June 17, 1952 J. A. MOLLOY 2,600,794

CORE-SUPPLYING MEANS FOR WINDING MACHINES

Filed Dec. 27, 1946 5 Sheets-Sheet 1

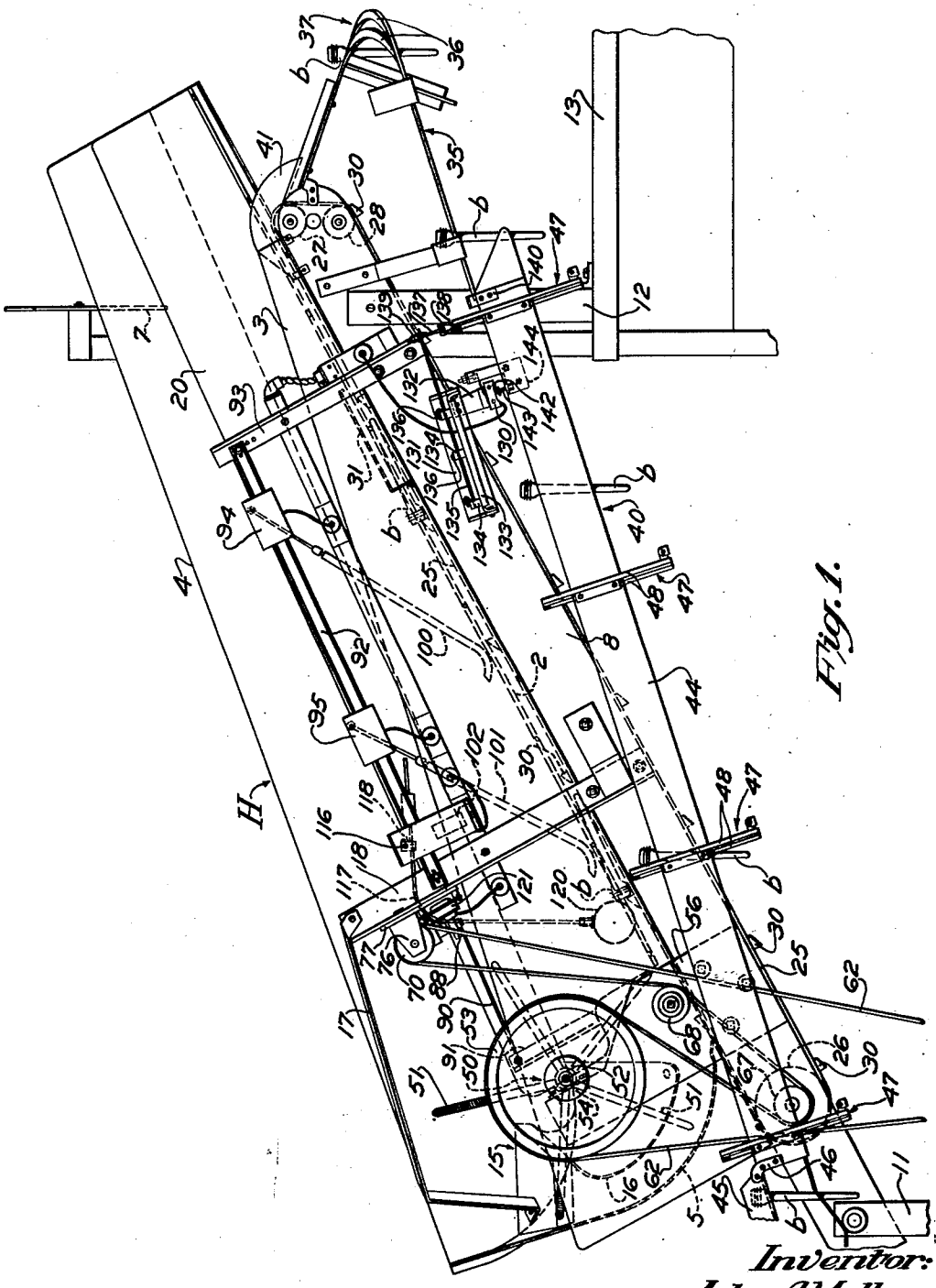


Fig. 1.

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Filed Dec. 27, 1946 5 Sheets-Sheet 2

