Oct. 4, 1966 H. RAASCH 3,276,566

APPARATUS FOR UNIFORM ORIENTATION OF SPINNING COPS AND THE LIKE

Filed Sept. 8, 1964 4 Sheets-Sheet 1

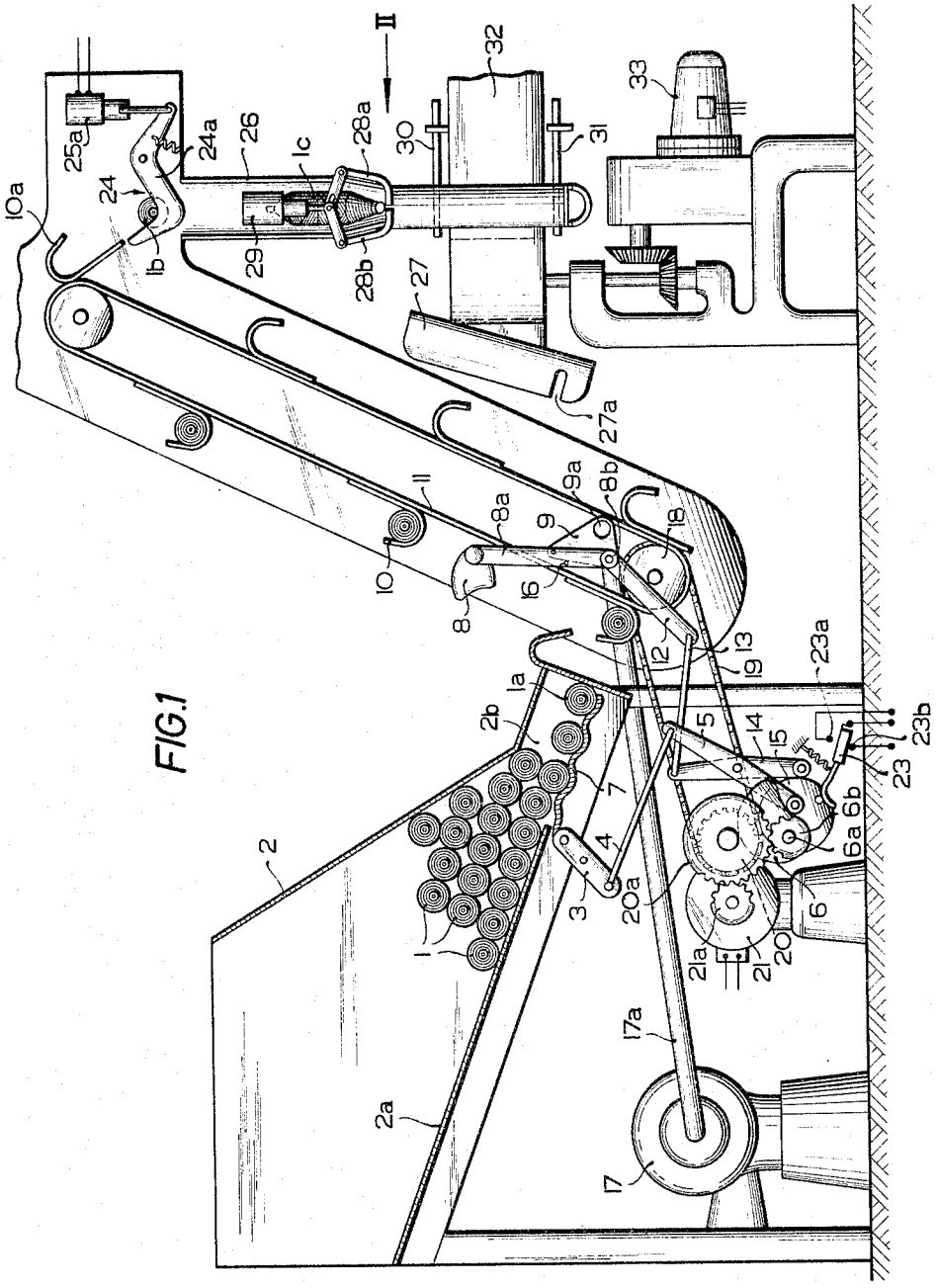


FIG.1

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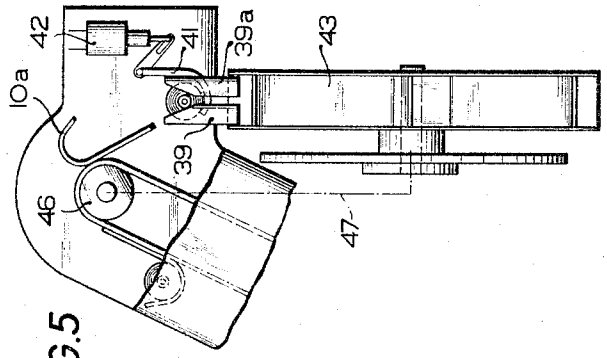


