May 14, 1968 B. J. SZMERETA ET AL 3,382,973

ARTICLE SELECTION APPARATUS

Filed Nov. 10, 1965 2 Sheets-Sheet 1

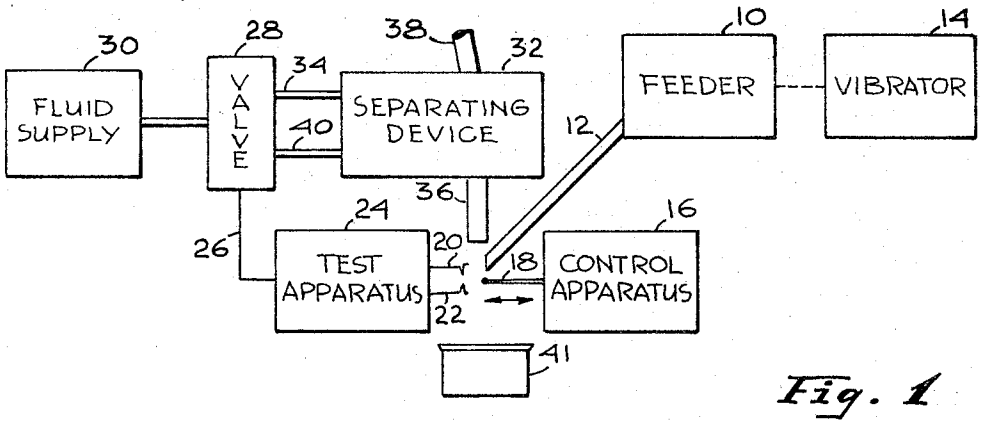


Fig. 1

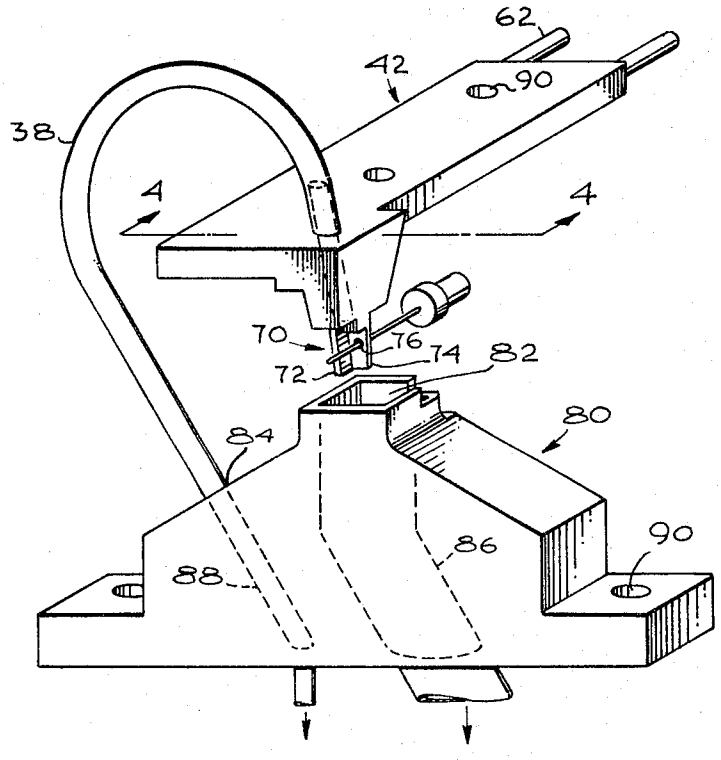


Fig. 2

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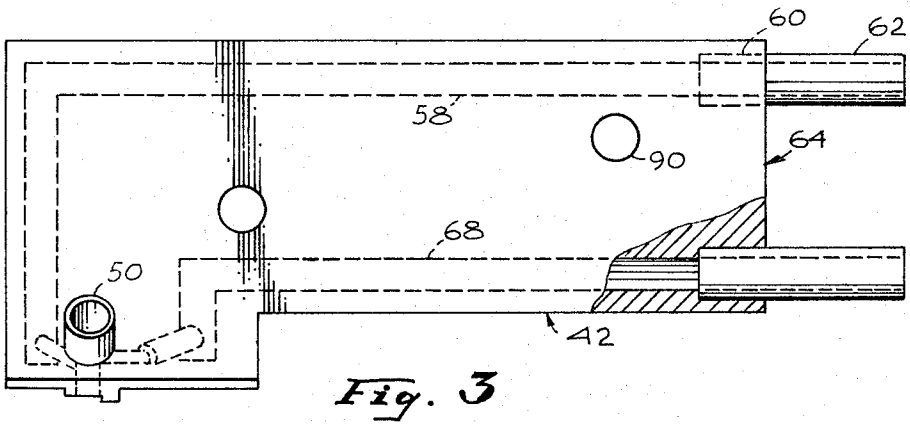
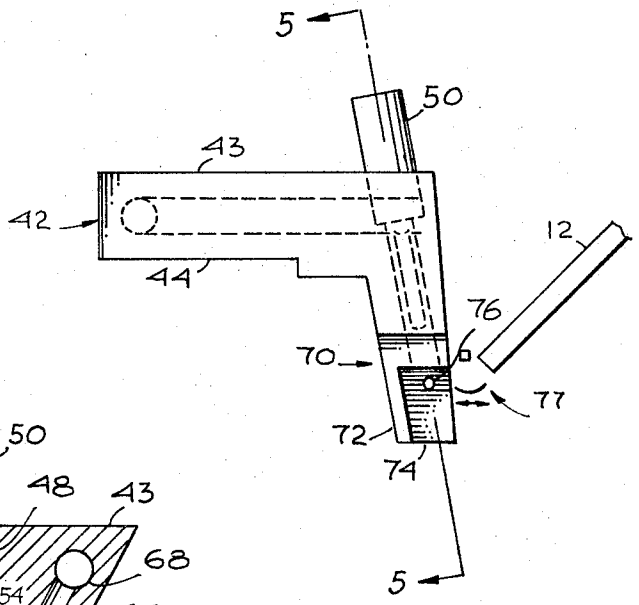


Fig. 3



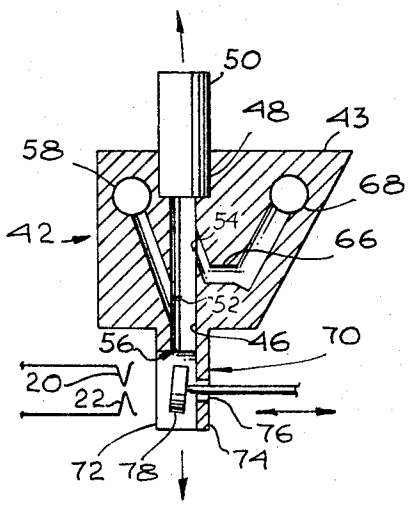


Fig. 4

Fig. 5

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ARTICLE SELECTION APPARATUS

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ABSTRACT OF THE DISCLOSURE

An apparatus for separating small articles such as magnetic cores. The apparatus includes a substantially vertically oriented tubular passageway having an entrance opening at the lower end thereof. First and second openings, respectively directed upwardly and downwardly, are provided in the tubular passageway. The first and second openings communicate with a fluid source (e.g. an air supply) through a valve. In one position of the valve, fluid is forced into the passageway through the first opening to develop a low pressure region so as to draw an article at the entrance opening up through the passageway. In another position of the valve, fluid is forced into the passageway through the second opening to thus drive the article at the entrance opening downwardly.

This invention relates generally to article handling apparatus and more particularly to apparatus suitable for use with magnetic core testing equipment for separating acceptable and non-acceptable cores.