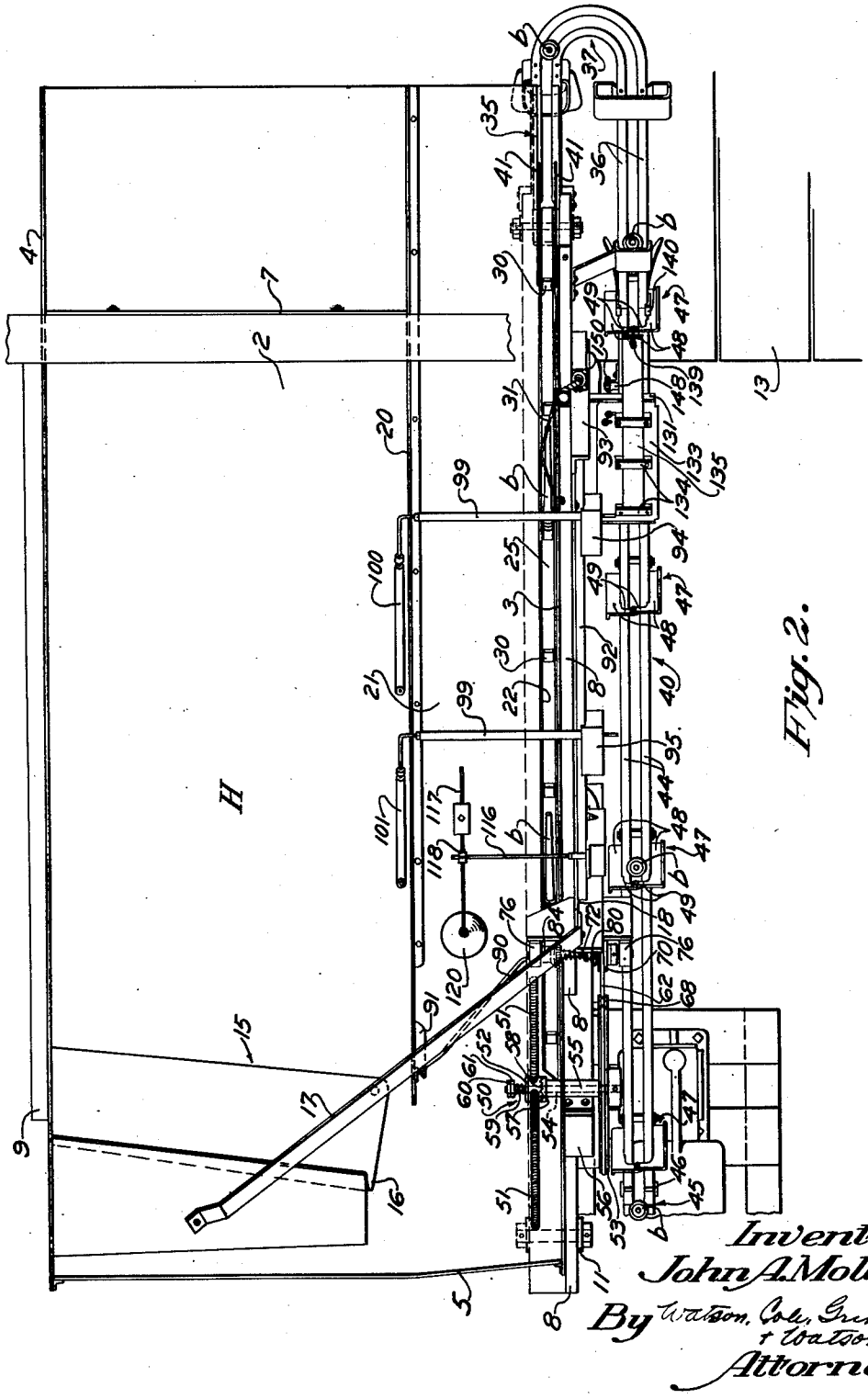


Fig. 2.

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Filed Dec. 27, 1946 5 Sheets-Sheet 3

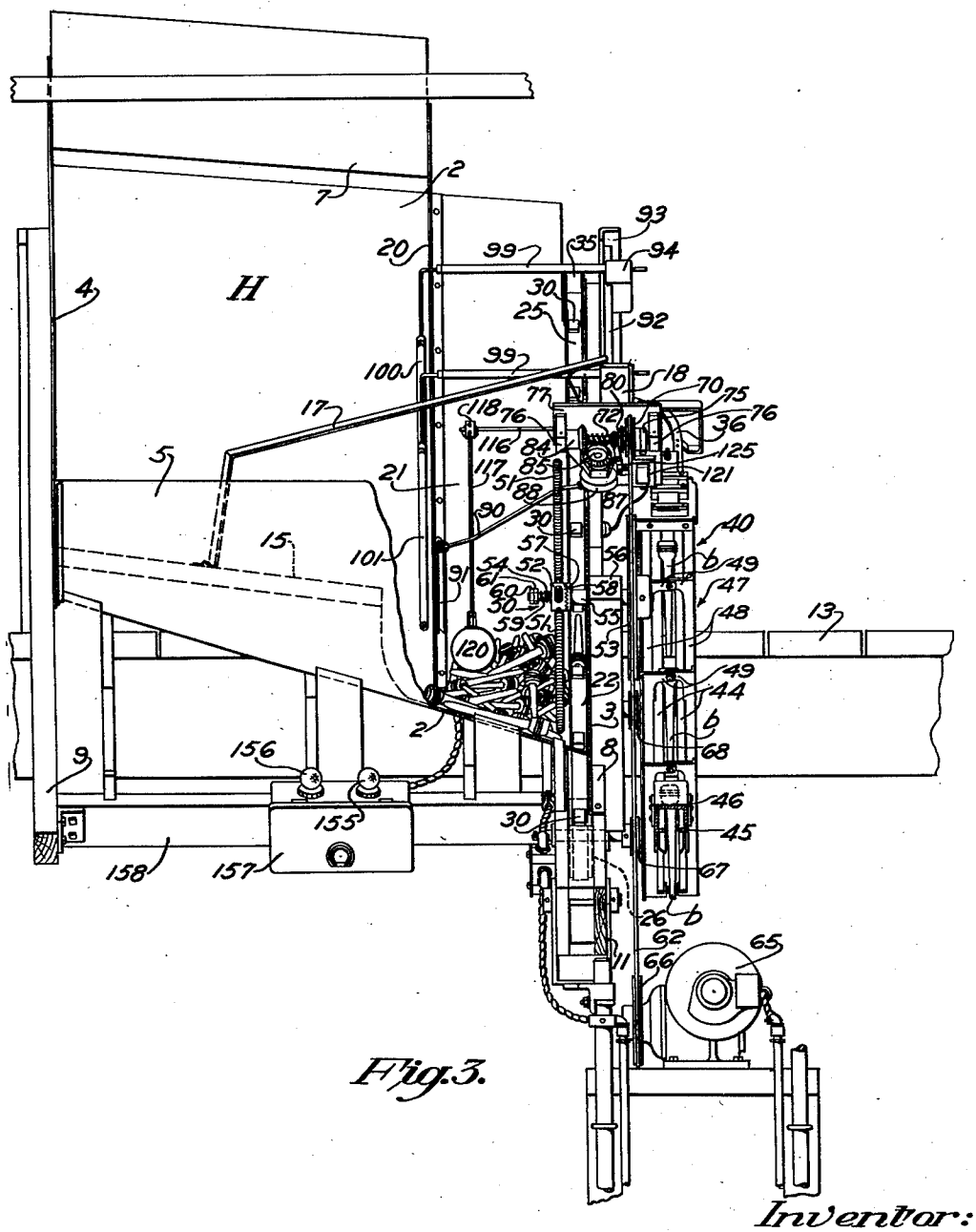


Fig. 3.

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CORE-SUPPLYING MEANS FOR WINDING MACHINES

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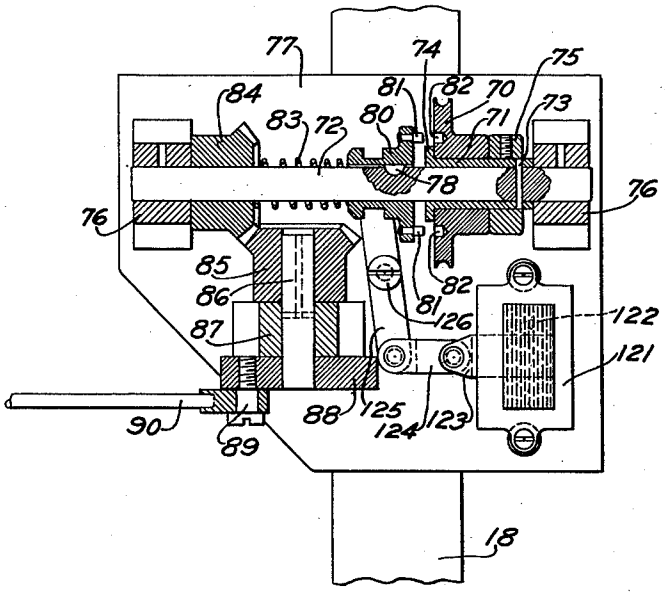


Fig. 4.

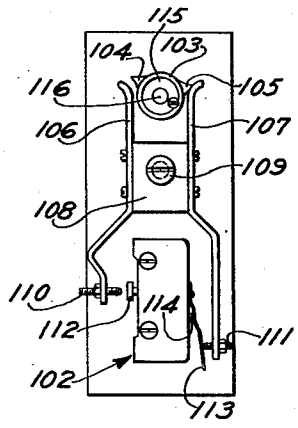


Fig. 5.

