Dec. 30, 1930. H. McADAMS 1,787,010

YARN SINKING APPARATUS FOR KNITTING MACHINES

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Fig. 1.

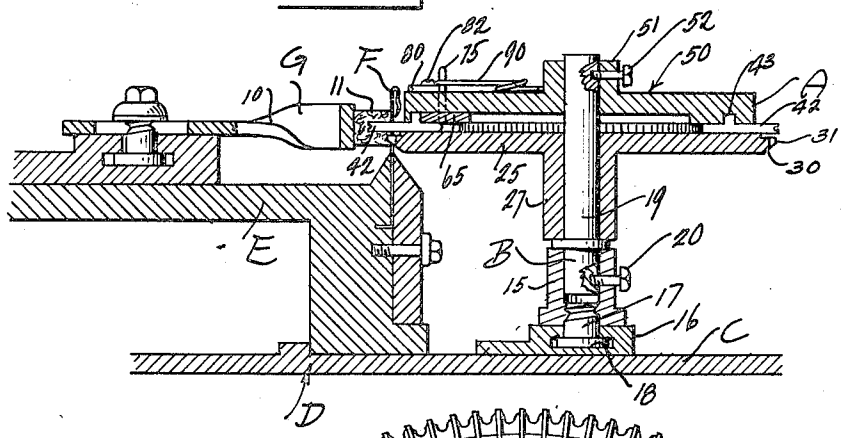
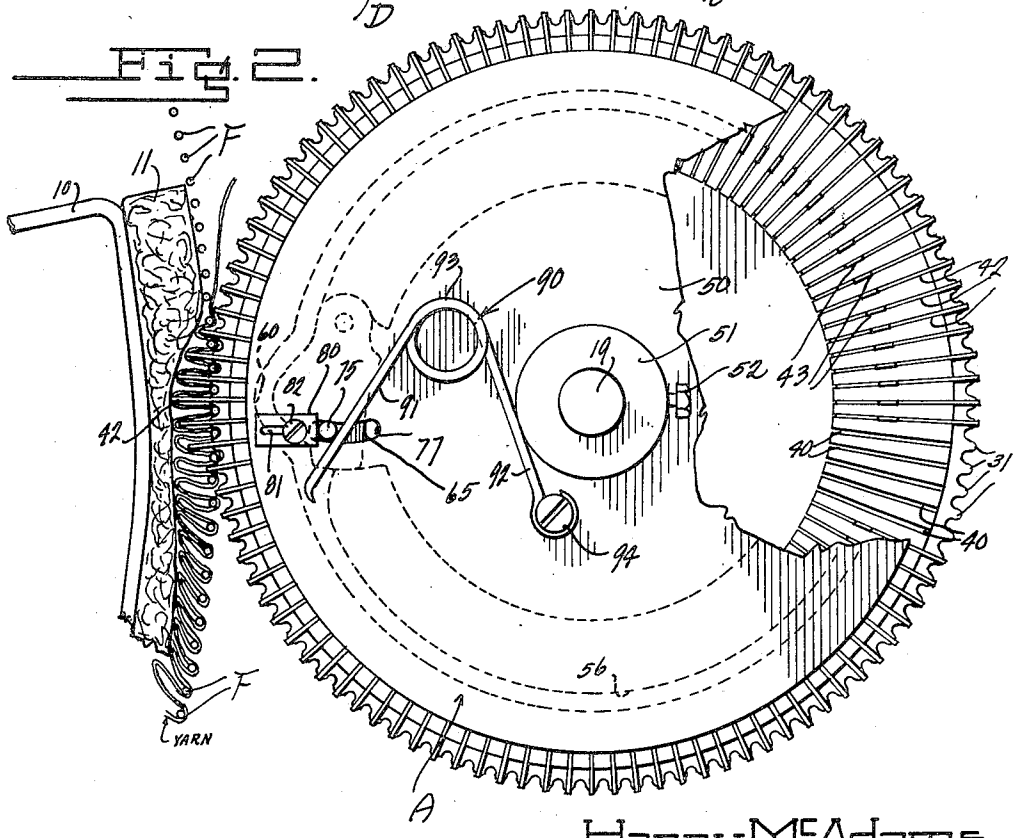



Fig. 2.