FIG. 5

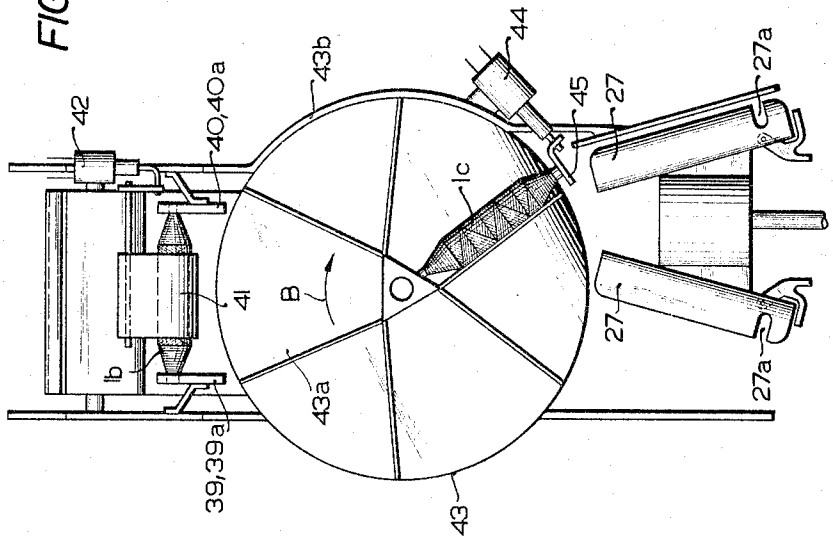


FIG. 6

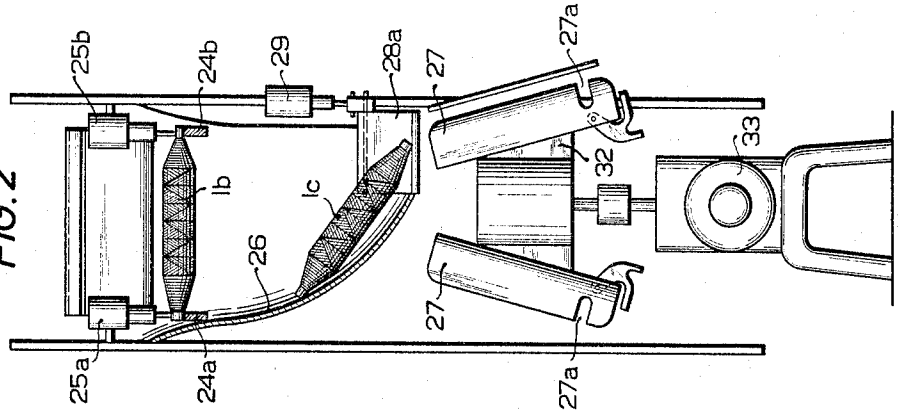


FIG. 2

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FIG.3

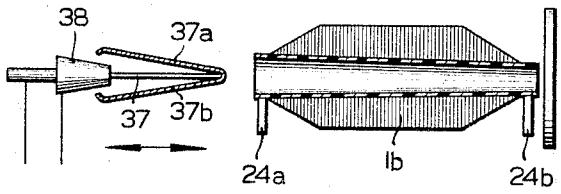


FIG.4

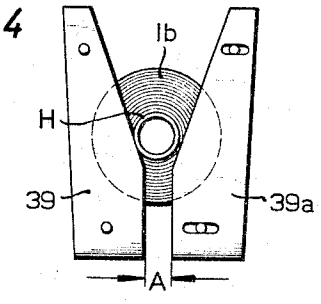
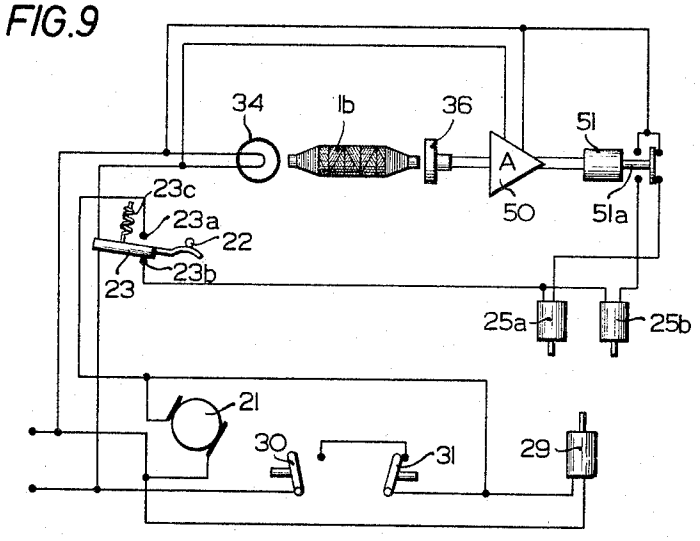


FIG.9



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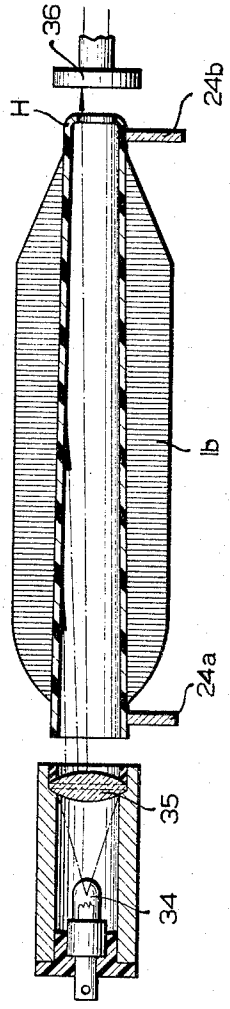


FIG. 7

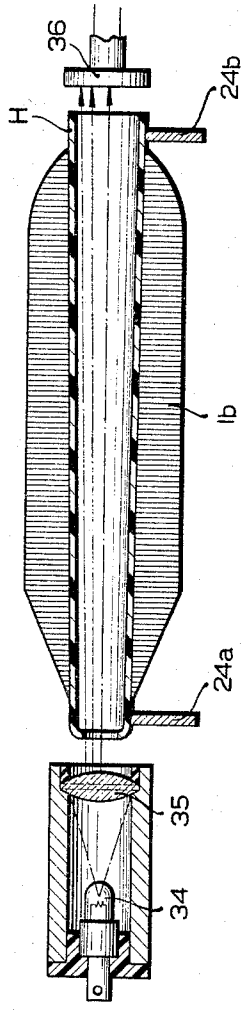


FIG. 8

United States Patent Office

3,276,566

Patented Oct. 4, 1966

3,276,566

APPARATUS FOR UNIFORM ORIENTATION OF SPINNING COPS AND THE LIKE

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Filed Sept. 8, 1964, Ser. No. 394,833
Claims priority, application Germany, Sept. 7, 1963, R 36,072
5 Claims. (Cl. 198—33)

My invention relates to apparatus for uniformly orienting randomly supplied spinning cops or similar bobbins for such purposes as passing the cops always in the same position and the same orientation to a winding machine or other processing machinery.

Spinning cops are often supplied from the spinning shop to the winding machines in large containers wherein the cops are located in random directions. At best, the cops lie parallel in the containers, but they are not oriented, having the tips of different cops point in one as well as in the opposite direction. However, the further processing of the cops, for example in a winding machine, makes it desirable to have all of the cops uniformly oriented with all tips pointing in the same direction. It has been necessary, therefore, to individually handle the cops for placing them in the proper position. This is time-consuming and involves undesirably much labor.

