

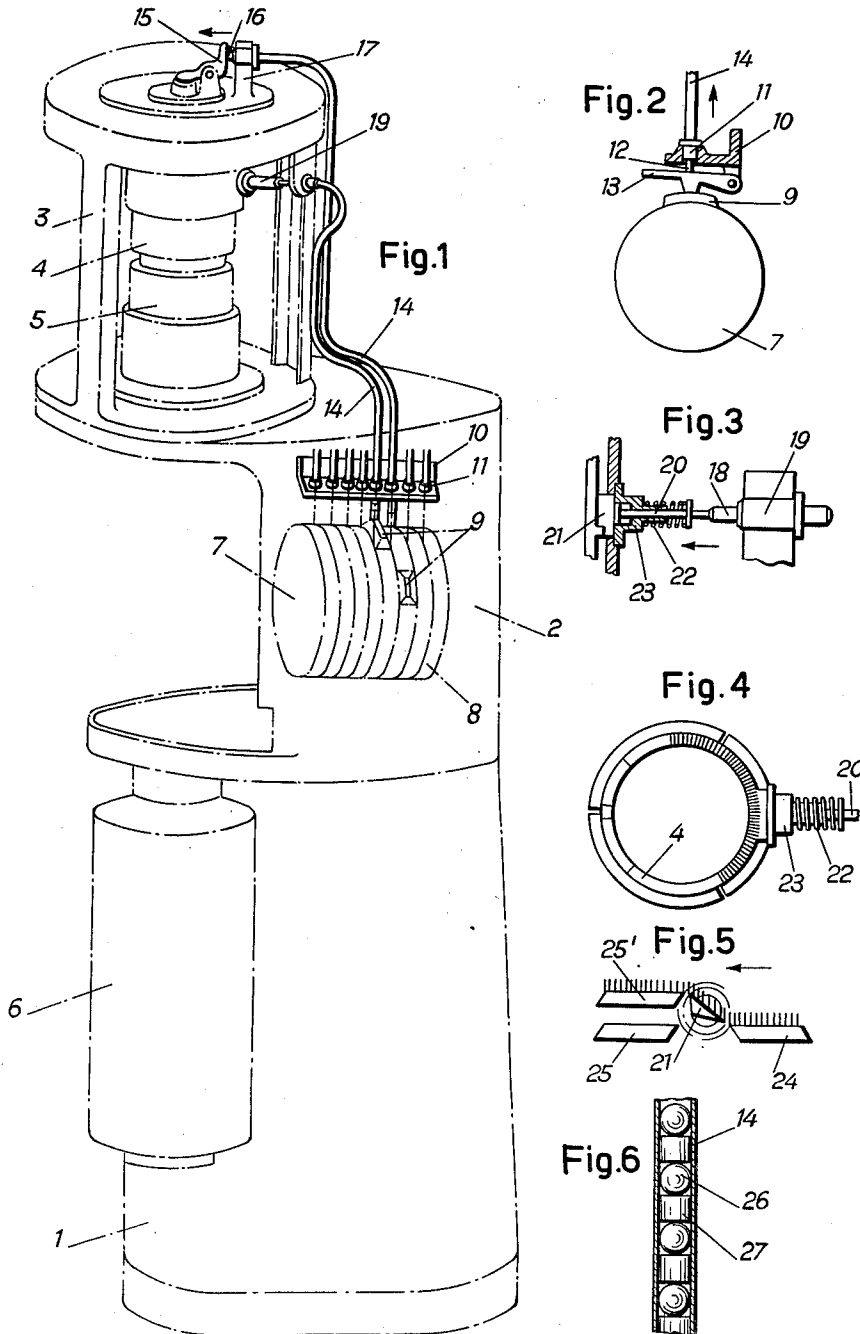
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CIRCULAR KNITTING MACHINE FOR STOCKINGS AND THE LIKE

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CIRCULAR KNITTING MACHINE FOR STOCKINGS AND THE LIKE

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This invention relates to circular knitting machines for stockings and the like having one or two needle carrying cylinders and has for its object improved means in such machines for the transmission of the impulses of the cam discs or drum which forms the actuating member of the machine to the various members to be actuated.

In the machines at present in use, each transmission is carried out by means of levers and rods acting under traction or thrust, the delicate and complicated construction of which impedes the movements of the machines and makes their operation uncertain.

According to the invention each transmission is a thrusting transmission formed by a small tube with a flexible incompressible core and which is curved in such a way as to connect the actuating member with the member to be actuated, and following the most suitable path along the intermediate parts of the machine taking in account the construction and the use of the machine.

All the levers, pivots and rods are thus dispensed with and the cylinders of the knitting machine are only flanked by small tubes, more or less curved, which are of no encumbrance.