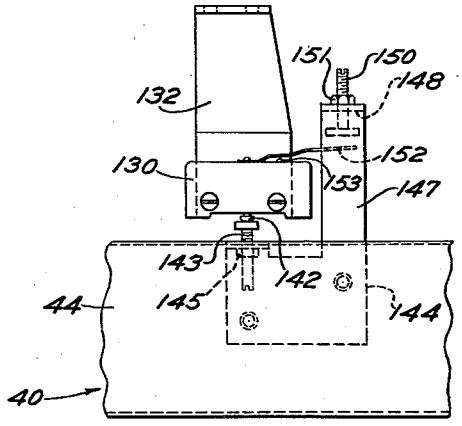


Fig. 6.

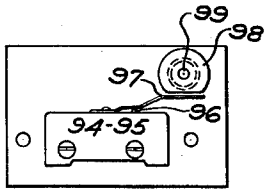


Fig. 7.

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CORE-SUPPLYING MEANS FOR WINDING MACHINES

Filed Dec. 27, 1946 5 Sheets-Sheet 5

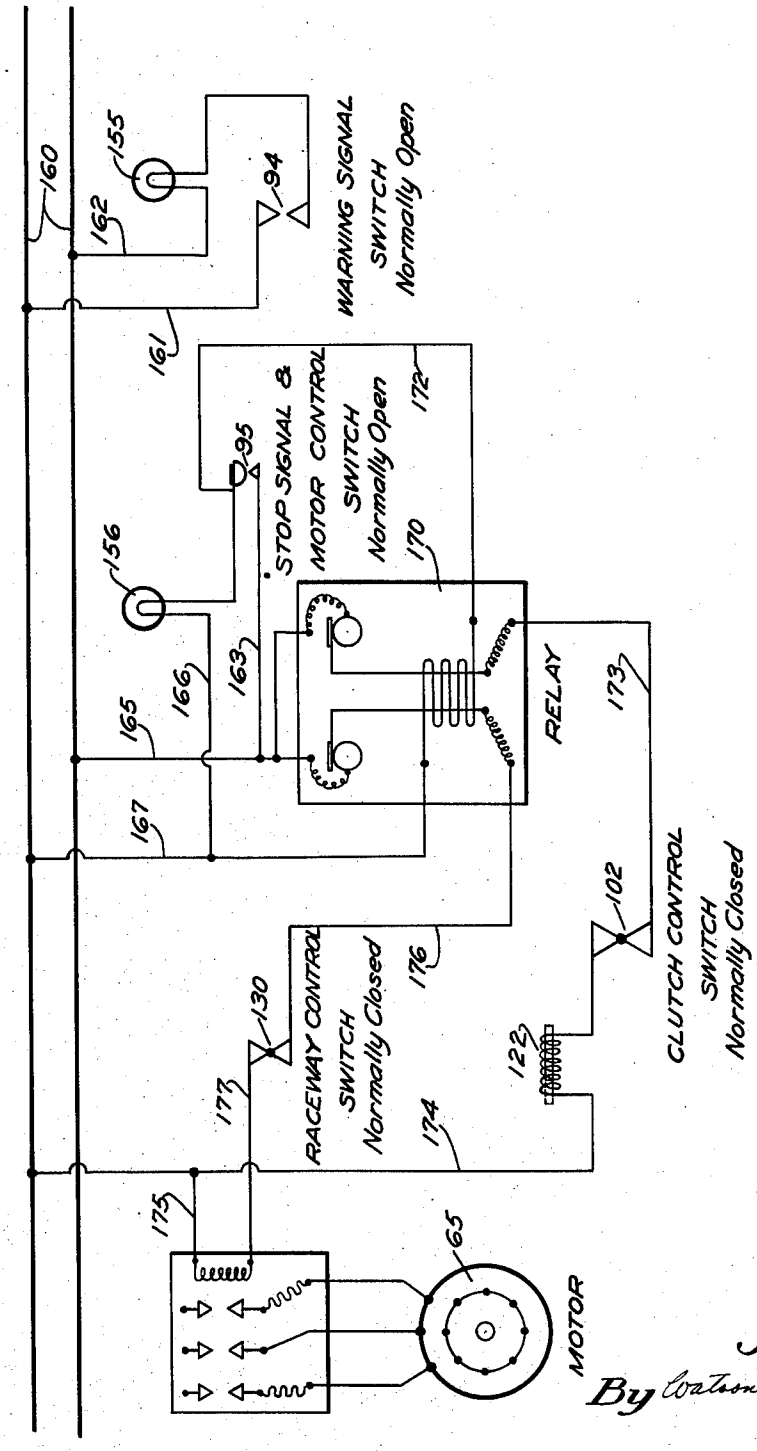


Fig. 8.

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Patented June 17, 1952 2,600,794

UNITED STATES PATENT OFFICE

2,600,794

CORE-SUPPLYING MEANS FOR WINDING MACHINES

John A. Molloy, Warwick, R. I., assignor to Universal Winding Company, Boston, Mass., a corporation of Massachusetts

Application December 27, 1946, Serial No. 718,640

11 Claims. (Cl. 198—33)

1

This application is a continuation in part of my prior application for United States Letters Patent, Serial No. 677,186, filed June 17, 1946, relating to an apparatus for automatically supplying bare cores such as wooden bobbins or the like to the magazines of a plurality of winding units arranged in multiple or gang form.

The present invention relates more particularly to the bin or hopper for containing a supply of cores or bobbins, indiscriminately or randomly disposed therein, and the means for segregating the cores or bobbins from the mass and conveying them progressively to a raceway, down which they feed to be delivered selectively to a conveyor-chain or the like for distribution to the winding units.

While the invention is herein illustrated and described as for use in supplying cores to an automatic winding machine which continuously produces wound bobbins for the shuttles of looms, it is to be understood that the present apparatus may be adapted to supply other forms of cores or for feeding other types of objects to machines used for different purposes.

One object of the present invention is to provide automatically-operated means for agitating the cores or bobbins in the hopper and feeding them singly to an escalator which delivers them to a raceway, down which they slide by gravity to be selectively delivered to a conveyor-chain or the like which transports them for distribution to the magazines of the winding units.

Another object is to provide electrically-operated signaling means for indicating depletion of the supply of cores or bobbins in the hopper so that it may be replenished.

Another object is to provide feeler-means for arresting the drive to the operating means upon substantial exhaustion of the supply of bobbins in the hopper.

Another object is to provide control means for arresting the drive for the bobbin-feeding means in the hopper when the raceway becomes filled with bobbins to prevent them from clogging the raceway or escaping therefrom.