Great quantities of magnetic cores are employed in storage systems of the type used in data processing equipment. In order for such systems to operate properly, all of the cores used therein must meet certain minimum specifications. That is, even a single malfunctioning core in a storage system can make the entire system, as a practical matter, useless. Accordingly, prior to assembling such storage systems, it is essential that each core be individually tested to determine whether its characteristics meet the desired specifications.

U.S. Patent No. 2,975,894 discloses a typical prior art system for testing and handling magnetic cores. Therein, cores are fed one at a time to a first position at which they are pierced by a test probe and moved to a second position where they are tested. After the test, the probe is withdrawn and the core is stripped therefrom and falls into a funnel. A diflecting means is positioned at the lower end of the funnel and is controlled by the test apparatus to direct the core into either an acceptable or a non-acceptable receptacle.

U.S. Patent No. 2,858,018 discloses a further apparatus for sorting cores after tests have been performed thereon. Therein, a core is dropped into a chute from which one or more branches extend. First and second doors are mounted in the chute adjacent each branch with each being normally oriented parallel to the chute to thus permit cores to drop therepast. One of the doors blocks the entrance to the branch. The doors are hinged so that in response to a blast of air directed perpendicularly thereat, one door is pivoted into an orientation perpendicular to the chute and the second door is pivoted to open the branch. Thus, the falling core can be blown into the branch to be carried to a receptacle associated therewith.

It is characteristic of prior art devices, as exemplified by the foregoing examples, that some type of movable mechanical mechanism be provided for directing the cores along one of two or more paths. Although devices such as these often do operate satisfactorily over extended periods, they occasionally malfunction as a consequence, for example, of the mechanism closing on and partially crushing a core to thus generate dust which thereafter prevents the mechanism from functioning smoothly.

Accordingly, it is an object of the present invention to provide an improved apparatus for separating small articles such as magnetic cores, which apparatus does not use any movable mechanical elements to direct the articles along a selected path.

Briefly, in accordance with the present invention a core separating device is provided which includes a substantially vertically oriented tubular passageway having an entrance opening at the lower end thereof. First and second openings, respectively directed upwardly and downwardly, are provided in the tubular passageway. The first and second openings communicate with a fluid source (e.g. an air supply) through a valve. In one position of the valve, fluid is forced into the passageway through the first opening to develop a low pressure region which functions to draw the core held at the entrance opening up through the passageway from which it can be deposited into a first receptacle. In another position of the valve, fluid is forced into the passageway through the second opening to thus drive a core held at the entrance opening downwardly into a second receptacle.

In accordance with a feature of the invention, the valve is normally positioned so as to direct the fluid downwardly through the passageway so that in the event the valve does not operate properly, cores will be directed into the nonacceptable, rather than the acceptable, receptacle.

The novel features that are considered characteristic of this invention are set forth with particularity in the appended claims. The invention itself will best be understood from the following description when read in connection with the accompanying drawings, in which:

FIGURE 1 is a block schematic diagram illustrating a core testing and handling system;

FIGURE 2 is a perspective view of a preferred embodiment of a core separating apparatus constructed in accordance with the present invention;

FIGURE 3 is an end view of the apparatus of FIGURE 2;

FIGURE 4 is a front view of the apparatus of FIGURE 2; and

FIGURE 5 is a sectional view taken substantially along the plane 5—5 of FIGURE 3.

Attention is now called to FIGURE 1 which illustrates in block diagram form a core testing system employing an apparatus constructed in accordance with the present invention. In the system of FIGURE 1, a large quantity of cores is initially deposited in a core feeder **10** having a chute **12**. A vibrator device **14** is connected to the core feeder **10** and functions to vibrate the feeder to cause the cores held therein to enter the chute **12**. The particular type of feeder employed is not critical to the present invention. However, a typical feeder which is commercially available is the Model No. EB–00 manufactured by "Syntron" which comprises a bowl having, for example, a spiral ledge built therein. In use, a large quantity of magnetic cores are deposited in the bowl and in response to the bowl being vibrated by the vibrator **14**, the cores tend to walk up the spiral path. The spiral path is coupled to the chute **12** into which the cores fall in sequence. The chute **12** is dimensioned so that the cores falling therein of necessity queue up. The lower end of the chute **12** is open and the cores emerge therefrom one at a time. A carriage (not shown in FIGURE 1) takes each core in sequence from the chute **12** and moves it to a testing position.