In the accompanying drawings:

Figure 1 shows one form of a circular stocking knitting machine with two needle carrying cylinders, on which the improvement according to the invention has been fitted;

Figure 2 shows the drive with a cam drum;

Figure 3 shows a side elevation, in part in section of the mechanism for selecting the needles in the upper cylinder;

Figure 4 is a plan view of said mechanism;

Figure 5 is a front view of the same mechanism, and

Figure 6 shows a longitudinal section of a portion of a transmission.

In Figure 1 the base of the machine is denoted by 1 having at its upper end a box 2 where are mounted the means for transmitting the motion of a motor (not shown) to the different members of the machine. Above this box and offset therefrom is fixed the support 3 in which the needle-carrying cylinders 4 and 5 are mounted for rotation, and in the lower part against the base 1 and coaxial with the needle carrying cylinders there is a collecting receptacle 6 for the finished stockings.

On the side of the machine and on the box 2, rotationally mounted is the cam drum 7 which is actuated by a ratchet system of the usual type, and which carries as many cam discs as there

are drives to be effected in the machine, each disc carrying one or several cams 9 having positions and heights suitable for producing the required movements.

In Figure 1 only two drives are shown, that is to say the drive of the movable sinker carrying disc in the lower orifice of the upper needle carrying cylinder 4, and the drive of the needle selecting cam in the upper cylinder 4.

The driving member for each of the drives is installed opposite the cam drum 7, and for this purpose there is a support 10 in which the movable heads 11 of the different driving transmission members are arranged.

Each of these members is composed of a simple tappet as indicated at 12 in Figure 2, and between the said tappet and the corresponding cam 9, preferably a lever 13 pivoting on the stationary support 10 is interposed. Starting at the fixed support 10 a small tube 14 extends terminating opposite the member to be driven. Said tube 14 contains inside a flexible, incompressible core by means of which the displacement of the tappet 12 is transmitted in its entirety to the driven member or receiver.

In the case of the drive of the sinker carrying discs of the upper needles cylinder, the drive which must cause an axial displacement of a rod (not shown) situated in the interior of the needles cylinders is produced by means of a right-angled lever 15 of which one arm rests against the end of the said rod, and the other arm abuts against the extremity of the receiving member 16 of the transmission situated in the extremity of the tube and supported by a stationary upright 17. In this way when the cam 9 of the drum 7 imparts a determined vertical displacement to the tappet 12, the receiving member 16 undergoes an equal horizontal displacement, which is transmitted to the right-angled lever 15, and consequently to the vertical rod mounted inside the cylinder 4, thus causing the sinker carrying disc of said upper cylinder 4 to sink.

In the case of another drive such as, for example, the drive of the mechanism for the selection of the needles in the upper needles cylinder, the tappet 12 opposed to a cam disc of the drum 7 transmits its displacement to an horizontal rod 18, movable in the guide 19, the extremity of the rod operating on the shaft 20 of the blade 21 (Figures 3-5) which functions as a selector for the needles and is mounted axially movable against the spring 22 in a support 23.

As is known, the selection of the needles in the upper cylinder is made by means of a blade 21

which, as is shown in Figure 5, can occur at an interval in the running of the needles where the changeover takes place between the single guide 24, and the two superposed guides 25 and 25'.

The effect of the drive is that the blade-21, which normally allows the free passage of the needles from the guide 24 to the guide 25, forms a prolongation of the guide 24 and acts as a gradient which forces the needles to rise into upper guide 25'. This takes place when the cam 9 of the corresponding disc 8 of the drum 7 acts on the corresponding tappet 12 and the rod 18, moving forward, causes the displacement of the shaft 20 of the blade 21.

The operation of the machine is quite conventional but it is obtained in a manner which eliminates the drawbacks of the transmissions as at present used which, because of their complicated nature, made known knitting machines unreliable in operation and rendered them cumbersome and difficult to look after.

For this purpose, between the support 10, where a guide 11 for a tappet 12 is mounted, and the upright 17 of the rod 16, and between the support 10, where another guide 11 is mounted, and the guide 19, a transmission is disposed which is contained in a flexible tube 14 which is arranged in the machine in such a manner as to cause it to follow a path which is the most adherent possible to the intermediate stationary parts of the machine so that it does not increase the space occupied by the machine nor impair the visibility and the easy and direct accessibility to all other members of the machine.

In order to ensure the transmission of motion from the end, where the control member is arranged, the tube 14 contains a flexible but incompressible core constituted by spherical pellets alternated with pellets each having two flat end-faces on which abut the two adjacent spherical pellets.

