The invention relates to apparatus for automatically dolfing and replacing coiler cans and similar pot-like receptacles as used with carding machines, drawing frames and other textile machinery.

The purpose of such machinery is to dolf a full can from a position adjacent a filler head which forms part of or is associated with the textile machine and delivers into a coiler can or other receptacle, rovings or similar fibrous material, hereinafter referred to as a ribbon, and replaces the full can by an empty one.

Mechanisms for this purpose are already known in which the filler head is pivotally mounted on the machine, so that when one can has been filled, the filler head indexes to a position in which it can fill another can. While the second can is being filled, the full can is dolf by hand from a turntable or other support and replaced by an empty can. When the second can is full, the filler head swings back into its former position. The second can is then dolfed and replaced, whereby the process is continuously repeated.

In other known equipment cans are arranged in a circle on turntables carried by a main support which is rotatable about a vertical turret. The rotatable support abruptly indexes from one can to the next as soon as a can is full, and the full cans are dolfed by hand and replaced by empty ones.

The above described known mechanisms have various disadvantages. The member of cans which can be simultaneously manually replaced is limited in the first case to one or two cans, and in the second case to between three and five cans, if an undesirably large unused space in the centre of the turret is to be avoided. Moreover, the empty cans must be accurately placed in their proper positions. If the care is not taken when thus replacing the cans it is easy possible for a can to be eccentrically located on its turntable so that it will run out of true and even if it does not fall off the turntable, it will give rise to an unsatisfactory throw of the ribbon as this is deposited in the can. If the ribbon is to be deposited in the can in the correct loop formation, which is usually required, while the can rotates continuously about its own axis, then immediate steps must be taken to sever the ribbon between adjacent cans when the mechanism operates to change over to the next empty can, otherwise the ribbon may start winding around the outer side of the fresh empty can.

The object of the present invention is to provide can dolfing and replacing apparatus constructed in such a way as to obviate the above mentioned drawbacks and to ensure a smooth, uninterrupted automatic action.

According to the present invention this object is achieved in that can exchange is effected, without moving the filler head and without moving the can turntable, by can displacing means which automatically move into engagement between separated cans of a guided row thereof, and then effect displacement of the engaged cans to replace a full can adjacent the filler head by an empty one.

It is to be understood that the above reference to the filler head not moving means that the filler head is stationary in the sense of having no bodily displacement from one can to another, and does not preclude motion of the filler head, such as rotation or oscillation about its own axis or reciprocatory movement whilst at the filling station. The movement of the can displacing means may be made dependent on a device controlled by the quantity of ribbon material delivered by the textile machine.

Such an arrangement affords the following advantages: The positions of both the filler head and the can turntable remain unchanged during the operation of can exchange, so that the construction of the drive means for these elements, as well as of the feed means for the ribbon material may be substantially simpler than in known devices. The number of empty cans which can be positioned ready for feeding is practically unlimited and a large number of dolfed full cans can be left in the vicinity of the textile machine without interfering with the operation of the can exchange device. The empty cans simply need to be placed in any positions not already occupied by other empty cans on a feed surface, such as an inclined track or a conveyor of belt or roller form. The device will then automatically feed the cans one by one in such a way as to place one of them, at the appropriate moment, in the correct position for the reception of a satisfactorily formed filling and retain it in this position until full. The device also permits the empty cans as well as the dolfed full cans to be conducted along any desired prescribed path without the help of additional operative means or manual assistance, for instance for the purpose of feeding the full cans to the next machine in a textile process.

One form of the apparatus according to the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 shows a plan view of the apparatus; this view is taken on line G—H—J—K of Figure 2;

Figure 2 is a sectional elevation on line C—D of Figure 1;

Figure 3 is a fragmentary sectional elevation on line A—B of Figure 1;

Figure 4 is a side elevation looking in the direction indicated by line E—F of Figure 2;

Figure 5 is a part-sectional elevation showing the drive means for a can turntable;

Figure 6 is a diagrammatic plan view of the can turntable drive means shown in Figure 5;

Figure 7 is a schematic side elevation of the entire equipment in side elevation, and

Figure 8 is a schematic plan view of the equipment shown in Figure 7.

