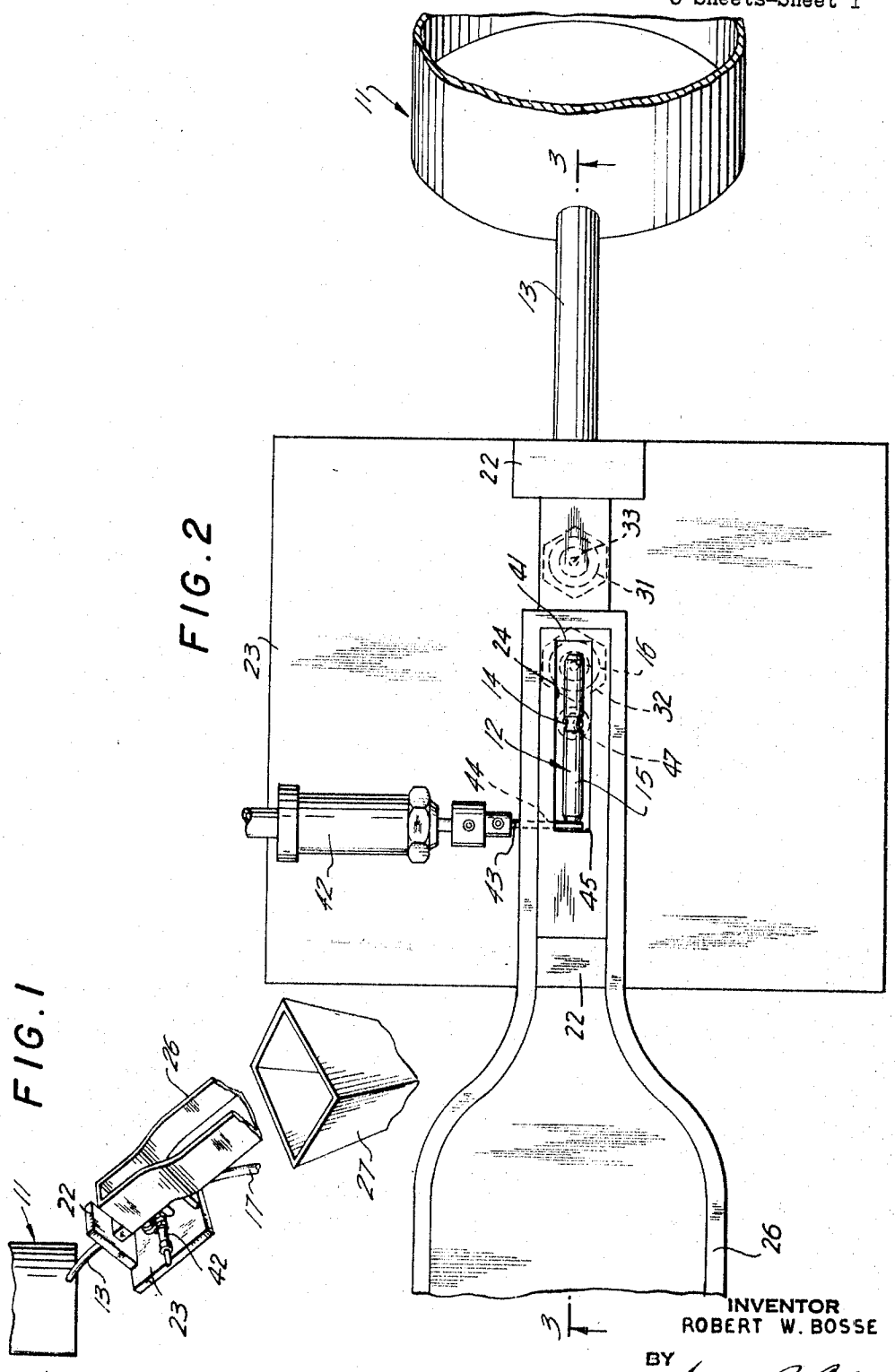
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EQUIPMENT FOR SORTING GROOVED PINS

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EQUIPMENT FOR SORTING GROOVED PINS