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Fig. 3.

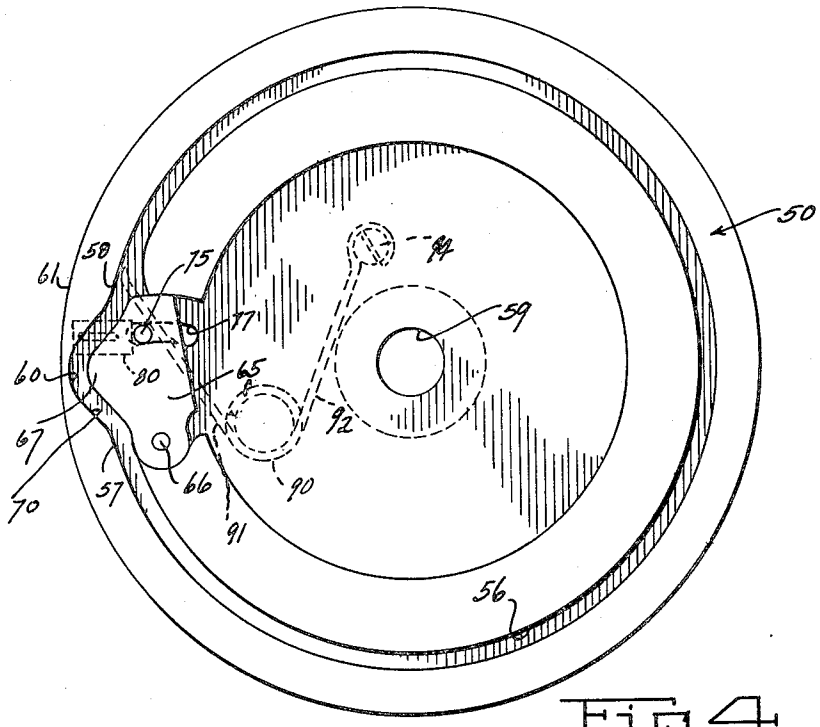



Fig. 4.

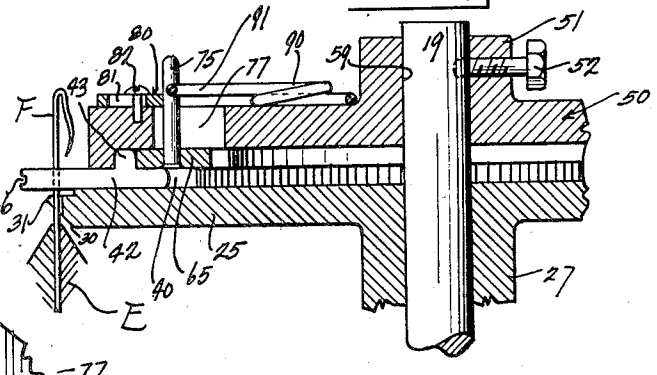
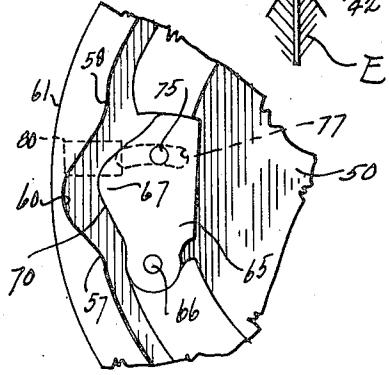



Fig. 5.




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# UNITED STATES PATENT OFFICE

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## YARN-SINKING APPARATUS FOR KNITTING MACHINES

Application filed February 3, 1928. Serial No. 251,716.

This invention relates to an improved wheel for introducing yarn between the needles of knitting machines, to produce relatively long yarn loops between the needles.

The primary object of the invention is the provision of an improved yarn introducing wheel for placing yarn in relatively long loops between the needles of knitting machines and the like, for the purpose of knitting terry looped fabric such as set forth in my co-pending applications, Serial No. 148,849, filed November 17, 1926, and Serial No. 208,483, filed July 26, 1927; the improved yarn introducing wheel embodying features of the yarn introducing wheel shown in said co-pending applications, but including improvements thereover which renders it more practical to provide properly terry looped fabric, in that the structure of the loop forming wheel compensates for irregularities in the quality of the yarn being introduced, to prevent breaking of needles, and bending or breaking of sinkers and the like.