It is an object of my invention to provide an apparatus for the uniform orientation of spinning cops or the like, which affords an automatic operation and thus obviates manual sorting and orienting of the cops.

Another object of the invention is to secure the just-mentioned result by relatively simple and reliable means requiring a minimum of maintenance.

To achieve these as well as the more specific objects apparent from the following description, and in accordance with one of the features of my invention, I provide a cop-receiving holder device with a comparator device having sensing means responsive to the respectively different core diameters at the two ends of the cop, and I further provide transfer means which pass the cop from the holder device into a collecting device under control by the comparator so that the cop always passes into the collecting device with the foot end, or always with the tip end, in the leading position. The thus oriented cops can then be supplied from the collecting device directly to the machine, such as a winding machine, in which the cops are to be subjected to further processing.

The above-mentioned and further objects, advantages and features of my invention, said features being set forth with particularity in the claims annexed hereto, will be apparent from, and will be mentioned in, the following with reference to embodiments of apparatus according to the invention illustrated by way of example on the accompanying drawings.

FIG. 1 shows partly in section a front view of a cop orienting apparatus.

FIG. 2 is a lateral and partly sectional view, see in the direction of the arrow II indicated in FIG. 1.

FIG. 3 shows schematically a diameter-responsive sensing device applicable in apparatus according to FIGS. 1 and 2.

FIG. 4 illustrates a different diameter-responsive sensing member.

FIG. 5 is a partial front view and FIG. 6 a partly sectional side elevation of a cop orienting apparatus equipped with a sensing device according to FIG. 4.

FIGS. 7 and 8 illustrate in section still another comparator device operating with photoelectric means, the device being applicable in apparatus otherwise corresponding to FIGS. 1 and 2; and

FIG. 9 is an electric circuit diagram of control magnets in cop orienting apparatus equipped with photoelectric sensing means according to FIGS. 8 and 9.

As shown in FIG. 1, a large number of spinning cops **1** are held available in a hopper-like container **2**. The cops may be placed into the container **2**, for example manually, regardless of whether the relatively thin tip or the thicker foot of the cop core points in one or the other direction, this being apparent from FIG. 1. The filling of the supply container **2**, therefore, is a simple matter and can be done very rapidly. The container **2** has an inclined bottom **2***a* and has an outlet opening **2***b* at its lower end from which only one cop at a time can issue. To prevent the cops when passing through the opening **2***b* from being subjected to edging by other cops, which would prevent the proper downward travel and issuance of the cops **1**, the lower portion **7** of the container bottom **2***a* has a wavy configuration, the wavy grooves extending horizontally. The wavy bottom portion **7** is reciprocable by means of a lever **3** linked by a connecting rod **4** to a crank **5** driven by a cam **6**. The cam **6** is mounted on a shaft **6***a* driven by a spur gear **6***b* which meshes with a gear **20***a* driven by a pinion **21***a* on the shaft of a motor **21**. Each full rotation of cam **6** imparts to the wavy bottom portion **7** a single forward and return stroke. The lowermost cops in the container **2** are thus moved in the same direction, thus preventing edging or bridge formation of the cops in the container.

The lowermost cop **1***a* is seized and entrained by a suction gripper **8**. When the gripper has reached its uppermost position, the current of suction air is interrupted, and the cop drops into a conveyor pocket **10** of an endless conveyor belt **11**. The suction gripper **8** is secured to a pivotally mounted tubular arm **8***a* to which is imparted a swinging motion about the appertaining pivot **8***b* by means of a lever **12** firmly joined with suction arm **8***a* and linked by a connecting rod **13** to a cam follower lever **14** controlled by a cam **15**. The cam **15** is also mounted on the shaft **6***a* and thus is likewise driven from the motor **21**. The negative pressure for the suction gripper **8** is a produced by a blower **17** which is connected through a conduit **17***a* with the tubular arm **8***b* of the suction gripper **8**. A control valve **9** is interposed between the conduit **17***a* and the suction tube **8***a*.