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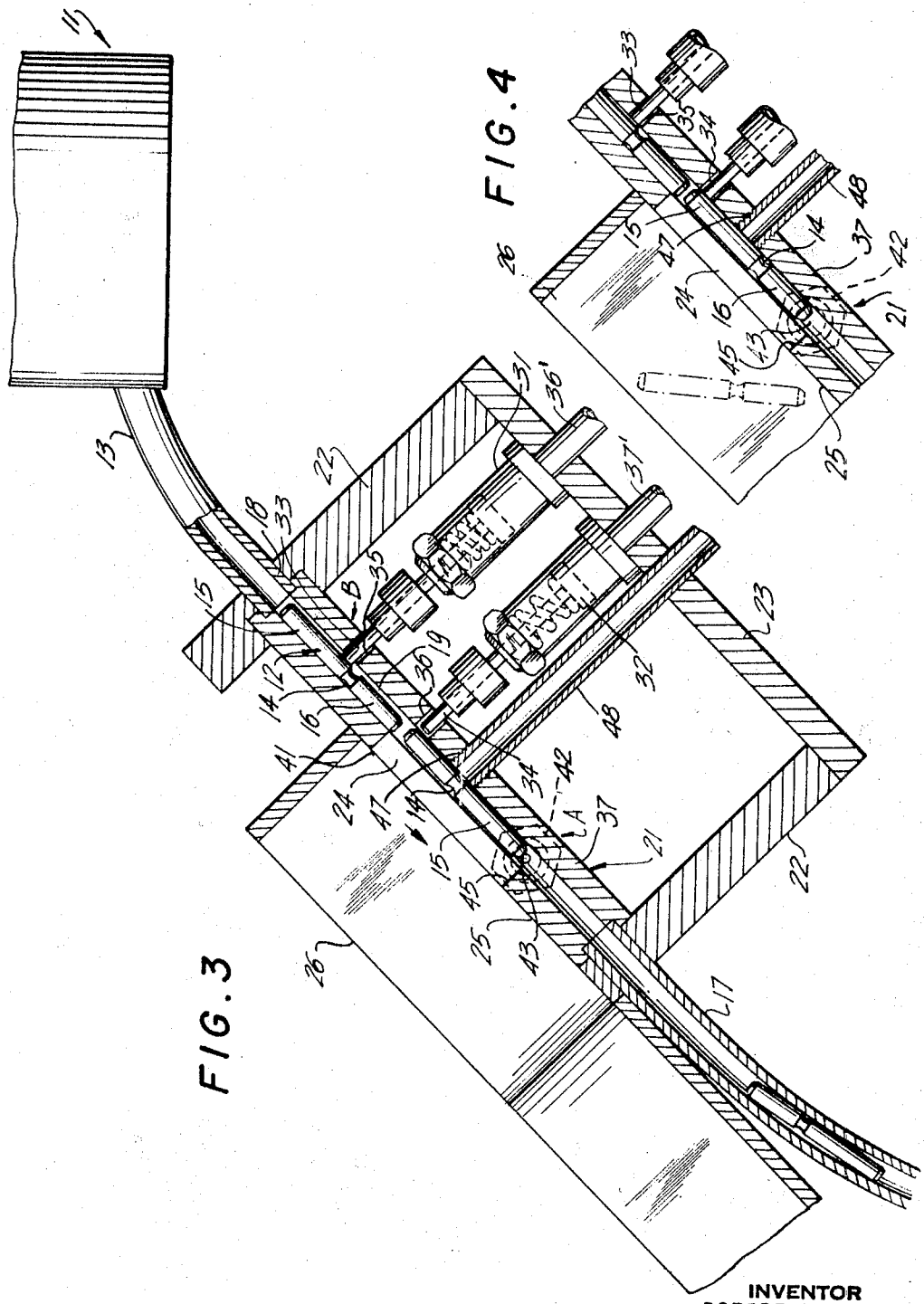