A further object of this invention is the provision of an improved yarn introducing wheel including resiliently supported sinkers which are adapted to intermesh with relatively long strokes between the needles of a knitting machine cylinder or the like, and by means of which the play of the sinkers is regulated according to the quality of yarn, so that if the sinkers encounter a thick or stiff piece of yarn, the sinkers will yield as to length of their stroke rather than producing a positive stroke and thereby breaking the needle, bending the same, or bending or breaking the sinker.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawings, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views,

Figure 1 is a cross sectional view taken through the improved yarn introducing wheel, showing it in its intermeshing relation with details of the knitting machine, such as set forth in my co-pending application, Serial No. 208,483, above referred to.

Figure 2 is an enlarged fragmentary plan view of the improved yarn introducing wheel, showing details thereof, with the sinkers extending in a loop forming relation with the yarn being introduced upon the cylinder needles.

Figure 3 is an inside plan view of the cam plate of the improved yarn introducing wheel.

Figure 4 is an enlarged fragmentary sectional view taken at the sinker throw cam of the improved yarn introducing wheel, at the location where the sinkers project, in any intermeshing relation with the cylinder needles.

Figure 5 is a fragmentary view of a portion of the cam plate, at the movable projecting cam, showing the latter in a differently adjusted position than the normal position illustrated in Figure 3; the position in this figure being intended to show the extent to which the projection cam will move to permit the sinkers to yield in length of throw, rather than damaging other parts of the apparatus.

In the drawings, wherein for the purpose of illustration is shown only a preferred embodiment of the invention, the letter A may generally designate the improved yarn introducing wheel, which may be mounted upon a suitable standard or frame B carried on the base C of a knitting machine D. The knitting machine D has rotatably supported thereon a conventional rotatable cylinder E, carrying needles F. Means G is provided to cooperate with the yarn sinkers of the wheel A, in a loop formation with the yarn being introduced thereby, as set forth in my co-pending application, Serial No. 208,483, above referred to.

While I have herein shown the improved yarn introducing wheel as being used in connection with the large rotatable cylinder knitting machine, in conventional use for producing knitted underwear and the like, yet it is to be understood that the yarn introducing wheel may be used upon various types of knitting machines, within the spirit and scope of the invention as claimed.

The cylinder E is rotatably supported upon the base C, and the needles F are sup-

ported thereby in a circular spaced relation. The means G consists in the support upon a suitable standard 10, of a felt pad 11, as shown in Figure 2, and forming a curvature to the circular line of needles, and being located at the inside of said circular line of needles, so that the sinkers may push the yarn between the needles into the felt pad 11; the latter holding the loops in place during retraction of the sinkers. It is of course understood that the felt pad 11 may be located at the external side of the line of needles F, and the yarn introducing wheel A, instead of being located externally on the standard B, may be located within the circular line of needles, and which conditions are disclosed, as to both forms, in my co-pending application, Serial No. 208,483, above referred to.

As to the looping wheel A, a hub 15 is provided in adjustable relation upon the back stand ring 16, by means of a conventional hub bolt 17 operating in the groove 18 of the said ring, 16, in the well known manner. A vertical standard 19 is keyed against rotation upon the hub 16, by means of a set screw 20. A rotatable sinker bed or body 25 is provided with a hub 27, having a passageway therethrough for receiving the standard 19. This sinker bed is beveled at its outer periphery at 30, in a downwardly and inwardly sloping relation, and at its extreme periphery the same is provided with teeth 31 extending thereabout, which are adapted to intermesh with the needles F of the cylinder E, immediately at the top edge of the cylinder, where the needles F project therefrom. This gearing connection of the sinker bed is provided as a means of conveniently driving the sinker bed in synchronism with the cylinder E, and at a location on the needles where the drive of the looper wheel will not be any considerable strain upon the needles nor interfere with the proper operation thereof; it being noted that the bevel 30 aids in placing the teeth 31 to the lowest possible extent upon the needles, immediately at the point where they project from the cylinder body.