Another object is to render the device entirely automatic to eliminate all manual operations except that of dumping the cores into the hopper.

Further objects and advantages of the invention are set forth in the following specification which describes a preferred form of construction of the apparatus, by way of example, as illustrated by the accompanying drawings. In the drawings:

Fig. 1 is a side elevational view of the bin or hopper for containing a supply of bobbins or the like showing the automatically-operated mechanism for controlling the delivery of the cores or bobbins to a raceway;

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Fig. 2 is a plan view of the hopper, its related raceway and the automatically-operated means for feeding the cores to the raceway and signaling the condition of the supply during such operation;

Fig. 3 is an end elevational view of the hopper showing a portion of its forward wall as broken away to reveal the mechanism therein and also illustrating the raceway for the bobbins;

Fig. 4 is an enlarged detailed view in section of the clutch and its operating means for connecting the drive to the agitating device in the hopper;

Fig. 5 is an enlarged detailed view of the electrical switch for controlling the operation of the clutch;

Fig. 6 is an enlarged view of the electrical switch for arresting the drive when the raceway becomes filled with cores or bobbins; and

Fig. 7 is an enlarged view of one of the switches for the electrical signaling means.

Referring first to Figs. 1, 2 and 3 of the drawings, the hopper H, designed to contain a large number of winding cores such as the wooden bobbins *b*, may be constructed from sheet-metal with an inclined bottom wall 2 and upstanding sides 3 and 4. The bottom wall 2 of the hopper H is inclined downwardly toward the machines to which it delivers the bobbins and also sloped downwardly from the wall 4 toward the wall 3, as shown in Fig. 3. The lower end of the bottom wall 2 is extended upwardly in a curved portion 5 connecting the side walls 3 and 4 to form a closure for the hopper H and provide a sort of collecting basin for the bobbins as they slide down the incline of the bottom wall under the force of gravity. The upper end of the hopper H may be left open to facilitate dumping the cores or bobbins into its interior and, preferably, a baffle-plate 7 extends across the interior in vertical arrangement thereabove to direct the bobbins down into the hopper. The hopper H is preferably supported in elevated position above the winding units with which it cooperates, as shown in the prior application referred to above, and for this purpose a suitable staging may be erected. The staging may be of any desired construction such as comprising inclined beams or stringers 8 and 9 supported from uprights indicated at 11 and 12. The hopper H may rest on and be fastened to the beams 8 and 9 and, in accordance with the present

showing, an extension of the staging may be erected at its rearward end to support a platform 13 on which an operator may stand for filling the hopper. In other cases the hopper H may be filled from an elevator or a chain-conveyor having buckets for dumping the bobbins into its open end. In certain locations, such as in textile mills, the hopper may be arranged beneath the ceiling of one floor to be filled through an opening in an upper floor of the building; these variations in its arrangement not being herein shown or more fully described as they form no part of the present invention.

Bobbin dispersing means

When the winding cores or bobbins *b* are dumped into the upper end of the hopper H they will slide down its inclined bottom 2 under the force of gravity to accumulate in an irregular mass at its lower basin-like end. It is necessary to disperse this large collection of bobbins to segregate them into units forming a procession feeding toward the upper end of the hopper H for delivery into the raceway which transfers them to the conveyor-chain for distribution to the winding units. Referring to Fig. 2, to assist in the dispersion of the cores or bobbins *b* a sheet-metal guard or deflector-plate 15 is provided at the lower end of the hopper H, the guard having a curved wall 16 directed downwardly in inclined relation to the curved end wall 5 of the hopper. The deflector-plate 15 may be riveted to one side wall 4 of the hopper and to its bottom wall 2 and braced at the top by an angular strut 17 attached to an upright 18 fastened to the side of the supporting beam or stringer 8. The lower end of the deflector-plate 15 terminates adjacent the end of a vertical partition wall 20 extending within the hopper H in parallel spaced relation to its side 3. The interior of the hopper H is thus divided into two compartments, a larger main section and a relatively narrow channel-section 21 at the lower end of which the bobbins collect and from which they are carried upwardly on an escalator to deliver them to the raceway 35 as later described.

Bobbin escalator

The escalator may consist in a relatively narrow, endless belt 25 arranged with its upper length located within a slot 22 in the bottom of the channel 21 extending alongside the wall 3 of the hopper H. The escalator belt 25 has its two opposite courses stretched between a driving pulley 26 at the lower end of the hopper H and a pair of smaller pulleys 27 and 28 at its upper end. Spaced at intervals along its length the belt 25 carries a plurality of abutments in the form of wedge-shaped blocks 30 adapted to engage the ends of the bobbins *b* to convey them to the upper end of the hopper for delivery to the raceway 35. Adjacent the upper end of the belt 25 is a wire guard 31 fastened to the bottom 2 of the hopper H, see Figs. 1 and 2, and extending in angular shape across the top of the belt 25 in spaced relation thereabove. The guard 31 is adapted to engage with and remove any misplaced bobbins overlying or resting upon those properly placed on and being transported by the escalator.

Bobbin raceway

The raceway 35 is formed by a pair of parallel, spaced-apart rails 36 fastened to the upper end of the stringer or beam 8 with their ends contiguous to the escalator-belt 25 where it passes around the pulley 27. From this point the rails 36 incline downwardly in a straight course for a short distance and are then formed into a sharp curve or U-bend at 37 continued downwardly at an inclination in a reverse direction to join a secondary track or raceway 40. Vertical guide-plates 41 straddle the sides of the terminal portion of the belt 25 at the entering end of the raceway 35 for directing the bobbins into the latter. As the bobbins *b* leave the belt 25 their tapered shanks or barrel-portions will swing downwardly under gravity to project through the space between the rails 36 whereof they are suspended in vertical position by their enlarged butt-ends or heads resting on the rails as illustrated in Fig. 1.

Secondary raceway

The secondary or continuing raceway 40 may be constituted by a pair of flat plates 44 disposed vertically in parallel spaced-apart relationship to adapt the shanks of the bobbins *b* to project downwardly between their opposed faces with their butts or heads resting on the edges of the plates. The lower end of the raceway 40 is pivoted to a shorter raceway or chute 45 by means of clamps 46, this latter part of the apparatus being described in my prior application referred to above as being arranged to feed the bobbins *b* into position adjacent the side of the conveyor-chain which transports them to the magazines of the several winding units. It is also explained in my prior application that the bobbins are restrained from sliding out from the open end of the chute 45 by a suitable gate, not herein shown, which is actuated automatically to transfer the bobbins into pockets on the conveyor-chain whenever an empty bobbin-holder moves into opposition to the gate. Spaced at intervals along the raceway 40 are a series of bridge-like elements 47, each composed of two uprights 48, see Figs. 1 and 2, fastened to the sides of the plates 44 and bolted together at top and bottom. The uprights 48 are in the form of sheet-metal arched plates having overlapping portions 49 bolted together at the top with fastenings at the bottom for clamping the sides of the raceway 40 in definite spaced-apart relationship along its length. The upper end of the raceway 40 is not fastened to the raceway 35 but is resiliently suspended with the ends of its side plates 44 underlying the ends of the rails 36. The resilient suspension of this end of the raceway 40 permits it to rock downwardly to a slight extent under the weight of an excessive number of bobbins therein to serve as a balance for a purpose as later explained.