In the illustrated embodiment the valve is formed by a plate having an opening **9***a*. Normally the plate **9** is turned to the left so that the opening **9***a* permits the current of air to pass from blower **17** through duct **17***a* to the suction tube **8***a* and the gripper **8**. In the illustrated position of the suction gripper **8**, however, the valve plate is displaced to the right by means of a dog pin **16** mounted on the suction tube **8**, so that the valve opening **9***a* is swung to a position in which the valve plate closes the duct **17***a*. When the suction gripper **8** is turned counterclockwise to its lower position, the plate of valve **9** moves to the left, either due to suitable mounting of the valve plate or under the biasing force of a spring (not illustrated), so that then the valve opening **9***a* permits the passage of suction air.

The conveyor belt **11** is driven by a sprocket **18**, an endless chain **19**, and a driving sprocket **20** which is fastened on the shaft of the spur gear **28** so that, when the cams **6** and **15** perform a single full revolution, the conveyor belt **11** is advanced one division of the conveyor pockets **10**.

When a conveyor pocket **10** has reached its uppermost position **10***a*, the cop drops out of the pocket and onto a holder device **24**. In the embodiment of FIGS. 1 and 2, the holder device comprises two supporting angles **24***a* and **24***b* which are pivotally mounted and biased by respective springs to remain in the position shown in FIG. 1. The supporting angles are linked to respective

electromagnets 25*a* and 25*b* (FIGS. 1, 2, 9). When a selected one of the two magntes is energized, it moves the appertaining one angle 24*a* or 24*b* away from the cop-supporting position so that then the cop will drop out of the holder device with the particular end in leading position that previously was resting upon the selected one angle 24 released by its magnet. The just-mentioned selective control is effected by a comparator device to be described in a later place.

In the illustrated embodiment, the comparator device controls the supporting angles 24*a* and 24*b* in such a manner that the cop, when released, always drops into the chute 26 with the core foot in leading position. The cop is thereafter released from the chute 26 by normally closed flaps 28*a* and 28*b* which open under control by another magnet 29 (FIGS. 1, 2, 9).

In this embodiment, the now oriented cops glide from the chute into pockets 27 of a conveyor belt 32 serving to supply the cops to further processing, for example an automatic cheese or cone winding machine. The conveyor belt 32 is driven by a motor 33. Mounted beneath the chute 26 are two switches 30 and 31 which control the magnet 29 (FIGS. 1, 2, 9) to open the flaps 28*a* and 28*b*. The switch 30 is closed whenever a conveyor pocket is accurately located beneath the chute 26. Normally, the switch 31 is closed so that the closing of switch 30 will actuate the magnet 29 and thus cause opening of the flaps 28*a* and 28*b*. However, if, by chance, the cop is still contained in the conveyor pocket 27 located beneath the chute 26, be it because the cop has not been taken off at the end of the conveyor belt, for example by the winding machine, then this cop causes opening of the switch 31. In this case, the closing of switch 30 cannot complete the energizing circuit of magnet 29. Consequently, the magnet 29 is not actuated and a new cop is not supplied. To permit scanning of the cop in the conveyor pocket 27 by the switch 30, this pocket is provided with a recess 27*a*.

Referring to FIG. 2, showing the cop 1*b* on the two supporting angles 24*a* and 24*b*, it will be noted that the foot portion of the tubular cop core has a larger diameter than the tip. If the core foot, for example, is located on angle 24*a* as shown in FIG. 2, this angle is released by the pull magnet 25*a* as soon as the preceding cop 1*c* glides from the chute 26 into the conveyor pocket 27. Since the cop 1*b* has its core tip resting upon the angle 24*b*, the cop will now drop into the chute with its foot in lowermost position. That is, the cop 1*b* now assumes the position shown for cop 1*c* in FIG. 2. On the other hand, if the core foot is located on the angle 24*b*, then this angle is released by the magnet 25*b*. In this case, too, the cop will drop into the chute with its core foot in the leading, downward position. Since the core foot of the cop 1*b*, when released by the angle 24*a*, must glide along the curved wall of the chute 26, it is advisable to line this wall with material having a particularly low friction coefficient.

