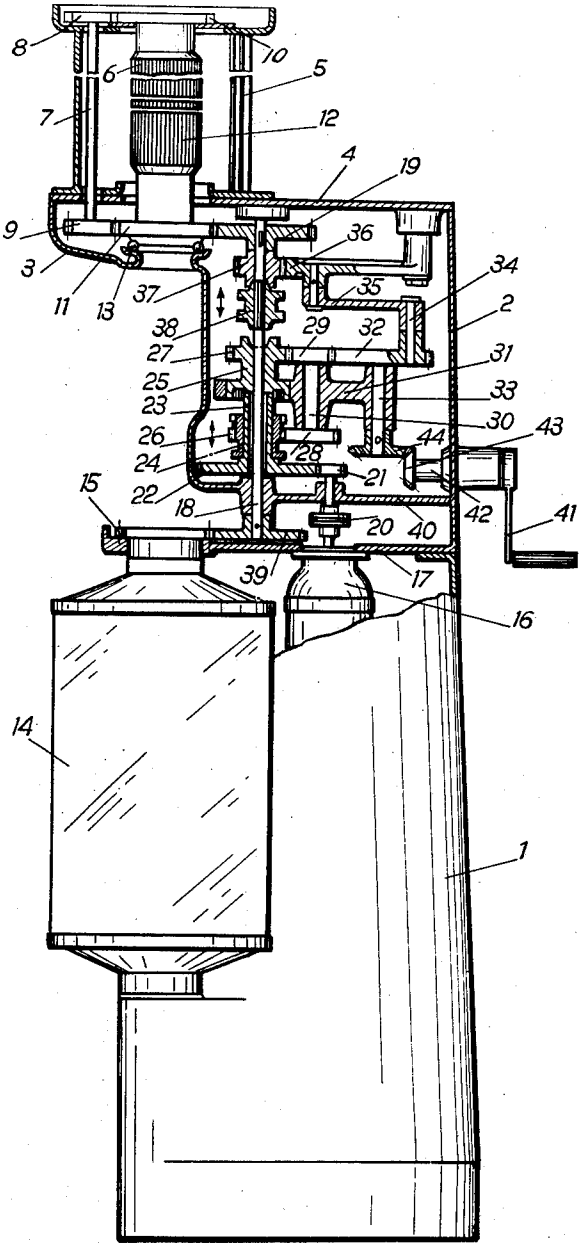
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CIRCULAR KNITTING MACHINE

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CIRCULAR KNITTING MACHINE

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This invention relates to circular knitting machines with one cylinder or two superimposed cylinders for stockings and the like, and has for its object an improved arrangement and disposition of the parts of such machines whereby their working and servicing are facilitated.

According to the invention, to effect the rotation of the principal members of the machine, a transmission shaft is used placed vertically in a box fixed to the base of the machine, which in its turn supports a cage in which the needle-carrying cylinder or cylinders are fitted. The cage is above the box but offset to one side.

In this way the motor for operating the whole machine can be fitted directly to the lower surface of the box by a clamp, and the transmission of the rotation to the cylinder or cylinders can be effected by cylindrical gears, thus avoiding bevel gears, which are usually employed.

It is a feature of the invention that this arrangement of the transmission enables the main shaft of the changespeed gear, to directly operate the mechanism for drawing off the stockings while being knitted, thus avoiding having to derive this motion from the drive of the group of cylinders.

The use of vertical transmission shafting enclosed in a box situated to one side of the path taken by the knitted stockings, and placed between the base of the needle carrying cylinder or cylinders and the mouth of the drawing off mechanism gives the whole machine the form of a slender column, and the machine is much less cumbersome and is easy to inspect.

The accompanying drawing which is given by way of example shows an elevation, part in section, of a double cylinder circular knitting machine for stockings according to the invention.

In the drawing, 2 represents the box on the base 1 of the knitting machine, in which the transmission with the changespeed gear is enclosed. This box has a lateral appendage 3. The box 2 and the appendage 3 are closed at the top by a plate 4 on which is fixed, to the right of the appendage 3, the cage 5 in which are mounted the upper cylinder 6 and the transmission members consisting of the shaft 7 with the pinions 8 and 9 engaging respectively with the toothed wheel 10 of the upper cylinder 6 and with the toothed wheel 11 of the lower cylinder 12.

When the lower cylinder 12 is being fitted the corresponding toothed wheel rests on the collar of the support 13 formed in the lower wall of the lateral appendage 3 of the box 2.