Bobbin agitator

Means are provided within the lower end of the hopper H for continuously agitating and dispersing the mass of cores or bobbins *b* collecting at this location. As shown in Figs. 1 and 2, the agitating means consists in a rotary sweeper-element 50 having a series of arms or spokes 51 radiating from a hub 52. The arms 51 are preferably constructed from tempered wire coiled into helical springs to give them a certain resiliency so as to prevent injury to the bobbins *b* when they strike thereagainst during rotation of the member 50. The agitator 50 is rotated by a pulley 53 fast on a shaft 54 journaled in a bearing 55 on a stanchion 56 bolted to the side of the beam or stringer 8, see Fig. 1. The shaft 54

carries a clutch-member 57, see Fig. 3, having teeth 58 opposed to corresponding teeth on the hub 52 of the agitator 50, a spring 59 on the end of the shaft being held under tension by collars 60 and 61 tending to slide the hub to maintain the teeth in engagement. When, however, the arms or spokes 51 encounter abnormal resistance during the rotation of the agitator 50 the spring 59 will yield to allow the hub 52 to slide on the shaft 54 to disengage its teeth 58 from those of the clutch 57. The pulley 53 and shaft 54 may therefore continue to rotate until the agitator 50 is free to turn again therewith.

Motor driving means

The pulley 53 for rotating the agitator 50 is driven from a continuous belt 62 connecting it with a pulley 66 on the shaft of an electric motor 65 shown in Fig. 3. The belt 62 passes around the driving pulley 66, leads up around the pulley 53 on the agitator shaft 54, see Fig. 1, and thence extends down around a smaller pulley 67 which drives the pulley 26, previously mentioned, for traveling the conveyor-belt 25. From the pulley 67 the belt 53 passes up under an idler-pulley 68, thence around an upper pulley 70, which is connected by a clutch, see Fig. 4, to drive certain elements of the apparatus, to be later explained, and finally leads back to the motor pulley 66.

Clutch and means for oscillating partition

Referring to Figs. 3 and 4, the pulley 70 is rotatably mounted on a bushing 71 pinned to a shaft 72 at 73, being held from axial displacement on the bushing by a flange 74 at one end of the latter and a collar 75 at the opposite end. The shaft 72 is journaled in suitable bearings 76 projecting from a plate 77 which is mounted on the upright 18, previously described as bolted to the side of the beam 8 as shown in Fig. 1. Keyed to the shaft 72 at 78 is a clutch-member 80 having spurs or pins 81 adapted to engage in pockets 82 on the end face of the pulley 70. A spring 83 coiled about the shaft 72 tends to normally slide the clutch-member 80 to engage it rotatively with the pulley 70, the spring being under tension between one end of the clutch and a bevel-gear 84 which is fast on the shaft 72. The bevel-gear 84 meshes with a corresponding gear 85 fast on a stud-shaft 86 which is journaled in a bearing 87 on the plate 77. The shaft 86 carries a disk 88 with a crank-pin 89 disposed eccentrically of its axis. Connected to the crank-pin 89 is a pitman 90 having its opposite end reaching across the channel 21 in the hopper H and connected at its end to an angular strip or rib 91 fastened to the end of the partition plate 20, previously described as dividing the hopper into two parts. It will be understood that as the pulley 70 is driven from the motor 65 with the clutch-member 80 engaged with the pulley 70 it will rotate the shaft 72 to drive the gears 84 and 85 and thereby the shaft 86 and crank-disk 88. Through this drive the pitman 90 will be reciprocated to oscillate or vibrate the relatively free end of the partition wall 20, thus tending to shake or jar the bobbins that may have collected adjacent thereto to cause them to be dispersed and displaced into position to be taken up by the escalator-belt 25.

Electrical control and signaling

Extending longitudinally of and above the side wall 3 of the hopper H is a channel-iron rail 92 fastened at its forward end to the upright 18 and at its rearward end to a second upright angle-iron 93. The rail 92 serves as a support for a plurality of boxes containing switches connected in electrical circuits and adapted to be actuated by control means as next explained. Two similar switches 94 and 95 of a type such as shown in Fig. 7, each comprises a plunger-pin 96 and a resilient movable arm 97 adapted to be operated upon by a cam-disk 98 to slide the pin to close the circuit. The cam-disk 98 of each switch is fast on a shaft or rod 99 which is extended at right-angles and joined to a cross-arm 100 or 101. As shown in Fig. 1, the two arms 100 and 101 serve as feelers for the bobbins in the hopper H, extending downwardly at an inclination with their arcuately-bent lower ends adapted to swing down toward the bottom of the main compartment in the hopper H alongside the partition wall 20, see Fig. 2. Preferably, the arms 100 and 101 are covered by rubber tubing to cushion their contact with the bobbins *b* and prevent injury thereto. When the hopper H is supplied with bobbins sliding down its inclined bottom the arms 100 and 101 will be retained in elevated relationship by the bobbins passing under their curved ends to hold the cam-disks 98 of the switches 94 and 95 in position to maintain their circuits open. When the feeler-arms 100 and 101 are permitted to drop, due to the absence of a sufficient supply of bobbins in the hopper H, they will rotate the cam-disks 98 to the position shown in Fig. 7 to release the arms 97 and close the circuits through the switches in the manner and for the purpose as explained more specifically in connection with the description of the wiring diagram.

Clutch-control switch

A third electrical switch 102 mounted on the rail 93 is of the re-set type with its actuating means constructed and arranged as shown in the detailed view of Fig. 5. Its operating mechanism consists of a rotary cam 103 of generally cylindrical shape formed with opposite radial projections 104 and 105 on its periphery adapted to engage respectively with a pair of arms 106 and 107 fastened to the sides of a block 108. The block 108 functions as a hub, being pivoted on a screw 109 and the two arms 106 and 107 are extended downwardly therefrom with adjustable contact-screws 110 and 111 carried at their ends. One contact-screw 110 is adapted to engage against a button 112 in the switch proper while the opposite contact-screw 111 is engageable against a spring-arm 113 for moving it against a plunger-pin 114 in the switch; the wiring circuit for this switch being explained in detail hereinafter in connection with the diagram of Fig. 8. The rotary cam 103 is fast on a hub 115 from which an axial spindle or shaft 116 extends rearwardly and is connected to a perpendicular wire-arm 117 by means of a clamp 118, see Figs. 1 and 3. The wire-arm 117 is bent into angular form with its longer portion inclined downwardly and carrying a hollow rubber ball 120 at its end adapted to rest on the bobbins in the bottom of the hopper H. If, however, the bobbins fail to slide down in the hopper and to collect at the lower end of the channel 21 the ball 120 will drop and swing the arm 117 downwardly, thereby turning the shaft 116 and rotating the cam 103 counterclockwise, as viewed in Figs. 1 and 5, to open the switch 102 in the manner and for the purpose as later explained. The switch 102 controls the clutch-mechanism shown in Fig. 4 and

previously described as employed for connecting the pulley 70 with the shaft 72 for driving the gears 84 and 85. For this purpose a solenoid contained in a casing 121 and indicated by dotted lines at 122 in Fig. 4 has its plunger-armature 123 connected by a link 124 to a lever 125 which is pivoted on a stud 126. The solenoid 122 is normally energized and operative to hold the clutch-member 80 released from the pulley 70.