The comparator device which serves for determining the position of the cop tip or cop foot may consist of a sensing or measuring device responsive to the diameter of the bore in the core of the cop. Since the wall thickness of the tubular core, as a rule, is constant along the length of the core, the diameter of the bore in the core foot is larger than the diameter of the tip bore.

An embodiment of a device for sensing the diameter of the core bore is exemplified in FIG. 3. This device comprises a generally conical mandrel structure 37 insertable into the bore of the core. The cop 1*b* is located on the supporting angles 24*a* and 24*b* as described above. The mandrel 37 is axially displaceable in front of the core bore. When the cop is properly located on the angles 24*a* and 24*b*, the mandrel performs a shifting motion toward the right. When the mandrel then enters into the small opening at the core tip, two contact springs 37*a* and 37*b* mounted on the mandrel are pressed together and enter into contact with a conductive cone 38. This closes an electric circuit which releases an electrical pulse. This pulse is electrically stored in known manner until the sensing member is again pulled out of the bore. Then the corresponding pull magnet 25*a* or 25*b* is controlled so that the cop will drop with its foot in leading position, as described above with reference to FIG. 2.

However, when the sensing mandrel 37 enters into the large bore in the foot of the core, this being shown in FIG. 3, the contact springs 37*a* and 37*b* are not pressed into contact with the cone 38, this cone being insulated from its holder. Hence, now no electric circuit is closed. The above-mentioned pulse is not released, and the absence of this pulse is then utilized for controlling the proper magnet 25*a* or 25*b*. The measurements for the respectively different core openings at which the sensing member is to respond, can be readily adjusted by axially displacing the insulated conical contact member 38 on the holder of the mandrel 37. While in the embodiment according to FIG. 3 the amount of compression imparted to a conical sensing structure serves as a measure of the bore diameter, a non-compressible structure may also be used and the penetrating depth of the conical structure into the core bore may then be employed as a measure of the bore diameter.

The sensing means of the comparator device employed for the purposes of the invention may also respond to the outer diameter or peripheral size of the cop core at the tip and foot respectively. The comparator illustrated in FIGS. 4, 5 and 6, also operating by mechanical scanning of the cop position, involves this sensing principle. The comparator device comprises two pairs of gage legs 39, 39*a* and 40, 40*a* engageable with the tip and foot respectively of the core H. The two legs of each pair are spaced from each other to form a beak-shaped opening. The widths of the openings in the two gage pairs are equal, and the largest width of the opening is larger than the diameter of the core foot, while the smallest width of the beak- or V-shaped opening is larger than the diameter of the core tip.

FIG. 4, for example, shows the gage pair 39 and 39*a* engaging the foot of the core H. The gage leg 39*a* is displaceable, having elongated slots resting on guide pins, so that any desired width A between the two legs 39 and 39*a* can be adjusted. The width A is somewhat larger than the diameter of the core tip but smaller than the diameter of the core foot. With such an adjustment, the core foot is held between the gage pair 39, 39*a* as shown in FIG. 4, whereas the core tip (not shown in FIG. 4) can glide downward between the two legs 39 and 39*a*.

As will be seen from FIGS. 5 and 6, the cop drops from the conveyor pocket 10*a* first into a trough 41 of the holder device. The trough 41 is pivotally mounted and controlled by a pull magnet 42 in such a manner that the cop is released from the trough 31 and then drops between the gage pairs 39, 39*a* and 40, 40*a*. As will be understood from the foregoing description of the gage pair shown in FIG. 4, the core tip will always drop downward into a chamber 43*a* of a subdivided drum 43.

The drum 43 rotates in the direction of the arrow B shown in FIG. 6. During rotation, the cop is prevented by a stationary housing wall 43*b* from prematurely gliding out of the pocket space 43*a*. When the cop arrives in the position 1*c*, the core foot is always located at the bottom. At this locality, the limiting wall 43*b* is no longer present, but the cop 1*c* is still prevented from gliding out of the chamber, by means of a flap 45 controllable by a pull magnet 44. This magnet 44 corresponds to the magnet 29 according to FIGS. 1 and 2 and is controlled in the same manner so that the cop 1*c* is released only when an empty conveyor pocket 27 is located directly beneath the flap 45.