In the embodiment illustrated empty cylindrical cans 1, 2 and 3 roll or slide down an inclined feed track 8 provided on opposite sides with guide rails 9 (Figs. 1, 2, 4, 7 and 8); the guide rail 9 on one side terminates before that on the other side, for the purpose hereinafter described.

The width of the inclined feed track 8 as defined by the guide rails 9 in the region of the cans 2 and 3 does not substantially exceed the diameter of the cans. The inclined feed track 8 constitutes in effect a can magazine or storage place which is limited in size and capacity only by the space available for the purpose. This can magazine or storage place need not be linear in shape and can be adapted to the nature of the space that is available or to permit a greater number of cans to be accommodated; the feed track could, for instance, be of hopper shape when viewed in plan. To permit the angle of inclination of the track 8 to be small, the cans may be arranged to run on casters 10 (Figs. 2 and 4). If
desired the inclined feed track may be partly or wholly replaced by a conveyor of belt or roller form. The cans 2 and 3 are adapted to be arrested as they approach a filling station beneath the filler head of the textile machine by retaining members 11 controlled in such a way that gaps are formed between the cans 2 and 3 and between cans 3 and 4 into which feed arms 12 and 13 may be swung when a can (that is, can 4) arrives at the filling station and on a turntable 14 upon which it is located and held in a centralised position by means of three or more pivoted stop plates 15 (four such plates are shown). The turntable 14 is rotatably mounted by a depending spindle which is received in a hollow post upstanding from a fixed baseplate 16 and the turntable can be driven through a spur wheel 17 secured to the foot of said spindle. Vertically slidable mounted on the baseplate post is a sleeve 18 which is adapted to actuate the stop plates 15 through pivotally connected levers 19 and push rod 20. The slidable displacement of the sleeve 18 is effected by two rockable levers 24, 25 which are interconnected by a rigid link 23 (or an elastic arm) of variable length, the lever 25 being operated by a cam 22 mounted on a shaft 21. A cam follower is carried by lever 25 and isblased into contact with said cam 22 by a spring connected to said lever. This cam arrangement may be replaced by a crank which actuates the lever 25 through a connecting rod. A spur wheel 27 has imparted to it by the associated textile machine, in any suitable manner, a continuous rotary motion and said spur wheel 27 drives the spur wheel 17 of turntable 14 through a so-called mangle gear 28 of known construction, and also a spur wheel 29 associated with an electromagnetic clutch 30; this electromagnetic clutch may be replaced by a mechanical or hydraulic clutch.

The clutch 30 simultaneously controls two arm trains, one of which drives the arm shaft 21 through bevel gear and a layshaft, and the other of which reciprocates a pin rack 32 through a pin oscillator 33. The transmission ratio between the arm shaft 21 and the pin rack 32 is such that one reciprocation of the pin rack 32 corresponds to one revolution of the arm shaft 21. The pin rack 32 rigidly connects together two blocks 33 and 34 which are slidable on a fixed radial 35, so that the pin rack is adapted to move said sliding blocks to and fro along said radial 35 which is secured to two brackets 36 and 37. The abovementioned feed arms 12 and 13 are rigidly interconnected and pivotally mounted on said sliding blocks 33, 34 respectively. A tilting device 38 of channelled beam form is also mounted on the brackets 36, 37 and the free end of an arm 39, which is affixed to the feed arm 12, can slide to and fro along the channel of said tilting device 38. It is on the same side of the equipment as that where the tilting device is located that the shorter of the guide rails 9 is provided, so that said guide rail does not interfere with the movements of the feed arms 12 and 13. The tilting device 38 is connected to the cam-rected lever 25 by means of a push rod 40. The cam shaft 21 carries two further cams 41 which actuate the retaining members 11 through pivoteds levers 42 and links 43. The changing of cans is effected as follows:

When the desired quantity of ribbon (as indicated, for example, on a preset counter of known construction) has been filled in a can situated beneath the counter closes a circuit for energising the electromagnetic clutch 30, so that the feed arms 12 and 13 will begin to move in the direction indicated by arrows in Figs. 1, 2 and 4 and the cam shaft 21 will begin to revolve. The movements of the feed arms 12 and 13 and the contour of the cans are correlated so that said ends of the feed arms 12 and 13 will follow a path which roughly conforms with the arrowed dot-dash line. In other words, the free ends of the feed arms 12 and 13 will swing on the sliding blocks 33, 34 into the gaps provided between the cans 3 and 4 and cans 2 and 3 respectively. At the same time the two cans 41 will actuate the retaining members 11 to release cans 1, 2 and 3 so that they will be free to move.

During the tilting of the feed arms 12 and 13 the stop plates 15 on the turntable 14 are operated by cam 22 through lever 25, link 23, lever 24, sleeve 18, lever 19 and push rod 20 in such manner as to retract them into the plane of the turntable, thus permitting the feed arms 12 and 13 to displace cam 4 from the turntable 14 and to replace it by cam 3. This can displacement action can be effected by one arm alone. Means may be provided whereby the doddled cans 5 and 6 may be pushed into any desired direction between suitable guide rails. The cans 1 and 2 now close up under their own weight. In the further course of their movement the feed arms 12 and 13 tilt back into vertical positions. At the same time the stop plates 15 grip the fresh can 3 which has been pushed on to the turntable 14, and the retaining members 11 move up again to arrest the following replacement cans 2 and 1. As soon as the feed arms 12 and 13 regain their initial positions, one of them trips an electric contact which de-energises the electromagnetic clutch 30. As the doddling equipment then remains inactive until can 3 has been filled, whereupon the described cycle of operations is repeated automatically.

I claim:

1. Apparatus for doddling and replacing fibrous ribbon receiving cans with respect to a filler head, said apparatus comprising means for guiding a row of cans to position a first can adjacent said filler head, means fixed in position along the length of said guiding means and insurably between said cans for separating a second can of said row of cans from said first can and said second can from a third can, can displacing arms insurably between said cans, an arm support on which said can displacing arms are mounted and means for imparting traversing movement to said can displacing arms along said arm support to dodd said first can when full and to displace said second can to enable said second and third cans to occupy respectively the positions previously held by said first and second cans.

2. Apparatus for doddling and replacing fibrous ribbon receiving cans with respect to a filler head, said apparatus comprising means for guiding a row of cans to position a first can adjacent said filler head, means fixed in position along the length of said guiding means and insurably between said cans for separating a second can of said row of cans from said first can and said second can from a third can, can displacing arms insurably between said first and second cans, an arm support on which said can displacing arms are mounted and said second and third cans and means for imparting traversing movement to said can displacing arms along said arm support to dodd said first can when full and to displace said second and third cans to occupy respectively the positions previously held by said first and second cans.

3. Apparatus for doddling and replacing fibrous ribbon receiving cans with respect to a filler head, said apparatus comprising means for guiding a row of transportable cans to position a first can beneath said filler head, means for moving said row of cans forward said filling position adjacent said filler head, traverser mean for said filler head, means for imparting movement of said row of cans for separating a second can of said row of cans from said first can and said second can from a third can, a pair of can-displacing members mounted for limited traverse movement to and fro in the direction of movement of said row of cans and for imparting traversing movement to said can-displacing members to doff said first can when full and to displace said second and
third cans to occupy respectively the positions previously held by said first and second cans and means for moving said third can to occupy the position of said first can, said can-displacing members being positioned to effect can displacement.