FIG. 3

FIG. 4

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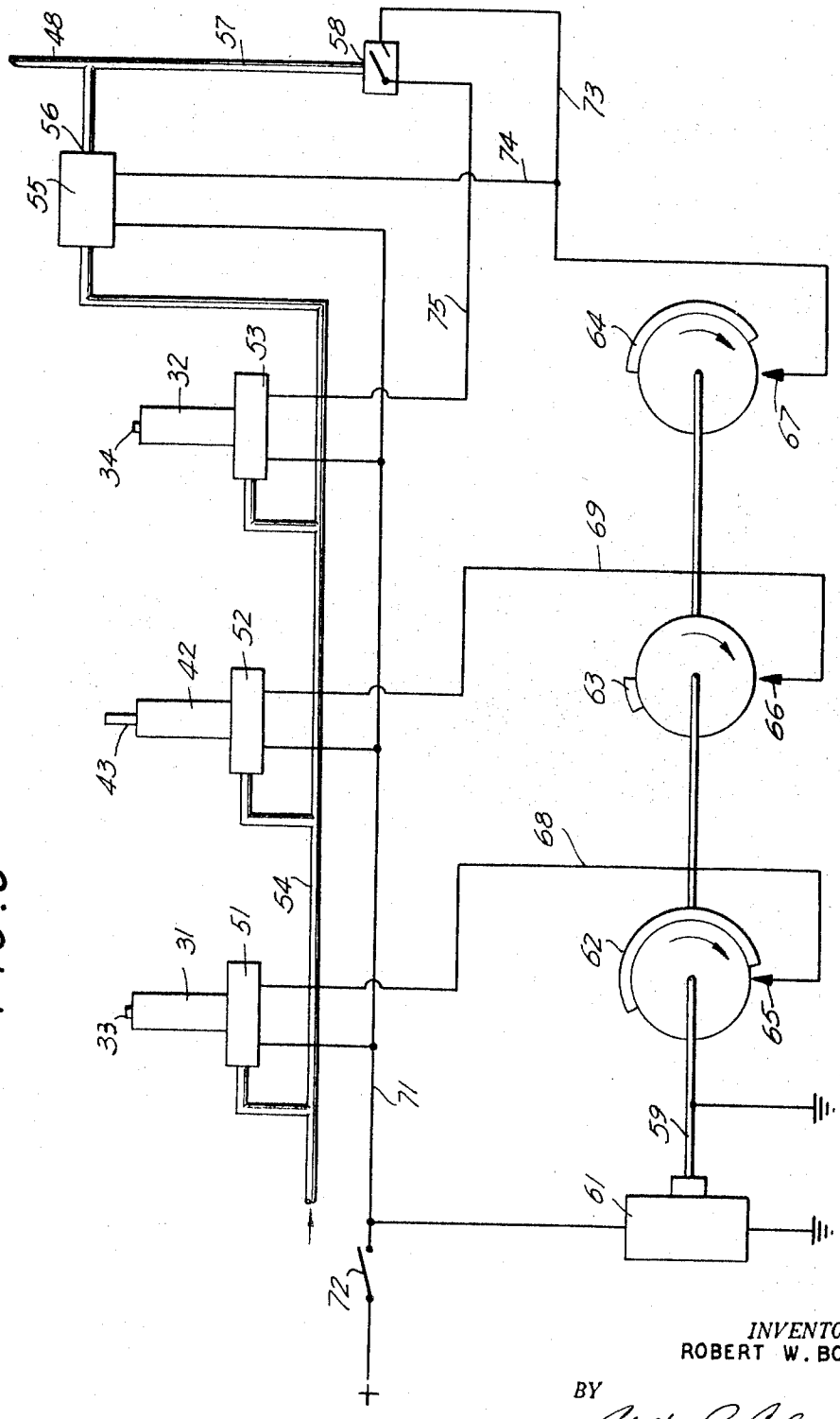


FIG. 5

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EQUIPMENT FOR SORTING GROOVED PINS

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Int. Cl. B65g 47/24
U.S. Cl. 193—43 3 Claims

ABSTRACT OF THE DISCLOSURE

This invention relates to an equipment for sorting pins of the type having an off-center annular groove therein defining a long portion and a short portion on each side thereof respectively and which are haphazardly oriented as they are successively fed in longitudinally aligned relation, so that pins having the same orientation may be successively fed.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to the art of sorting equipment, more particularly of the type to sort pins of the above type as they are successively fed so that pins having the same orientation may be successively arranged for subsequent processing.

Description of prior art

As conducive to an understanding of the invention it is noted that pins are utilized for industrial use which have an annular groove therein offset from center to define a long portion and a short portion on each side thereof respectively with the long portion having circumferentially spaced longitudinal grooves therein to retain the pin in the work piece in which it is to be inserted.