A control apparatus **16** is provided which apparatus includes a probe **18** adapted to reciprocally move between an operative test position and an inoperative position. On each forward stroke, the probe **18** will pierce a core held by the carriage and move into engagement with contacts **20** and **22** forming part of a test apparatus **24**. The carriage then will return to the chute **12** for another core. The apparatus **24** will perform various tests to determine whether the core through which the probe **18** extends meets the desired set of specifications. U.S. Patent No. 2,817,809 describes a typical sequence of tests which can be performed on the core.

Conductor **26** connects the test apparatus **24** to a valve **28**. The valve **28** couples a fluid supply source **30**, preferably an air supply, to a separating device **32** constructed in accordance with the present invention. When the test apparatus **24** indicates that a core is acceptable, the valve **28** is forced into a first position in which the fluid supply **30** is communicated with a fluid path **34**. Fluid directed through the path **34** creates a low pressure region above the core being tested and thus causes the core to be drawn through a passageway way **36** and into a tube **38** to a receptacle (not shown in FIGURE 1). On the other hand, if the core being tested is not acceptable, the valve **28** communicates the fluid supply **30** with a fluid path **40** which forces the core being tested downwardly into a receptacle **41**.

Attention is now called to FIGURES 2 through 5 which illustrate the details of a preferred embodiment of core separating device **32**. More particularly, the device **32** is comprised of a flat block **42** having upper and lower surfaces **43** and **44** respectively. It is intended that the block be mounted in a substantially horizontal orientation. A tubular passageway **46** extends through the block **42**. The upper end of the passageway **46** is enlarged at **48**. A tubular extension **50** is force fitted into the enlarged passageway portion **48** and projects above the upper surface **44** of the block **42**.

First and second openings **52** and **54** are formed in the wall around the passageway **46**. The first opening **52** is directed downwardly toward a lower entrance opening **56**. The second opening **54** is directed upwardly toward the enlarged passageway portion **48**.

The opening **52** communicates with a passageway **58** defined in the block **42**. The passageway **58** terminates in an enlarged portion **60** which receives a tubular extension **62** therein adjacent one end **64** of the block **42**.

The opening **54** communicates with a small passageway portion **66** which enters into an enlarged portion **68** which extends to an enlarged end portion also receiving a tubular extension therein.

A guide **70** is secured to the lower surface of the block **42** in alignment with the tubular passageway **46**. The guide **70** is comprised of first and second substantially perpendicular guide walls **72** and **74**. A probe guide hole **76** is defined in guide wall **72**.

In the operation of the core separating apparatus, the chute **12** coupled to the feeder **10** of FIGURE 1 delivers cores **78** one at a time to a carrier **77** (FIGURE 4) which moves the cores into alignment with the hole **76** and immediately below the entrance opening **56** to the tubular passageway **46**. The probe **18** of the control apparatus **16** is then projected through the hole **76** and pierces or threads a core **78** and engages contacts **20** and **22** of the test apparatus **24**. Appropriate tests are then performed with respect to the core **78** and the probe **18** is then withdrawn through the hole **76** to thus remove or wipe the core therefrom. Concurrently, the valve **28** is operated by the test apparatus **24** to either force air through the passageways **58** or **68** and out through the openings **52** or **54** depending upon whether the core is acceptable or non-acceptable. In the event the core is acceptable, the air will be driven out of opening **54** to thus create, by Venturi action, a low pressure region in the tubular passageway **46** which functions to draw the core **78** upwardly. Once the core **78** moves past the opening **54**, it is effectively blown through the tubular extension **50** and into flexible tube **38**. On the other hand, if the core is non-acceptable, then the air will be driven out through opening **52** thus driving the core **78** downwardly.