4. Apparatus for doffing and replacing fibrous ribbon receiving cans with respect to a stationary filler head, between which head and said cans there is relative rotary motion, said apparatus comprising means for guiding a row of transportable cans to position a first can beneath said filler head, means for moving said row of cans toward said filling position adjacent said filler head, a pair of can arresting members spaced apart in the direction of movement of said row of cans for projection into the path of said cans to separate a second can from said first can and said second can from a third can, a pair of can displacing members spaced longitudinally at the same spacing as said can arresting members, said can displacing members being mounted for limited traverse movement to and fro in the direction of movement of said row of cans and for rocking into and out of the gaps formed in front of the arrested second and third cans, means for imparting traversing movement to said can displacing means to doff said first can when full and to displace simultaneously said second and third cans to occupy respectively the positions previously held by said first and second cans, and means for projecting and withdrawing said arresting members, said last mentioned means withdrawing said arresting means when said can-displacing members are positioned to effect can displacement.

5. Apparatus for doffing and replacing coiler cans with respect to a stationary filler head having associated control means to effect feeding of a predetermined quantity of fibrous ribbon material into each of said cans, said apparatus comprising means for guiding a row of transportable cans in substantially straight-line formation toward a filling station beneath said filler head, a turntable at said filling station, means for advancing said row of cans toward said filling station to position a first can on said turntable beneath said filler head, retractable stop means for locating a can centrally beneath said filler head, two arresting devices spaced apart in the direction of flow of said cans and projectible into the path of the cans to form a gap between said first can and a second can and between said second can and a third can, two can-displacing members spaced apart similarly to said arresting members and mounted for concerted reciprocatory movement alongside of said first, second and third cans and for imparting movement into the gaps separating said cans, and drive means under influence of said ribbon feed control means to effect synchronous movement of said turntable, stop means, can arresting members and can feeding arms, said arresting members restraining the cans during traversing and swinging movements of said feeding arms.

7. Apparatus as claimed in claim 6, incorporating can feeding arms interconnected for movement together, a guide rail on which said interconnected arms are slidably and rockedly supported, said guide rail being disposed alongside of said first and second cans and parallel to the path of movement of the cans, a bar tiltably mounted adjacent and parallel to said guide rail, a laterally projecting member secured to said interconnected feeding arms and slidably engaging said tiltbar, rack and pinion drive means for reciprocating said interconnected feeding arms and linkage for imparting rocking movement to said tiltbar to swing the feeding arms between separated cans without interfering with the reciprocation of said arms.

8. Apparatus as claimed in claim 7, characterised in that the reciprocatory movement of the feeding arms is effected by gearing which generates a uniform drive as well as a reciprocating drive.

9. Apparatus as claimed in claim 8, characterised in that the tilting movement of the feeding arms is effected by gearing which generates a uniform drive as well as a reciprocating drive.

10. Apparatus as claimed in claim 9, wherein the gearing is of pin rack and mangle pinion form.

11. Apparatus as claimed in claim 6, incorporating at least three stop plates pivotally mounted on the turntable for centralising and gripping a can being filled, whilst the feeding arms are withdrawn from between the separated cans, said stop plates being swung down into the plane of said turntable when cans are to be exchanged.

12. Apparatus as claimed in claim 6, characterised in that the cans are fed by gravity action down an inclined track to the turntable at the filling station.

13. Apparatus as claimed in claim 6, characterised in that the said drive means includes gearing which actuates the can arresting members and the reciprocating movement with the clamping action of the turntable stop means, said arresting members retaining the next two empty cans being fed toward the turntable in spaced relationship to permit the feeding arms to swing into position between the separated cans.

14. Apparatus as claimed in claim 9, characterised in that the two gearings are simultaneously activated and inactivated by a releasable clutch.

15. Apparatus as claimed in claim 14, wherein the clutch is automatically operated by the machine when a desired quantity of material (such as length in metres or feet in the case of ribbon material) has been delivered by the machine.

16. Apparatus as claimed in claim 14, wherein the clutch is automatically released when exchange has been completed.

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