When the magnet 44 responds, a magnet 42 is actuated simultaneously so that the cop 1*b* can drop from

the trough **41** and through the two pairs of gage legs into the chamber **43***a* of the drum **43**.

The drum **43** is connected with the sprocket gear **46** of the driving chain **11** through a mechanical transmission **47** in such a manner that when the chain **11** is advanced one division of the pockets **10**, the drum **43** is rotated one chamber division.

The comparator device illustrated in FIGS. 7 and 8 functions in a manner similar to that of FIG. 3 in that it senses the diameter of the core bore and can be employed in apparatus according to FIGS. 1 and 2. However, according to FIGS. 7 and 8, the bore diameter is determined photoelectrically rather than mechanically. For this purpose, a light source **34** is mounted at the holder device **24** coaxially in front of the core H at one end thereof, and a photosensitive control member **36** is mounted on the opposite side. As explained with reference to FIGS. 1 and 2, the cop **1***b* is located on the supporting angles **24***a* and **24***b*. The light rays issuing from the source **34** are not parallel but have some amount of divergence. If the core is oriented as shown in FIG. 7, namely so that the core foot faces the light source **34** whereas the smaller opening is close to the photoelectric cell **36**, then the area eliminated on the photocell is small because it corresponds only to the size of the small opening in the core. However, when the core has the reverse position shown in FIG. 8, then the light rays, on account of their divergence, illuminate the photocell on a much larger area corresponding approximately to the large opening at the core foot.

These differences in illumination of the photocell **36** result in corresponding current or voltage differences which are applicable by means of conventional electronic circuit components for controlling the magnets **25***a* and **25***b*. For intensifying the differences in illumination, a lens **35** may be mounted between the light source **34** and the location of the core end in order to condense the light rays from source **34** but to retain the desired slight amount of divergence.

The circuit diagram shown in FIG. 9 is suitable for controlling the above-described magnets in the manner explained with reference to FIGS. 1, 2.

As described, the magnet **29** is energized when an empty conveyor pocket **27** is accurately located beneath the chute **26**. In this case the two switches **30** and **31** (FIGS. 1, 9) are both closed. If the conveyor pocket **27** is filled, the switch **31** is open so that the energizing circuit for magnet **29** cannot be closed. When the magnet **29** is energized, the cop **1***c* contained in the chute **26** glides into the empty conveyor pocket. The circuit for the electric motor **21** is closed simultaneously with the energizing circuit of magnet **29** so that motor **29** can operate. As apparent from FIG. 1, the cam **15** has a lobe **22** which forces a contact arm **23** downward against the force of a spring **23***c* when the motor **21** is at standstill, then closing the contact **23***b*. As soon as the motor **21** commences running, the lobe **22** leaves the contact arm **23** so that the arm is pulled upwardly by the spring **23***c* and closes the contact **23***a*. As a result, the motor **21** continues running even after the switch **40** is opened due to the continued travel of the conveyor pocket **27**.

When the transport chain **11** has advanced one pocket division, a cop drops upon the supporting angles **24***a* and **24***b* as described above. At this moment, the lobe **22** of cam **15** again opens the switch **23** at contact **23***a* and closes the contact **23***b*. This stops the motor **21**. However, the closed contact **23***b* now prepares a supply line to the pull magnets **25***a* and **25***b*.

The comparator device, exemplified in FIG. 9 by the photoelectric device according to FIGS. 7 and 8, now ascertains the cop position. The voltage issuing from the photocell **36** is amplified in a pulse amplifier **50** (preferably a Schmitt trigger). Depending upon the magnitude of the voltage issuing from the amplifier **50**, the magnet **51** is excited to a greater or lesser extent. When the magnet **51** is only weakly excited, that is, if the tip of the cop points to the right, the armature **51***a* is not attracted. However, if the cop foot points to the right, the amplifier **50** issues such a high voltage and current that the magnet **51** pulls its armature **51***a* to the left. This opens the circuit of magnet **25***a* and closes the circuit of magnet **25***b*. Consequently, when contact **23***b* closes, the magnet **25***b* attracts its armature and moves the supporting angle **24***b* about its pivot so that the cop is released from the holder device and drops into the chute **26**.