Fig. 6 shows in axial section one portion of the said transmission. In this figure the tube 14 is seen, which is filled with a set of pellets 26 of a spherical form alternated with pellets 27 of a substantially cylindrical form, each ending at the two ends by flat faces against which abut the two adjacent spherical pellets.

The tappet 12 of a guide as 11 abuts against the first pellet, while the last pellet abuts against the rod 16 or 18 adapted to slide in the corresponding guide at the other end of the tube 14.

By the construction described, it is possible to allow a considerable transverse play to the internal core formed by the set of pellets 26 and 27, which renders the tube 14 so flexible, that it may be disposed along a path comprising several curves, even such of a small radius.

On the other hand, the transverse play of the pellets in the internal core does not hinder the function of the transmission because even though the pellets move transversely in relation to the axis of the tube 14 no jamming is produced nor a reduction of length of the internal core takes place.

This is due to the fact that in all relative transverse positions of the pellets 26 and 27, the spherical surfaces of the pellets 26 are constantly abutting on flat surfaces of the pellets 27 and the relative distance of all pellets 26 remain always unaltered.

Thus, the flexible core of the transmission maintains always an invariable length whatever the path may be along which the transmission is disposed.

What we claim is:

1. A circular knitting machine comprising a plurality of members to be displaced, a stationary support opposite to each of said members, rotatable discs, cams carried by said discs for imparting impulses to said members, stationary supporting means placed opposite said cam discs, a number of tubes each extending from one of said supports to said supporting means, alternating spherical and cylindrical rigid pellets inside each tube, means on the supporting means adjacent to cam discs for transmitting the impulse of a cam to the first pellet, and means on the support adjacent to said members to be displaced for transmitting the displacement of the last pellet to a member to be displaced.

2. A circular knitting machine comprising a plurality of members to be displaced, a stationary support opposite to each of said members, rotatable discs, cams carried by said discs for imparting impulses to said members, stationary supporting means placed opposite said cam discs, a number of tubes each extending from one of said supports to said supporting means, a series of contacting rigid pellets inside each tube, said series comprising spherical pellets alternating with pellets each having flat end faces contacting with spherical surfaces of the adjacent pellets, means on the supporting means adjacent to cam discs for transmitting the impulse of a cam to the first pellet, and means on the support adjacent to said members to be displaced for transmitting the displacement of the last pellet to a member to be displaced.

3. A circular knitting machine comprising a plurality of members to be displaced, a stationary support opposite to each of said members, rotatable discs, cams carried by said discs for imparting impulses to said members, stationary supporting means placed opposite said cam discs, a number of tubes each extending from one of said supports to said supporting means, a series of contacting rigid pellets inside each tube, said series comprising spherical pellets alternating with cylindrical pellets, means on the supporting means adjacent to cam discs for transmitting the impulse of a cam to the first pellet, and means on the support adjacent to said members to be displaced for transmitting the displacement of the last pellet to a member to be displaced.

4. A circular knitting machine comprising a plurality of members to be displaced, a stationary support opposite to each of said members, rotatable discs, cams carried by said discs for imparting impulses to said members, stationary supporting means placed opposite said cam discs, a number of tubes each extending from one of said supports to said supporting means along a path contouring the intermediate parts of the machine, a series of contacting rigid pellets inside each tube, said series comprising spherical pellets alternating with pellets each having flat end faces contacting with spherical surfaces of the adjacent pellets, means on the supporting means adjacent to cam discs for transmitting the impulse of a cam to the first pellet, and means on the support adjacent to said members to be displaced for transmitting the displacement of the last pellet to a member to be displaced.

5. A circular knitting machine comprising a plurality of members to be displaced, a stationary support opposite to each of said members, rotatable discs, cams carried by said discs for imparting impulses to said members, stationary supporting means placed opposite said cam discs,

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a number of tubes each extending from one of said supports to said supporting means along a path contouring the intermediate parts of the machine, a series of contacting rigid pellets inside each tube, said series comprising spherical pellets alternating with cylindrical pellets, means on the supporting means adjacent to cam discs for transmitting the impulse of a cam to the first pellet, and means on the support adjacent to said members to be displaced for transmitting the displacement of the last pellet to a member to be displaced. 10

6. A circular knitting machine comprising a plurality of members to be displaced, a stationary support opposite to each of said members, rotatable discs, cams carried by said discs for imparting impulses to said members, stationary supporting means placed opposite said cam discs, a number of tubes each extending from one of said supports to said supporting means, alternating spherical and cylindrical rigid pellets in contact with each other inside each tube, a guide 15

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connected with each end of said tube, one of said guides mounted on the supporting means adjacent to cam discs and the other mounted on the support adjacent to said member to be displaced, and rods sliding in each guide, one cooperating with a cam and the other cooperating with said member to be displaced.

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