Raceway-control switch

Still another switch 130, such as shown in the enlarged view in Fig. 6, is provided for arresting the drive to the various operating elements of the apparatus should the raceway 40 become clogged with bobbins when their feed to the conveyor-chain is interrupted for a considerable period. Referring to Figs. 1 and 2, the switch 130 is suspended from a bracket 131 fastened to the side of the beam 8, being mounted on an arm 132 reaching downwardly from said bracket. The bracket 131 is provided with an overhanging ledge 133 supporting several upright posts 134 which are slotted to receive a flat leaf-spring 135. The spring 135 is secured in the slots in the posts 134 by clamps and screws 136 and extends forwardly therefrom with its outer end connected to the otherwise unsupported end of the raceway 40. For this purpose a bolt 137 has its head held by a stirrup element 138 fastened to the bridge-element 47 at the upper end of the raceway 40 and extending through an opening in the end of the spring 135 with a pair of nuts 139 screwed onto its upper end. The upper end of the raceway 40 is thus resiliently suspended by the spring 135 in position with the ends of its side plates 44 underlying the ends of the rails 36 of the raceway 35. As shown in Fig. 1, a pair of clamps 140 screwed to the sides of the plates 44 are bent at right-angles to overlie the top of the rails 36 and engage therewith to limit the downward swinging movement of the raceway 40. By adjusting the nuts 139 on the bolt 137 the spring 135 may be tensioned to normally maintain the suspended end of the raceway 40 raised to the position shown in Fig. 1 under the weight of any prescribed number of bobbins *b* filling the greater part of the length of the raceway 40. When, however, should the delivery of the bobbins from the lower end of the raceway be prevented and the feeding of the bobbins into the raceway continue to such an extent that there is danger of clogging, then the weight of the bobbins will swing the raceway 40 downwardly in the manner of a scale-beam to actuate the switch 130 whereof to interrupt the current to the motor 65 and arrest the drive to the operating mechanism of the apparatus.

When the apparatus is functioning normally the switch 130 remains closed, it having been previously explained that the switch is of the reset type, a push-button 142 being under compression through the engagement of a headed stud 143 screwed into a bearing on a bracket 144 fastended to the side plate 44 of the raceway 40. The stud 143 is adjustable in the bearing on the bracket 144 with a nut 145 for locking it in place. The bracket 144 is formed with an upstanding arm 147 bent at right-angles at the top to form a ledge 148 through which is threaded a headed stud 150 locked in place by a nut 151. The head of the stud 150 is normally positioned above a spring arm 152 adapted to make contact with a plunger-pin 153 in the switch 130, the depression of the arm acting to slide the plunger-pin to open the switch when the upper end of the raceway 40 is swung downwardly by the weight of an excessive number of bobbins therein. As soon as the bobbins start to deliver again from the lower end of the raceway 40 its free end will swing upwardly as the weight of the bobbins is relieved and, eventually, the stud 143 will contact the push-button 142 to re-set the switch 130 to close the circuit and restart the electric motor 65; it being understood that delayed operation of the re-set switch 130 provides an interval prior to the closing of the circuit to the motor so that the bobbins may travel down the raceway 40 for a brief period before the escalator starts to transfer more bobbins from the hopper H into the raceway 35.

Signaling electrical circuits

It has been stated that the two similar switches 94 and 95 are employed for signaling the condition of the supply of bobbins in the hopper H. To this end they are connected by wiring to two lamp-bulbs 155, 156 mounted in a conspicuous location above the winding machine. Referring to Fig. 3, the two lamp-bulbs 155 and 156 may be mounted in a box 157 supported on a crossbeam 158 extending between the beams 8 and 9 of the main scaffolding. Referring to Fig. 1 and the wiring diagram in Fig. 8, the lamp 155 may be of orange color as a caution signal controlled by the upper bobbin-feeler 100 in the hopper H. Referring to Fig. 7, when the arm 100 descends toward the bottom 2 of the hopper H, due to the absence of any considerable number of bobbins *b* therein, the cam-disk 98 will be rotated to cause it to release the spring 97 from the plunger-pin 96 and cause it to close the circuit through the switch 94. Thereupon, the caution lamp 155 will be illuminated to indicate to the operator that the supply of bobbins *b* in the hopper H must be replenished within a reasonable time. Should such replenishment be delayed for too long a period the second bobbin-feeler 101 in the hopper H will be lowered to effect closing its switch 95 in the same manner as above explained to energize the circuit to the second lamp 156 which shows a red light as a stop signal. The switch 95 is also connected in circuit to the relay 170 for arresting the operation of the motor 65. As shown in the diagram of Fig. 8, the lamp 155 is connected in circuit with the power line, represented by the wires 160, by branch conductors 161 and 162 including the first switch 94 in circuit therewith. The stop-signal lamp 156 is connected in the circuit through wires 163 leading from a branch wire 165 and another conductor 166 leading from a branch 167 with the switch 95 in this circuit.

Electrical circuit and relay for motor

The branches 165 and 167 which lead from the opposite sides of the power line 160 are connected in circuit with a relay, represented diagrammatically at 170 in Fig. 8, having the usual magnetic switch for controlling the circuit to the electric motor 65. As before stated, the closing of the switch 95 to illuminate the lamp 156 also functions to open the circuit to the electric motor 65 through the operation of the magnetic switch in the relay 170. For this purpose a branch circuit includes a wire 172 leading from one of the contacts of the switch 95 to the relay 170 while the opposite side of the power line is connected therewith through the branch conductor 167, previously mentioned. From the relay 170 a wire

173 leads to the switch 102 which controls the current to the solenoid 122, and thence a wire 174 leads back to one side of the power line 160 with a cross branch 175 connected to the motor wiring. The other side of the power line 160 is connected through the relay 170 and has a branch conductor 176 leading therefrom to the re-set switch 130 which controls the loading of the raceway 40. From the switch 130 a wire 177 leads to the other side of the circuit for the motor 65. The actuation of the several switches is explained more in detail in connection with the operation of the complete apparatus.