The top surface of the sinker bed is provided with a substantially ring-shaped raised portion, having exposed substantially radially disposed slots 40 therein, more particularly detailed in Figure 2 of the drawings, where a few of the sinkers have been omitted to more clearly show these slots 40 in the circular ring-shaped raised portion. This raised portion does not extend outwardly as far as the gear teeth 31, as is clearly shown in Figures 1 and 2 of the drawings. In the drawings the slots are shown truly radial on the sinker bed, that is, with respect to the axis of rotation of the sinker bed, but the slots may be other than truly radial, that is, their alignment may be eccentric to the axis of rotation of the bed, in event the looper wheel is to be used at the inside of the circular line of needles, in accordance with that principle of my invention disclosed in my co-pending application, Serial No. 208,483, above referred to.

The sinkers 42 are well illustrated in the sectional view of Figure 4, the same comprising flat bodies, which are rectangular in cross section, and which slide or reciprocate in their respective slots 40. Each of the same is provided with a transversely extending shank or butt 43, closer to the inner end thereof than the outer end, so as to provide a relatively long forward shank which may project for a long throw between the needles F of the cylinder. The outer end of each sinker 42 is rounded in a groove or recess 46 wherein the yarn is received and positively held as it is pushed between the cylinder needles. The sinkers 42 when resting in their slots 40 have the top edges therof flush with the top surfaces of the circular or ring-shaped raised portion in which the slots 40 are formed, so that the shanks 43 extend upwardly above the topmost surface of the raised portion of the sinker bed 25, for cooperation in the cam groove of the cam plate 50 which forms an important part of the wheel.

The cam plate 50 includes a hub portion 51 centrally thereof, which is keyed at 52 upon the top end of the vertical shaft 19, to prevent rotation of the cam plate and fix it in place against any rotation or shifting movement. This cam plate is preferably provided with a substantially annular portion on the lower surface, and at the outer margin thereof, and which is concentrically grooved at 56, from a location 57 to another location 58, as shown in Figures 3 and 4 of the drawings. This groove receives the butts 43 of the sinkers, and regulates the sliding of the sinkers in the cam plate. Between the ends of the groove 56 a portion of the cam plate is removed, and from the location 57 to 58 the groove 56 takes a radial bulge to provide a convex edge 60 which convexly slopes outwardly toward the periphery 61 of the cam plate. In cooperation with this edge 60 is disposed a pivoted sinker butt engaging cam 65, which may be referred to as the sinker projection cam, the same being pivoted at 66 on the under surface of the cam plate, and it is provided with a peaked portion 67 providing a convex edge 70 which cooperates in a conforming relation with the edge 60 to provide an extension for the groove 56, between the points 57 and 58, which guides the sinkers and throws them radially outward when the butts ride into engagement with the advance edge of the peak 67; the sinkers being retracted when the butts pass the peak 67 and ride into engagement with the opposite edge 60, as can readily be understood

by anyone skilled in the art to which this invention relates.

The cam 65 is resiliently movable, in order that the sinkers 42 need not throw for the full intended length, between the needles, if they meet a stiff or thick piece of yarn. To this end, it is preferred to provide a transverse pin or extension 75 upon the pivoted cam 65, extending normal thereto, through a slot 77 in the body of the cam plate. The slot 77 is concentric with the pivot 66, and the length of the slot 77 is such that the pin 75 may ride therein so that at one extremity in the slot the cam 65 will throw the sinkers outwardly for their full length, and when the pin 75 is at the opposite end of the slot 77, the cam 65 will be retracted so that the sinkers are not thrown or projected at all, as the sinkers pass the said pivoted cam 65. The slot 77 extends through the thickness of the plate 50, and the pin 75 projects above the top surface thereof.

In order to regulate the projected throw of the sinkers 42 I prefer to provide an adjustable stop member 80, having a slot 81 therein which receives a set screw 82 adjustable into the material of the cam plate 50. The stop member 80 may be adjusted longitudinally of the slot 77 from the outer end thereof towards the opposite end thereof, against the edge of which the pin or extension 75 may abut, as shown in Figures 2 and 4 of the drawings, to limit the throw of the sinkers.