Pins of the above type may be fabricated by first forming the body of the pin with the annular groove therein and thereafter the thus formed pins are collected in a hopper or other suitable receptacle for subsequent processing. Consequently, when the pins are fed to a grooving equipment for forming the longitudinal grooves therein, since such grooves are to be formed for example in the long portion of the pin, the pins must be manually sorted and arranged so that they can automatically be fed to the grooving equipment with the long portions all extending in the same direction. Such operation is extremely time-consuming and often, due to carelessness or fatigue by the operator, the pins are not properly oriented so that after the grooving operation is completed many pins will have the grooves improperly located and must be discarded.

It is accordingly among the objects of the invention to provide an equipment for automatically sorting annularly grooved pins as they are haphazardly fed in sequence in longitudinally aligned relation so that only those pins having the same orientation will be subsequently fed in sequence.

Another object of the invention is to provide a sorting equipment of the above type which has relatively few parts that are not likely to become deranged even after long use and which will dependably and automatically effect the sorting action without need for manual supervision.

SUMMARY OF THE INVENTION

According to the invention, the sorting equipment comprises an elongated channel having a discharge outlet at one end and a feed inlet at the other end into which pins having an off center annular groove therein are fed, preferably by a "Syntron" feeder. The channel is preferably inclined so that the pins will flow therealong by gravity and by the reason of the "Syntron" feed, the pins are inherently haphazardly arranged, so that as they are introduced into the channel some of the pins will have the long portion thereof extending forwardly and others the short portion thereof.

The channel has a sensing region where the pins are sucessively stopped in order that a determination can be made as to whether the long or short portion is at the forward end of the pin. Through suitable ejection means controlled at the sensing region, those pins having an orientation other than that desired will be ejected from the channel and only those pins having the desired orientation will be permitted to move completely through the channel out of the discharge outlet thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings in which is shown one of various possible embodiments of the several features of the invention,

FIG. 1 is a fragmentary perspective view of the sorting equipment;

FIG. 2 is a top plan view of the sorting equipment with parts broken away;

FIG. 3 is a longitudinal sectional view taken along line 3—3 of FIG. 2 showing a pin in position having the desired orientation;

FIG. 4 is a view similar to FIG. 3 showing a pin having an undesired orientation, and

FIG. 5 is a diagrammatic view of the control mechanism of the equipment.

Referring now to the drawings, as shown in FIG. 1, the pin selecting equipment comprises a feeding device **11**, illustratively a "Syntron" feeder of conventional type for successively feeding pins **12** into an inclined feed tube **13**.

Each of the pins **12**, as shown in FIG. 3, has an annular groove **14** between its ends which is offset from center to define a long portion **15** and a short portion **16**.

The pins **12** that move by gravity through the feed tube **13** are haphazardly oriented and the purpose of the equipment is to select those pins **12** having the same orientation, i.e., with the long portion **15** at the leading end, for example, for discharge through an inclined outlet tube **17** to be fed to a grooving equipment of conventional type (not shown) which forms grooves in such long portion.

The outlet end **18** of the feed tube **13** communicates with the inlet of an elongated bore **19** that extends through a block **21**, the latter being supported between opposed end walls **22** rising from a base **23**. The outlet of the bore **19** communicates with the outlet tube **17**.

The bore of the feed tube **13** and the outlet tube **17** are preferably the same diameter as that of the bore **19** of block **21** and the tubes **13, 17** and bore **19** are positioned at an incline so that the pins may move therethrough by gravity.

The block **21** has an elongated slot **24** in its top wall **25** of length greater than that of a pin **12** and which extends into the bore **19** for discharge of pins **12** therethrough in the manner hereinafter to be described.

Mounted on the top wall **25** of block **21** is an elongated guide channel **26** through which the pins **12** discharged through slot **24** will pass, to be collected in a suitable receptacle **27**.

Mounted on the base **23** and raising therefrom are actuators **31, 32** illustratively of the pneumatic type. Each of the actuators has a reciprocable plunger **33, 34** movable through an associated opening **35, 36** that extends through the lower portion **37** of the block into the bore **19** thereof.

The plungers **33, 34** of actuators **31, 32** are normally spring returned to retracted position and are moved to

extended position when air under pressure is applied to the associated line 36', 37'.