Method of operation of the apparatus

Assuming that a plentiful supply of bobbins *b* has been placed in the hopper H to cause them to slide down its inclined bottom and collect at its lower end adjacent the end of the partition wall 20, the apparatus may be set in operation by starting the driving motor 65 through the closing of a manually-operable suitable switch, not herein shown. The bobbins *b* sliding down the inclined bottom of the hopper H will ride under the feeler-arms 100 and 101 to raise these arms whereof to rotate the cam disks 98 to depress the spring arms 97 and maintain the switches 94 and 95 open. Current will consequently be supplied to the motor 65 through the circuit including the switch 130 which, as before stated, is normally maintained closed when the raceway 40 is in its raised position shown in Fig. 1. The motor 65 will therefore operate through the belt 62 to drive the large pulley 53 for the wiping agitator 50 and also the driving pulley 26 for the escalator-belt 25. The belt 62 also drives the pulley 70 which operates through the clutch to actuate the oscillating means for the partition wall 20, but normally the clutch element 80 is disengaged from the pulley 70 with the lever 125 held by the solenoid 122 which remains energized with the switch 102 closed.

The turning of the pulley 53 rotates the agitator 50 to cause its resilient arms 51 to wipe through the mass of bobbins *b* collected at the lower end of the hopper H as they are directed laterally across its bottom by the deflector plate 15. The wiper arms of the agitator 50 are thus caused to sweep through the mass of bobbins *b* to stir and disperse them so as to influence them to ride or roll over onto the escalator belt 25. The individual bobbins *b* will thus be picked up by the escalator-belt 25 and engaged at one end or the other by the abutment blocks 30 in the manner indicated in Figs. 1 and 2. It is immaterial whether the bobbins ride onto the escalator-belt one way or the other, that is with either their heads or tip ends engaged by the abutment blocks 30 so long as they take a recumbent position to be conveyed by the belt toward the upper end of the hopper H. Should a number of the bobbins pile one above another on the belt 25, the overlying ones will be swept off therefrom as they meet the angular wire guard 31, thus causing them to roll or slide back down the channel 21 into position to be picked up separately in proper position on the belt.

With the bobbins being conveyed upwardly by the escalator, as each one reaches the end of the belt 25 it is discharged therefrom to cause it to swing or rock downwardly between the guide plates 41 at the upper end of the raceway 35. Since the heads of the bobbins *b* are too large to pass through the opening between the rails 36 of the raceway 35, their smaller portions or tapered shanks will be acted upon by gravity to swing them downwardly into perpendicular relationship as shown at the right in Fig. 1; that is, with their rounded heads resting on the rails 36 and their shanks projecting downwardly therebetween. The bobbins *b* will thus be caused to slide down the upper portion of the inclined raceway 35, continue around its U-bend 37 and along its reversely-extending inclined portion to eventually enter the raceway 40. In this way a continuous stream or procession of bobbins *b* is supplied to the escalator and transported by the belt 25 upwardly to cause them to be delivered into the race way 35 and, sliding down the incline thereof, to enter the raceway 40. The bobbins *b* sliding down the raceway 40 are fed to the delivery mechanism, shown and described in my prior application identified above, which transfers them selectively to vacant holders on the conveyor-chain for distribution to the magazines of the several winding units by which the present apparatus is supplied.

Partition oscillating means

It has been explained that the gearing shown in Fig. 4 operates to rotate the crank-disk 88 to reciprocate the pitman 90 connected to the end of the partition wall 20. Normally, when the apparatus is operating properly the clutch-member 80 is disengaged from the driving pulley 70 due to the energization of the solenoid 122 which maintains the lever 125 in the relationship shown in Fig. 4. The solenoid 122 is energized through the circuit previously described as including the switch 102 and the opening and closing of this switch is regulated by the rotation of the cam 103 under the control of the swinging arm 117 carrying the ball 120 at its end. With a sufficient supply of bobbins in the channel 21 of the hopper H the arm 117 will be rocked upwardly by the bobbins underlying its ball 120. Should there not be a sufficient number of bobbins at this point in the hopper for continuously feeding to the escalator belt 25, then the ball 120 will drop and the arm 117 be swung downwardly to open the switch 102. The descent of the ball 120 and the downward rocking motion of the arm 117 will rotate the cam 103 in counterclockwise direction, as viewed in Fig. 5, to thereby release the arm 107 from the spring-arm 113 and concurrently move the arm 106 against the re-set button 112 to cause the opening of the switch to interrupt the current to the solenoid 122. When the solenoid thus becomes de-energized the clutch member 80 will be released from the control of the lever 125 to permit the spring 83 to slide it into engagement with the driving pulley 70. The shaft 72 will then be clutched with the driving pulley 70 to rotate the gears 84 and 85 and thereby the crank-disk 88 to reciprocate the pitman 90. As the pitman 90 is reciprocated in relatively short sharp strokes it will oscillate the partition wall 20, thereby operating to dislodge any bobbins that have been caught or otherwise held and thereby prevented from feeding to the location adjacent the escalator. In this way, if the flow of bobbins down through the main compartment of the hopper H and laterally thereof into position to be picked up by the escalator-belt 25 is impeded or interrupted the bobbins will be shaken loose and caused to feed in the manner required. Usually, it requires but a short period of oscillation of the partition wall 20 to release any bobbins whose flow may be restricted. After

the bobbins start to flow again and ride under the ball 120 to raise the arm 117 the cam 103 will be rotated in clockwise direction to cause the arm 107 to contact its screw 111 with the spring 113 to re-set the switch to closed position and energize the solenoid 122. The clutch-member 80 will thereupon be disengaged from the pulley 70 to arrest the operation of the partition-oscillating means.

Raceway overloading control

It has been explained that the raceway 40 is pivotally mounted at its lower end to permit its upper end to drop within the limits defined by the detent clamps 140, see Fig. 1. It also has been stated that if the raceway 40 becomes overloaded with bobbins, that is filled to such an extent as to cause crowding when the feed of the bobbins therefrom is interrupted for an extended period, then the upper end of the raceway will be swung downwardly under the weight of the excessive number of bobbins therein to open the switch 130. The opening of the switch 130 will interrupt the circuit to the motor 65 to thereby arrest its operation and the drive to the various parts of the apparatus so that the bobbins will stop feeding from the escalator to the raceway 35. As soon, however, as the delivery of the bobbins from the raceway 40 to the conveyor-chain, illustrated in my application referred to above, is started again and the raceway 40 relieved of the overload its free end will swing upwardly under the tension of the spring 135 until its side plates 44 bring up against the under side of the rails 36 as shown in Fig. 1. The return of the raceway 40 to operative position again will cause the stud 143 carried thereby to contact with the push button 142 to re-set the switch to close the circuit to the motor 65 whereof to start the operation of the apparatus once more.