If desired, a time delay member may be inserted into the electric circuit in order to make certain that, in the event the control voltage fails, the magnet **25***a* or **25***b* remains energized a sufficient length of time to have the cop reliably drop into the chute **26**.

In the illustrated embodiments, the comparator device ascertains the direction of the cop tip while the cop is held horizontally. This has the advantage that the cop will issue by gravity from the holder device in the proper orientation. If desired, however, the direction of the cop tip may also be ascertained in any other position, for example the vertical position, of the cop. In this case, two pressure or pull members can be provided of which one engages the cop foot and the other the tip, and which always push or pull either the foot or the tip out of the holder device for the purpose of securing the desired uniform orientation.

To those skilled in the art it will be obvious, upon a study of this disclosure, that such and other modifications are readily applicable, and that the invention can be given embodiments other than particularly illustrated and described herein, without departing from the essential features of the invention and within the scope of the claims annexed hereto.

I claim:

1. Apparatus for uniformly orienting cops having a core whose respective ends are different, comprising a container for cops in random orientation; a cop holder device having two mutually spaced support members engageable with the respective core ends of a cop for holding the cop in a given position; conveyor means between said container and said holding device for individually passing cops from said contaner to said position; said support members being individually movable for releasing the cop from said position with a given core end leading in dependence upon which of said members is moved at a time; comparator means mounted at said holder device and responsive to said core-end difference of a cop in said position on said support members; selective control means connected between said comparator means and said support means for moving a selected one of said support members in dependence upon response of said comparator means; and collector means for receiving said cops from said comparator means in uniform orientation.

2. Apparatus for uniformly orienting cops having a core whose respective ends are different, comprising a container for cops in random orientation; a releasable cop-holding device defining a given checking position for a cop being held; conveyor means between said container and said holding device for individually passing cops from said container to said position; comparator means mounted at said holding device and responsive to said core-end difference of the cop in said position, said comparator means having unilaterally active means for releasing the cop from said position with a given one of said core ends in leading position; and collector means for receiving said cops from said comparator means in uniform orientation, said comparator means comprising a sensing member responsive to the diameter of the inner core diameter of the cop in said position.

3. Apparatus for uniformly orienting cops having a core whose respective ends are different, comprising a container for cops in random orientation; a releasable cop-holding device defining a given checking position for a cop being held; conveyor means between said container

and said holding device for individually passing cops from said container to said position; comparator means mounted at said holding device and responsive to said core-end difference of the cop in said position, said comparator means having unilaterally active means for releasing the cop from said position with a given one of said core ends in leading position; and collector means for receiving said cops from said comparator means in uniform orientation, said comparator means comprising a generally conical and radially compressible mandrel structure mounted in coaxial relation to the cop in said position and axially displaceable into the core bore of the cop on said holding device, the amount of mandrel compression being indicative of the bore diameter, and control means connected between said mandrel structure and said releasing means for controlling the latter in dependence upon said amount.

4. Apparatus for uniformly orienting cops having a core whose respective ends are different, comprising a container for cops in random orientation; a releasable cop-holding device defining a given checking position for a cop being held; conveyor means between said container and said holding device for individually passing cops from said container to said position; comparator means mounted at said holding device and responsive to said core-end difference of the cop in said position, said comparator means having unilaterally active means for releasing the

cop from said position with a given one of said core ends in leading position; and collector means for receiving said cops from said comparator means in uniform orientation, said comparator means comprising a light source and a photo-sensitive sensor coaxially mounted on axially opposite core sides of a cop in said position on said holding device for issuing a sensor signal dependent upon the diameter of the bore opening facing said sensor, and control means connected between said sensor and said releasing means for controlling the latter in dependence upon said signal.

5. In a cop-orienting device according to claim 4, said light source comprising an optical condenser lens of the diverging type.

References Cited by the Examiner

UNITED STATES PATENTS

2,377,154	5/1945	Hurley.	
3,085,713	4/1963	Reiners	221—171
3,178,002	4/1965	Hanna.	

FOREIGN PATENTS

328,849	8/1935	Italy.

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