As shown in FIGURE 2, positioned immediately beneath the block **42** is a block **80** which has a first aperture **82** therein positioned immediately beneath the guide means **70** and a second aperture **84** into which extends the flexible tube **38**. Openings **82** and **84** communicate with ramps **86** and **88** within the block **80** which respectively terminate a different receptacles (not shown in FIGURE 2).

The valve **28** is normally biased so as to communicate the fluid supply **30** with the separating device **32** so that fluid is driven out the opening **52**. Accordingly, in case the valve **28** malfunctions, the fluid will force the core **78** into the non-acceptable receptacle. This is significant because it assures that in case of a malfunction, no non-acceptable cores will enter the acceptable receptacle. Inasmuch as the individual cores are relatively inexpensive, it is infinitely better to lose some acceptable cores than to permit non-acceptable cores to be interpreted as being acceptable.

Although the method of fabrication of the core separating device **32** is not critical, it should be appreciated from the drawings that the device can be formed substantially from a single block of properly machined material. If desired, the guide **70** and tubular extensions **50** and **62** can be formed integrally with the block **42** but whether or not this is done depends strictly upon economic considerations. Mounting holes **90** are provided in blocks **42** and **80** to facilitate their mounting.

From the foregoing, it should be appreciated that a core separating apparatus has been disclosed herein which is able to deposit cores in either one of two distinct receptacles which apparatus does not use or require any movable mechanical members for directing the cores.

What is claimed is:

1. Apparatus, for use in a system for testing articles presented one at a time to a testing device, for separating acceptable and non-acceptable articles, said apparatus including:

a wall defining a substantially tubular passageway;

a first opening in said wall directed in substantially a first direction along said tubular passageway;

a second opening in said wall directed in substantially a second direction along said tubular passageway;

a fluid supply source;

valve means selectively communicating said source with said first and second openings; and

means coupling said testing device to said valve means for communicating said source with said first opening in response to a non-acceptable article being tested for forcing said article in a first direction relative to said passageway and for communicating said source with said second opening in response to an acceptable article being tested for drawing said article through said passageway in a second direction.

2. The apparatus of claim **1** including means mounting said apparatus for orienting said tubular passageway substantially vertically with said first opening directed downwardly and said second opening directed upwardly.

3. The apparatus of claim **2** including a guide extending from said wall adjacent the lower end of said tubular passageway.

4. The apparatus of claim **2** wherein said testing apparatus includes means for releasing said articles proximate to the lower end of said passageway.

5. The apparatus of claim **3** wherein said articles comprise magnetic cores and including means for delivering said cores one at a time to a position adjacent to said guide.

6. The apparatus of claim **5** wherein said guide defines a hole therein and wherein said cores are delivered to a position in alignment with said hole; and wherein

said testing device includes a probe adapted to be projected through said aligned hole and core for supporting said core thereon.

7. The apparatus of claim 6 wherein the dimensions of said hole are smaller than the dimensions of said core whereby said guide will remove said core from said probe when said probe is withdrawn through said hole.

8. In combination:

an apparatus defining a tubular passageway having a lower entrance opening;

means for delivering articles one at a time to said entrance opening;

a first upwardly directed opening in said passageway;

a second downwardly directed opening in said passageway; and

means for selectively exhausting a high velocity fluid through said first opening to draw articles from said entrance opening up through said passageway and through said second opening to force articles downwardly from said entrance opening.

9. The combination of claim 8 wherein said articles comprise magnetic cores and wherein said means for delivering includes a guide wall defining a hole therein;

a probe;

means projecting said probe through said hole from a first side of said guide wall for supporting a core on a second side of said guide wall; and

means for withdrawing said probe through said hole to thereby remove said core therefrom.

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