the wheels may be formed as at 56', 57', 58' and the drive may be effected through toothed portions which perform only the driving function. This is shown in Fig. 8, in which the driving portions of the teeth are shown at c, and the yarn furnishing portions at d. This arrangement will prevent the yarn from being unduly pinched, because the driving force will not be exerted from tooth to tooth through the interposed yarn.

Features relating to the yarn furnishing means have been made the subject of a divisional application Serial No. 595,149, filed October 17, 1922.

I claim:

1. In combination in a knitting machine, a plurality of feeds, with a set of knitting devices at each feed, each set having a member to be thrown out of operation to cause the needles to stop knitting but to hold the fabric thereon at the corresponding feed, yarn furnishing means for each feed to measure off the yarn supplied thereto and a detector device for each feed between the yarn furnishing means and the knitting devices, means driven from the power of the machine, and connections to control the said members at the respective feeds, said connections being set by the detector device to be actuated by the said power driven means, said yarn furnishing means being driven from said power driven means, substantially as described.

2. In combination in a spring needle knitting machine, spring beard needles, a presser cam, a spring for moving the presser cam to inoperative position, a screw for adjusting the presser cam against the tension of the spring, a nut mounted in the cam ring slidably receiving said screw, a catch for holding the nut, and detector means for the yarn for controlling the catch, substantially as described.

3. In combination in a spring needle

knitting machine, spring beard needles, a presser cam, a spring for moving the presser cam to inoperative position, a screw for adjusting the presser cam against the tension of the spring, a nut mounted in the cam ring slidably receiving said screw, a catch for holding the nut, and detector means for the yarn for controlling the catch, said nut having a notched flange for receiving the catch, substantially as described.

4. In combination with a knitting machine, toothed yarn furnishing wheels, gearing for driving the same, stop motion connections driven from said gearing, yarn detector means operable upon the failure of the yarn for rendering the stop motion connections operative from said gearing, and connections to a member of the knitting devices at the needles to cause the needles to stop knitting but to hold the fabric thereon, said connections being operated from said gearing when the yarn fails said detector means being between the yarn furnishing means and the needles.

5. In combination with a knitting machine, rotary members for furnishing yarn to the needles, gearing for driving the same, knitting devices including a member to be thrown out of operation to stop knitting while the fabric remains in the needles, stop motion connections, connections to said knitting device, detector means engaged by the yarn, power transmitting means moving with the gearing and normally ineffective, means for operating the said connections from the power transmitting means when in engagement therewith, said detector means controlling said engagement, substantially as described.

6. In combination with a knitting machine, a let-off connection, a gear driven from the machine, a toothed member carried by said gear, a lever, a dog carried by said lever to engage the toothed member, a detector engaged by the yarn and controlling the dog to make it engage the toothed member when the yarn fails, a member operated by the lever for operating the let-off connection, knitting devices including a member to be thrown to inoperative position for causing the needles to stop knitting, but to hold the fabric thereon, and a connection from said lever to the said knitting member, substantially as described.

7. In combination with a knitting machine, a let-off connection, a gear, a toothed member carried thereby, a lever having a pivoted dog to engage said toothed member, a yarn detector, a member connected therewith to hold the dog in inoperative position while the yarn is running but to thrown said dog into engagement with the toothed member when the yarn fails, a ring common to a plurality of said levers to be operated by either one of them, said ring being connected to the let-off connection, knitting devices at each feed, each including a member which may be thrown to inoperative position to stop the needles from knitting, but to hold the fabric thereon, and a connection from each of said levers to the said member of the feed corresponding thereto, substantially as described.

8. In combination, a plurality of yarn detector devices, one for each yarn, a series of levers, each having a dog controlled by one of the detector devices, a power transmitting ring with which the dogs engage when released, a notched ring, each lever having a portion entering one of the notches in the ring and a stop motion connection operated by the ring, substantially as described.

9. In combination, a plurality of yarn detector devices, one for each yarn, a series of levers, each having a dog controlled by one of the detector devices, a power transmitting ring with which the dogs engage when released, a notched ring, each lever having a portion entering one of the notches in the ring and a stop motion connection operated by the ring, a plurality of sets of knitting devices, one set at each feed, each set comprising a member to be thrown out of operation when the yarn belonging to that feed fails, and a connection from each of said levers to the said member of the feed to which said lever belongs, substantially as described.

10. In combination, a plurality of feeds, a plurality of yarn detectors, one for each feed, a plurality of pivoted levers, means controlled by the movement of said levers for controlling the knitting functions of the machine, a power transmitting member for operating the levers, means controlled by the detectors for causing the levers to be operated by the power transmitting means, said levers being disposed about a central point and a spring band encircling said central point and engaging all of the levers for holding them in normal position, substantially as described.