The plunger 33 of actuator 31, which is the clamp actuator, is located between the upper end 41 of slot 24 and the outlet end 18 of feed tube 13 and is designed to clamp a pin 12 in fixed position. The plunger 34 of actuator 32, which is the eject actuator, is aligned with slot 24 and located adjacent the upper end 41 thereof and is designed to move into the slot 24 to eject a pin 12 therethrough.

In addition, a third actuator 42 is provided also preferably of the pneumatic type and mounted so that its plunger 43 is reciprocable through an opening 44 in the side wall of block 21 into the bore 19 thereof. The plunger 43 of actuator 42 which is the abutment acutator, is aligned with the slot 24 and located adjacent the lower end 45 thereof.

The plunger 43 of actuator 42 is normally spring returned to extended position so that it will act as an abutment for the leading end of the pin 12, the latter being of length such that its trailing end will still be in alignment with the slot 24.

Extending through the lower portion 37 of the block 21 into the bore 19 and in alignment with slot 24 is an opening 47 to which an air line 48 is connected. The opening 47 which defines the sensing opening, is so positioned that when the pin 12 is oriented with its long portion 15 extending forwardly and with the leading end of the pin against abutment plunger 43, the opening 47 will be aligned with the annular groove 14 in the pin 12.

To control the operation of the actuators and the sensing mechanism, the circuit shown in FIG. 5 is illustratively provided.

Thus, each of the solenoids 31, 42 and 32 is controlled by an electrically actuated air valve 51, 52 and 53 which are connected to a line 54 which is in turn connected to a source of air under pressure. The line 54 is also connected to the inlet of an electrically controlled air valve 55, the outlet 56 of which is connected by line 48 to the sensing opening 47 and by line 57 to a pressure switch 58.

To control the timed sequence of operation, a cam shaft 59 is provided driven by cam motor 61 and carrying three cams, 62, 63 and 64, each having an associated contact 65, 66 and 67.

The contacts 65, 66 of cams 62 and 63 are connected respectively by leads 68 and 69 to one side of air valves 51 and 52, the other sides of which are connected to common lead 71, connected through normally open switch 72 to one side of a source of potential. The contact 67 of cam 64 is connected by leads 73 and 74 to one side of pressure switch 58 and to one side of air valve 55, the other side of said air valve 55 being connected to common lead 71. The other side of the pressure switch 58 is connected by lead 75 to one side of air valve 53, the other side of which is connected to common lead 71.

To complete the circuit the cam shaft is connected to the other side of the source of potential as is one side of motor 61, the other side of the motor being connected to common lead 71.

In the operation of the equipment above described, before the switch 72 is closed and with the cams in the "start" position shown, the plungers 33, 34 of actuators 31, 32 will be spring retained in retracted position and the plunger 43 of actuator 42 will be spring retained in extended position.

The valve 55 controlling flow of air under pressure to the sensing opening 47 is normally closed and the pressure switch 58 controlling the ejector solenoid 32 is normally open.

Thus, when the "Syntron" feeder 11 is energized, the pins 12 will flow by gravity into the feed tube 13 and then through the bore 19 of block 21 until the leading end of the frontmost pin 12 strikes abutment plunger 43.

The system is now ready for operation and switch 72 is closed. This will energize the cam motor 61.

As a result, the cam 62 will engage its contact 65 to complete a circuit to the air valve 51 controlling clamp solenoid 31 so that the clamp plunger 33 will be extended to abut against the second pin 12 in bore 19 (FIG. 3) to prevent further downward movement of said pin and the succeeding pins.

With continued rotation of the cam motor 61, the cam 64 will engage its contact 67 to complete a circuit to the valve 55 so that air under pressure will flow through the sensing opening 47. At the same time, the pressure switch 58 will be readied for operation.

Referring to FIG. 3, if the groove 14 of the frontmost pin 12 is aligned with the sensing opening 47, the air under pressure will flow through said groove 14 and hence there will be insufficient buildup of pressure in lines 48 and 57 (FIG. 5) to actuate the pressure switch 58 which will remain open. Hence, the valve 53 controlling the eject solenoid 32 will not be actuated and the eject plunger 34 will remain in retracted position.