Electrical signaling lamps

It has been explained that the feeler-arms 100 and 101 are normally maintained in elevated position by the bobbins *b* sliding and rolling down the inclined bottom of the hopper H. If, however, the supply of bobbins is depleted to such an extent that the arm 100 is allowed to drop to the bottom of the hopper H it will close the switch 94 to light the caution signal lamp 155. In this way a signal is given to the operator that a fresh supply of bobbins is required in the hopper H. Should the supply not be replenished promptly the second feeler-arm 101 will be caused to drop by the depletion of the bobbins adjacent the lower end of the hopper and this will operate the switch 95 to illuminate the stop light 156 and at the same time close the circuit through the branch wire 172 to actuate the magnetic switch of the relay 170 for shutting off the flow of current to the motor 65. By these several lamp signals and the electrical controls the apparatus may be maintained operative continuously providing that the supply of bobbins in the hopper H is kept replenished; that the feed of the bobbins to the escalator is not impeded; or that the delivery of the bobbins from the raceway 40 to the conveyor-chain is not interrupted for an extended period. The present apparatus operating in conjunction with the bobbin-distributing mechanism of my prior application thus provides an automatically-operative unitary supplying means for distribution of cores or bobbins to a plurality of winding units; or it may be adapted for feeding other objects to various types of machines within the purview of the present invention. Therefore, without limiting myself as to the exact form and structure of the operating parts of the mechanism or to the method of its application to use, I claim:

1. An apparatus of the type indicated comprising a hopper for containing winding cores, bobbins or similar objects, a vertical partition rising from the bottom of the hopper and dividing the interior of the hopper into two compartments, the main compartment extending considerably more than half the width of the hopper and the other compartment being relatively narrow, a conveyor-belt extending adjacent the narrow compartment, a raceway at the end of the conveyor belt for receiving the objects therefrom, and means to oscillate the partition laterally to free the objects in the hopper to disperse them and direct them to the conveyor-belt.

2. An apparatus of the type indicated comprising a hopper for containing winding cores, bobbins or other objects, a partition dividing the interior of the hopper into two compartments, conveyor-means for transporting the objects from the hopper, a rotary crank, a pitman connecting the crank with the partition to oscillate it to disperse the objects and maintain their delivery to the conveyor-means, a feeler normally maintained in raised position by a collection of objects in one of the compartments of the hopper, and means operative by the descent of the feeler when unsupported by the objects to actuate the crank to reciprocate the pitman and oscillate the partition to release the objects when their flow to the conveyor-means is impeded.

3. A device of the type indicated comprising a hopper for containing a supply of winding cores, bobbins or similar objects, a partition dividing the interior of the hopper into compartments, conveyor-means for transporting the objects from one of the compartments, means for osecillating the partition to shake the objects free in one compartment and cause them to flow into the other compartment for transport by the conveyor-means, means for actuating said oscillating means, and a feeler in the hopper normally maintained in elevated position by the objects collected therein and operative when lowered by the absence of objects to start the operation of the oscillating means.

4. An apparatus of the type indicated comprising a hopper divided into two compartments by a resilient partition wall, means for oscillating the partition wall to shake the objects free in the hopper, driving means for operating the oscillating means, a clutch for connecting the driving means with the oscillating means, a solenoid for controlling the clutch, an electric circuit for the solenoid, a feeler normally sustained in elevated position by the objects in the hopper, an electric switch in the circut for the solenoid, and means for actuating the switch when the feeler descends due to the absence of objects therebeneath.

5. An apparatus of the type indicated comprising a hopper for containing a supply of winding cores, bobbins or similar objects, means for delivering the objects from the hopper, an inclined raceway for receiving the objects as they are delivered thereto, said raceway being mounted to adapt it to move downwardly under the weight of an excessive number of objects therein, and

means for arresting the operation of the delivering means when the raceway is carried downwardly by the weight of the objects therein.

6. An apparatus of the type indicated comprising a hopper adapted to contain a supply of winding cores or similar objects, conveyor-means for transporting the objects from the hopper, a raceway for receiving the objects delivered thereto by the conveyor-means, means for operating the conveyor-means, means for mounting said raceway to adapt it to descend under the weight of an excessive number of objects delivered thereinto, and means actuated by the descent of the raceway to arrest the operation of the conveyor-means.

7. An apparatus of the type indicated comprising a hopper for containing a supply of winding cores, bobbins or similar objects, means for conveying the objects from the hopper, a motor for driving the conveying-means, a raceway for receiving the objects delivered thereto by the conveying-means, said raceway being pivoted at one end to adapt it to swing downwardly, resilient means for normally maintaining said raceway in raised position to receive the objects, and means actuated by said raceway when it is swung downwardly by the weight of an excessive number of objects therein to arrest the operation of the motor.

8. An apparatus of the type indicated comprising a hopper for containing a supply of winding cores, bobbins or similar objects, conveyor-means for transporting the objects from the hopper, a raceway pivoted at one end with its opposite end adapted to receive the objects transported thereto by the conveyor-means, resilient means for sustaining the raceway in position to receive the objects while adapting it to swing downwardly under the weight of an excessive number of objects contained therein, a motor for driving the conveyor-means, an electric circuit for the motor, a switch in said circuit, and means operative by the descent of the raceway to actuate the switch to arrest the operation of the motor.

9. An apparatus of the type indicated comprising a hopper for containing a supply of winding cores, bobbins or similar objects, conveyor-means for delivering the objects from the hopper, a raceway for receiving the objects delivered by the conveyor-means, means for operating the conveyor-means, and means actuated by the delivery of an excessive number of objects into the raceway to arrest the operation of the conveyor-means.

10. An apparatus of the type indicated comprising a hopper for containing a supply of winding cores, bobbins or like objects, an endless conveyor-belt for delivering the objects from the hopper, means for driving the conveyor-belt, a raceway for receiving the objects delivered thereto by the conveyor-belt and movable under the weight of an excessive number of objects therein, means operative by the movement of said raceway to arrest the driving means for the conveyor-belt, and feeler-means normally maintained in inoperative position by a supply of objects in the hopper and releasable thereby to arrest the operation of the conveyor-means upon exhaustion of the supply of bobbins.

11. An apparatus of the type indicated comprising a hopper for containing winding cores, bobbins or similar objects, said hopper having a sloping bottom, a conveyor-belt at the side of the hopper for transporting the objects upwardly therefrom, means for driving the conveyor-belt, a raceway at the end of the conveyor-belt having a reverse portion inclined downwardly therefrom, a second raceway inclined downwardly from the first raceway and pivoted at its lower end, means for resiliently maintaining the upper end of the second raceway in connection with the first raceway to adapt it to receive the objects therefrom, and means operative when the second raceway is overbalanced and swung downwardly by an excessive number of objects therein to arrest the drive for the conveyor-belt.

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