11. In combination in apparatus of the class described, a rotary power transmitting member having teeth, a plurality of levers turnable about vertical axes and having their outer ends adapted to swing in arcs across the path described by the toothed transmitting member, dogs carried by the outer ends of the levers to engage the teeth, yarn detector means for controlling said engagement, means common to the series of levers to be operated by any one of them and connections operated by said last mentioned means, said dogs automatically releasing themselves from the teeth due to the path of travel of said dogs with the levers, substantially as described.

12. In combination in apparatus of the

class described, a supporting head, yarn furnishing means thereon, radiating shafts for driving the yarn furnishing means, a beveled gear, pinions on the radiating shafts driven from said gear, a power transmitting member carried by the gear and means operated thereby for controlling the operations of the knitting machine, and yarn detector means controlling the operation of the means operated by the power transmitting means, substantially as described.

13. In combination with a knitting machine, rotary members for furnishing yarn to the needles, gearing for driving the same a cam at the needles which when withdrawn from operative position causes the needles to stop knitting but holds the fabric thereon, connections to said cam for operating it, stop motion connections, detector means engaged by the yarn at a point between the yarn furnishing means and the needles, power transmitting means moving with the gearing and normally ineffective, means for operating said stop motion connections and said cam operating connections from the power transmitting means when in engagement therewith, said detector means controlling said engagement.

14. In combination with a knitting machine, a let-off connection, a gear driven from the machine, a toothed member carried by the said gear, a lever, a dog carried by said lever to engage the toothed member, a detector engaged by the yarn and controlling the dog to make it engage the toothed member when the yarn fails, and a member operated by the lever for operating the let-off connection, substantially as described.

15. In combination with a knitting machine, a let-off connection, a gear, a toothed member carried by the gear, a lever having a dog pivotally mounted thereon to engage said toothed member, a yarn detector, a member connected therewith to hold the dog in inoperative position while the yarn is running, but to throw said dog into engagement with the toothed member when the yarn fails, a ring common to a plurality of said levers to be operated by either one of them, and a connection between the said ring and the let-off connection, substantially as described.

16. In combination in a knitting machine having a plurality of feeds, a plurality of yarn detectors, one for each feed, a plurality of pivotally mounted levers, an annular power transmitting member for operating the levers, means controlled by the detectors for causing the levers to be operated by the power transmitting means, said levers being disposed about a central point, and a spring band encircling said central point and engaging all of the levers for holding them in normal position.

17. In combination in apparatus of the class described, a head, a gear, a radiating shaft carried by the head, and having a pinion meshing with the gear, a yarn furnishing wheel on the radiating shaft, a second yarn furnishing wheel engaging with the first and driven thereby, a toothed power transmitting ring carried by the gear, stop motion connections, a yarn detector, and means controlled thereby for connecting up the power transmitting ring with said connections upon failure of the yarn, substantially as described.

18. In combination in a knitting machine, a rotary gear, a plurality of yarn furnishing rotary members disposed about said gear and driven therefrom for measuring off the yarns supplied to the needles from the bobbins, a member at each feed cooperating with the needles to knit and when withdrawn from operative position causing the needles to stop knitting but to hold the fabric thereon, connections to said members, power transmitting means rotating with the gear but normally disengaged from said connections, and detector means to receive the yarns from the yarn furnishing means and upon failure of said yarn causing said rotary power transmitting means to operate the connection belonging to the yarn which has failed, to withdraw the member controlled by said connection, substantially as described.

19. In combination in a knitting machine, a rotary gear, a plurality of yarn furnishing rotary members disposed about said gear and driven therefrom for measuring off the yarns supplied to the needles from the bobbins, a member at each feed cooperating with the needles to knit and when withdrawn from operative position causing the needles to stop knitting but to hold the fabric thereon, connections to said members, means rotating with the gear but normally disengaged from said connections, and detector means to receive the yarns from the yarn furnishing means and upon failure of said yarn causing said rotary means to operate the connection belonging to the yarn which has failed, to withdraw the member controlled by said connection, and a stop motion connection also operated by said rotary member, substantially as described.

20. In combination with a circular knitting machine having a plurality of feeds with a member at each feed which when withdrawn from action prevents the work from running off from the needles, a central stop motion head, a plurality of yarn furnishing means, one for each feed disposed about the said head, shafts disposed substantially radially in respect to said head and carrying said yarn furnishing means, a yarn detector, one for each feed, arranged between the yarn furnishing means and the

needles and receiving the yarn from said furnishing means on its way therefrom to the needles, a connection for each feed to operate the first mentioned member thereat, rotating means in the stop motion head driven by the power of the machine and driving said yarn furnishing means, and also operating said connections when the latter are connected up with said rotating means, means controlled by the detector for connecting said connections with said rotating means when the yarns fail, and a let-off connection also operated from said rotating means when any one of the yarns fail, substantially as described.

In testimony whereof, I affix my signature.

KENNETH HOWIE.