In the lower part and on one side of the base

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1 and on the axis of the two cylinders 6 and 12, the machine is provided with a receiving receptacle 14 having the usual drawing off mechanism, of which only the toothed wheel 15 is shown which serves to the actuation of said mechanism.

Motion is transmitted to all the parts of the machine by an electric motor 16 which is in the interior of the base 1, and which is arranged with its shaft in vertical position. The motor is preferably fixed by its clamp to the base 17 of the box 2 which contains the transmission inside.

This transmission consists, as is usual, of a main shaft and countershafts, and of clutches for producing different speeds. The feature of this transmission is that all the shafts are vertically placed, and that the main shaft 18 has at its upper end a cylindrical toothed wheel 19 which meshes with the annulus 11 integral with the lower cylinder 12.

In the example shown, the shaft of the motor 16 is connected by a friction joint 20 with a pinion 21 which engages with a toothed wheel 22 coaxial with the main shaft and fitted in a socket 23 which is grooved on the outside and loose on the main shaft 18.

On the splined socket 23, a sleeve 24 is fitted so that it can slide axially, and it can be brought into complete engagement with another sleeve 25, and this is also loose on the shaft 18. The sleeve 24 carries a pinion 26, and the sleeve 25 carries a pinion 27, these pinions meshing respectively with the pinions 28 and 29 of a shaft 30, fitted in a stationary support 31.

For transmission in direct gear with a ratio of 1 to 1, the sleeve 24 must be in its highest position in which it engages with the sleeve 25, while for a reduced speed it will be in the lower position shown in the drawing, in which pinion 26 engages with pinion 28. The pinion 29 engages with the toothed wheel 32, situated on the shaft 33, in the support 31 and carries a crank pin 34 which by means of the rod 35 drives the quadrant 36 which produces the rotatory reciprocating motion of the cylinder at the times when the machine is knitting the toe and the heel.

The quadrant 36 engages with the pinion 37 loose on the main shaft 18, and by its reciprocating motion imparts to the said pinion a reversing rotation, one revolution clockwise and one revolution anti-clockwise.

That part of the main shaft 18 between the pinion 27 and the pinion 37 is splined and along this part a clutch-collar 38 can slide which can be moved towards the top when engaging the pinion 27, or towards the bottom when engag-

ing the pinion 37. In the first case, the main shaft 18 rotates with a continuous motion always in the same direction while in the second case it makes one revolution clockwise and one anti-clockwise.

Since the wheel 19 fitted at the upper end of the main shaft engages with the toothed annulus of the lower needle carrying cylinder 12 then, when the motor is running the motion is transmitted directly and through the countershafts to the needle carrying cylinders 12 and 6. The variations in the motion for the different operations of the machine are effected in the usual ways and by the manipulation of the clutches.

The main shaft 18 carries at its lower end a cylindrical toothed wheel 39 which engages with the toothed wheel 15 of the drawing off mechanism, and which in this way can be operated independently of the driving group of the cylinders.

The arrangement described thus makes it possible to obtain the drive for the needle carrying cylinders with cylindrical toothed wheels, and the drive for the drawing off mechanism independently of the drive for the needle carrying cylinders.

In the example shown and described, the transmission between the motor 16 and the main shaft 18 which carries the wheels 19 and 39, is supported partly by the box 2 by its lower and lateral walls and by the partition 40, and partly by the plate 4 which closes the box from above. Given the arrangement of the units of the transmission in the interior of the machine, it is also possible to fit the different members of the machine itself in a separate cage which can be placed inside the box 2.

The machine is fitted in the usual way with a crank 41, engaging in one direction of rotation only with the shaft 42 which carries a bevel wheel 43 meshing with a bevel wheel 44 fitted on the shaft 33, whereby the knitting machine can be hand operated.

What we claim is:

1. In a circular knitting machine for stockings, a needle carrying cylinder, a gear for operation of said cylinder comprising a lower cylindrical toothed annulus, a gear transmission with vertical axes, a cylindrical toothed wheel at the lower end of said transmission, a motor having a shaft, a toothed wheel connected with said shaft and meshing with said lower toothed wheel of said transmission and a cylindrical toothed wheel at the upper end of said transmission meshing with said lower cylindrical toothed annulus of the cylinder gear.

2. In a circular knitting machine for stockings, two superposed needle carrying cylinders, a gear for operation of said cylinders comprising a lower cylindrical toothed annulus, a gear transmission with vertical axes, a cylindrical toothed wheel at the lower end of said transmission, a motor having a shaft, a toothed wheel connected with said shaft and meshing with said lower toothed wheel of said transmission and a cylindrical toothed wheel at the upper end of said transmission meshing with said lower cylindrical toothed annulus of the cylinder gear.