With further rotation of cam motor 61 and cam 64, contact 67 will be disengaged and air valve 55 will be closed. Thereafter, the cam 63 will engage its contact 66 to energize the air valve 52 controlling abutment solenoid 42 to retract the abutment plunger 43, thereby permitting the first pin 12 which is properly oriented with its longer portion 15 extending forwardly, to be discharged through outlet tube 17.

After a predetermined period of rotation of cam 63, the abutment solenoid 42 will be de-energized and its plunger 43 spring extended into bore 19.

Thereupon, the cam 62 will move away from its contact 65 to cause the clamp solenoid 31 to be de-energized so that its plunger 35 will be spring withdrawn from bore 19 thereby permitting flow of the pins 12 down the bore 19 until stopped by abutment plunger 43.

The cycle will then repeat.

In the event the short portion 16 of pin 12 was at the front end thereof when the pin was aligned with the sensing opening as shown in FIG. 4, the groove 14 would not be aligned with such opening. As a result, when cam 64 completed the circuit to air valve 55 and readied pressure switch 58 for operation, there would be a pressure buildup in lines 48, 57 due to the fact that the pin 12 blocked escape of air from opening 47.

Such pressure buildup would cause switch 58 to close completing a circuit to the air valve 53 controlling eject solenoid 32. Consequently, the plunger 34 would be extended rapidly to abut against the rear end of the frontmost pin 12 thereby ejecting such pin through slot 24 into the channel 26 and into the receptacle 27.

With the equipment above described, dependable sorting of grooved pins may be achieved with assurance that pins having the same alignment may be fed to subsequent processing equipment.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. Equipment for sorting pins of the type having an off-center annular groove therein defining a long portion and a short portion on each side thereof respectively, said equipment comprising an elongated member having a longitudinal channel therethrough having a discharge outlet at one end, said channel having an ejection region between its ends, a sensing station aligned with said ejection region, means to advance such pins in sequence in longitudinally aligned relation through said longitudinal channel to said sensing station with such pins haphazardly oriented, means controlled by the orientation of the first pin in said sequence at said sensing station to sense the location of the annular groove therein with respect to its distance from the leading end of the first pin, said means comprising a gas pressure line having an outlet leading into the ejection region of said channel, a gas

pressure switch connected to said line and means to apply a source of gas under pressure to said line, ejection means aligned with said ejection region, and means controlled by the actuation of the gas pressure switch based on the pressure in said line to actuate said ejection means to eject pins through said ejection region having an orientation other than that of the pins to be discharged through said discharge outlet, whereby pins having the same orientation will be successively discharged from said sensing station through said discharge outlet.

2. The combination set forth in claim 1 in which means are provided to retain the first pin in said sequence at said sensing station, means to restrain movement of the succeeding pins in said sequence, means momentarily to release said retaining means after the first pin has been sensed to permit discharge through said discharge outlet of any pin remaining in said sensing station and means thereafter to release said restraining means for the succeeding pins.

3. The combination set forth in claim 1 in which said longitudinal channel is a bore, said elongated member has an elongated longitudinal slot extending into said bore and defining said ejection region between its ends, said slot being of length greater than that of such pin, means to retain the first pin in such sequence at said sensing station, said means comprising a plunger movable into and out of said bore adjacent the end of the slot near the discharge outlet an aligned with the slot, means to restrain movement of the succeeding pins in said sequence, said restraining means comprising a plunger movable into and out of said bore and being longitudinally spaced from said slot, said outlet of said gas pressure line leading into said bore and being aligned with said slot, said outlet being located so that when one end of the pin is against said retaining plunger, the annular groove will be transversely aligned with said outlet and when the other end of the pin is against said retaining plunger the annular groove will be longitudinally spaced from said outlet, said ejection means comprising a plunger movable into and out of said bore adjacent the end of said slot remote from the discharge outlet, whereby upon actuation of said gas pressure switch based on the pressure in said line, said ejection plunger will be actuated to eject a pin at said sensing station through said slot having an orientation other than that of the pins to be discharged through said discharge outlet, and means momentarily to actuate said retaining plunger after the first pin has been sensed to permit discharge through said discharge outlet of any pin remaining in said sensing station and means thereafter to actuate said restraining plunger for the succeeding pins.

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