To resiliently urge the cam member 65 outwardly into position for causing a loop forming extension of the sinkers, I prefer to provide a spring 90, comprising a pair of legs 91 and 92 connected by a spring coil portion 93. The leg 92 is eyed at one end, and secured by a screw 94 on the top surface of the cam plate, and the outer end portion of the other leg 91 engages against the upper end of the pin or extension 75 at the opposite side of the latter from the stop block or member 80; the legs 91 and 92 being in a V-shaped relation with the coil 93 tensioned to normally urge the pin 75 with considerable force against the stop member 80 and thus insure that the pivoted cam will have its throw portion 67 urged into a proper groove forming relation with the edge 60 of the cam plate, to cause a positive extension of the sinkers as the butts 43 thereof ride into engagement with the edges of the cam plate and extension 67 between the points 57 and 58.

It is perfectly apparent from the foregoing that during rotation of the cylinder, the geared connection of the wheel A therewith will cause a rotation of the wheel A in synchronism. The sinkers 42 are placed to intermesh between each of the needles F, and under normal conditions the spring 90 is of sufficient resiliency to urge all of the sinkers for their maximum adjusted throw between the needles, to cause a uniform length of the terry loops. If, however, a stiff piece of yarn or a thick piece of yarn is met by the sinkers, and offers considerable resistance to passing between the needles F, the spring 90 will yield and permit the cam 65 to pivot at 66 and move inwardly, without forcing the sinkers into a positive looping relation between the needles. Obviously this prevents damaging or breaking of the needles and the sinkers, and insures a continuous operation of the machine. This is a considerable improvement, since it was found heretofore, when knitting fabrics having long terry loops, that occasional break-downs of the the machine occurred. As a result a larger and more economical production is insured.

Various changes in the shape, size, and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In a wheel for introducing yarn upon knitting cylinder needles the combination of a supporting bed, means rotatably supporting the bed, sinkers slidably carried on the bed, gear teeth formed directly on the bed adjacent said sinkers, and a cam plate for projecting the sinkers from the bed.

2. In a looping wheel of the class described a sinker bed, sinkers slidable on the bed, means to project the sinkers from the bed, gear teeth peripherally formed directly on the bed adjacent to the plane of the sinkers on the bed, said sinker bed being beveled in receding relation below said teeth.

3. In a device of the class described the combination of a knitting cylinder, needles supported in spaced relation by the cylinder, a pad cooperating at one side of the needles, and a rotatable yarn introducing wheel at the opposite side of the cylinder from said pad comprising a bed, sinkers slidable on the bed, and means resiliently urging said yarn introducing sinkers into intermeshing relation with the needles and yieldably into yarn loop projecting relation directly into said pad.

4. In means for introducing yarn between the needles of knitting machines the combination with a rotary standard having spaced needles thereon, a friction pad at on side of the needles into which yarn loops may be projected, sinkers for introducing yarn between the needles directly into the pad, and yieldable means acting on the sinkers and normally urging them into yarn introducing relation between the needles and directly into the pad.

5. In a yarn introducing wheel a support, a rotatable bed upon the support, sinkers slidable upon the bed, a cam plate for regulating the position of the sinkers, a movable pro-

jecting cam on the cam plate, an extension on the cam plate and movable therewith, an adjustable stop member which the extension may engage to limit the throw effect of the movable cam upon the sinkers, and spring means operating against said extension for urging the same into engagement with the adjustable stop.

6. In a yarn loop introducing wheel, the combination of a sinker bed, sinkers reciprocably carried by the bed, a pivoted sinker projecting cam, and resilient means yieldably urging the cam on its pivot axis into position against the sinkers for moving the latter in yarn loop projecting relation from the sinker bed.

7. In combination with a cylinder having spaced needles in circular arrangement thereon, a yieldable pad mounted closely to the needles at one side of the circular needle line for receiving yarn loops projecting between the needles from the opposite side of the circular needle line, and a rotatable yarn introducing wheel wholly mounted at the opposite side of the circular needle line from said pad on an axis of rotation eccentric to the axis of the cylinder and comprising a bed, sinkers slidable upon the bed, and resiliently urged cam means yieldably directing said sinkers into intermeshing relation between the needles in yieldable yarn loop projecting relation directly into said pad.

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