3. In a circular knitting machine for stockings, a needle carrying cylinder, a gear for operation of said cylinder comprising a lower cylindrical toothed annulus, a support for said cylinder and operating gear, a gear transmission with vertical axes, a box enclosing said transmission, a lower base carrying said box, the support for said needle cylinder and operating gear being mounted on the upper wall of said box, a cylindrical toothed wheel at the lower end of said transmission, a motor with vertical shaft, a toothed wheel connected with the shaft of said motor and meshing with said lower toothed wheel of said transmission and a cylindrical toothed wheel at the upper end of said transmission meshing with said lower cylindrical toothed annulus of the cylinder gear.

4. In a circular knitting machine for stockings, a needle carrying cylinder, a gear for operation of said cylinder comprising a lower cylindrical toothed annulus, a support for said cylinder and operating gear, a gear transmission with vertical axes, a box enclosing said transmission, a lower base carrying said box, the support for said needle cylinder and operating gear being mounted on the upper wall of said box offset to one side of said transmission, a cylindrical toothed wheel at the lower end of said transmission, a motor with vertical shaft, a toothed wheel connected with the shaft of said motor and meshing with said lower toothed wheel of said transmission and a cylindrical toothed wheel at the upper end of said transmission meshing with said lower cylindrical toothed annulus of the cylinder gear.

5. In a circular knitting machine for stockings, a needle carrying cylinder, a gear for operation of said cylinder comprising a lower cylindrical toothed annulus, a support for said cylinder and operating gear, a gear transmission with vertical axes, a box enclosing said transmission, a lower base carrying said box, the support for said needle cylinder and operating gear being mounted on the upper wall of said box, said box forming a lateral appendage enclosing the gear of the needle cylinder, a cylindrical toothed wheel at the lower end of said transmission, a motor with vertical shaft, a toothed wheel connected with the shaft of said motor and meshing with said lower toothed wheel of said transmission and a cylindrical toothed wheel at the upper end of said transmission meshing with said lower cylindrical toothed annulus of the cylinder gear.

6. In a circular knitting machine for stockings, a needle carrying cylinder, a gear for operation of said cylinder comprising a lower cylindrical toothed annulus, a support for said cylinder and operating gear, a gear transmission with vertical axes, a box enclosing said transmission, a lower base carrying said box, the support for said needle cylinder and operating gear being mounted on the upper wall of said box, a cylindrical toothed wheel at the lower end of said transmission, an electrical motor with vertical shaft fitted directly to the lower wall of said box, a toothed wheel connected with the shaft of said motor and meshing with said lower toothed wheel of said transmission and a cylindrical toothed wheel at the upper end of said transmission meshing with said lower cylindrical toothed annulus of the cylinder gear.

7. In a circular knitting machine for stockings, a needle carrying cylinder, a gear for operation of said cylinder comprising a lower cylindrical toothed annulus, a gear transmission with vertical axes, a cylindrical toothed wheel at the lower end of said transmission, a motor having a shaft, a toothed wheel connected with said shaft and meshing with said lower toothed wheel of said transmission, a cylindrical toothed wheel at the upper end of said transmission meshing with said lower cylindrical toothed annulus of the cylinder gear and a receptacle for receiving the

stockings, and a cylindrical toothed wheel on said receptacle for operating a drawing off mechanism and meshing with a cylindrical toothed wheel of said transmission.

8. In a circular knitting machine for stockings, a needle carrying cylinder, a gear for operation of said cylinder comprising a lower cylindrical toothed annulus, a support for said cylinder and operating gear, a gear transmission with vertical axes, a box enclosing said transmission, a lower base carrying said box, the support for said needle cylinder and operating gear being mounted on the upper wall of said box offset to one side of said box, a cylindrical toothed wheel at the lower end of said transmission, a motor with vertical shaft, a toothed wheel connected with the shaft of said motor and meshing with said lower toothed wheel of said transmission, a cylindrical toothed wheel at the upper end of said transmission meshing with said lower cylindrical toothed annulus of the cylinder gear and a receptacle for receiving the stockings mounted to one side on said lower base of the machine vertically beneath the needle carrying cylinder, and a cylindrical toothed wheel on said receptacle for operating a drawing off mechanism and meshing with a cylindrical toothed wheel of said transmission.

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