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W. E. RENIKER ET AL
ARTICLE SEPARATING APPARATUS

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Fig. 1

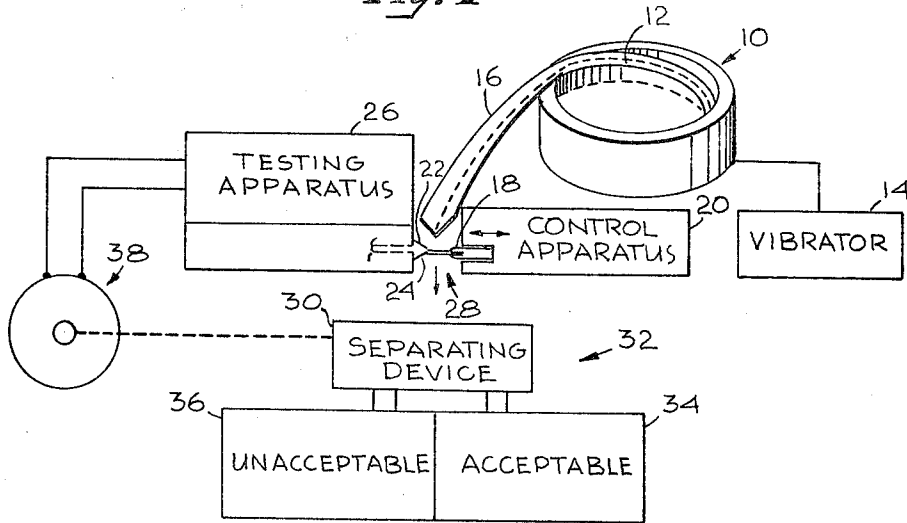
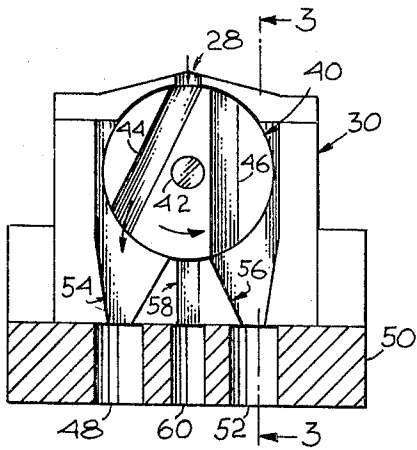


Fig. 2

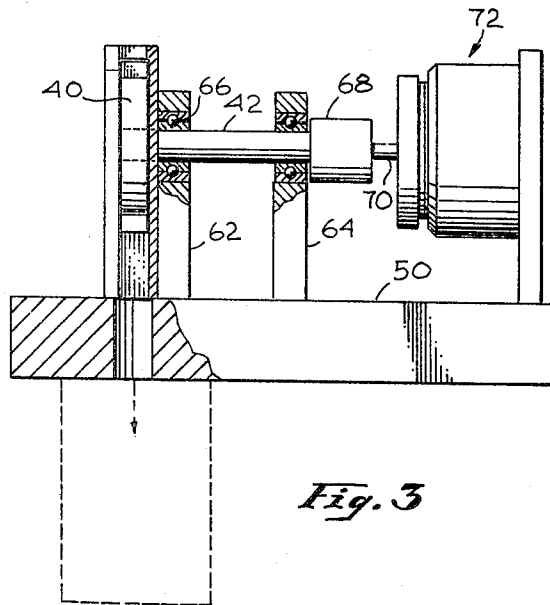


Fig. 3

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ARTICLE SEPARATING APPARATUS

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2 Claims. (Cl. 209—111.8)

This invention relates generally to article handling apparatus and more particularly to improved means for use in article testing apparatus for mechanically separating acceptable and non-acceptable articles.

Great strides have been made in recent years in reducing the size of components used in modern electronic equipment. Although component miniaturization has eliminated many problems with respect to packaging, transporting, etc., new problems, e.g. that of handling small discrete components has arisen.

To be more specific, consider the problems encountered in handling magnetic cores commonly utilized in digital computer memories. Inasmuch as these cores are utilized in great quantities, it is essential that rapid means be available for sizing and testing them. Thus, prior art apparatus is available which is capable of testing the electric and magnetic characteristics of approximately 600 cores per minute. Essentially such apparatus operates by causing the cores to be fed one at a time through an open-ended chute to a reciprocally moving finger mechanism which picks up the cores in sequence and places each core between a pair of electrical probes. The probes close on the core and perform appropriate electric and magnetic tests after which the probes open thereby dropping the core into an entrance opening of a separating device positioned therebeneath. The known prior art separating devices usually comprise a pair of shanks which have oppositely directed ramp portions thereon. On the basis of the electric and magnetic tests, a selected one of the shanks is moved to align its ramp portion with the entrance opening to thus be directed into either a receptacle for acceptable cores or a receptacle for unacceptable cores.

The cores are very small and on occasion are crushed or break thereby forming a dust which often accumulates to the extent of preventing proper movement of the shanks. As a consequence, although prior art devices can rapidly test cores when they are operating properly, in actuality too much "down" time is encountered and the number of cores tested over a period is often inadequate.

In view of the above, it is an object of the present invention to provide a separating device which is simple and inexpensive in construction and yet which is exceedingly reliable.

In accordance with the present invention, a mechanical separating device is provided which comprises a housing enclosing a disc mounted for rotational movement about its axis. The disc is provided with first and second open-ended passageways each of which can be moved into alignment with an entrance opening in the housing. The passage ways extend away from the entrance opening at different angles and thus cores dropped into the entrance opening will be directed through a selected one of the passageways, dependent upon the rotational position of the disc, to an acceptable or an unacceptable receptacle. The rotational position of the disc is of course controlled by the electric and magnetic testing apparatus.

Inasmuch as the per core cost is very nominal, it is not of very great significance to derive the maximum number of acceptable cores out of an untested quantity of cores. Thus, even though close to 75% of all cores tested are usually acceptable, it is much less desirable to permit an unacceptable cores to find its way into the acceptable receptacle than to waste a quantity of cores by permitting

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acceptable cores to be deposited in the unacceptable receptacle. Consequently, in accordance with the invention, the disc is normally oriented so that the passageway communicating with the unacceptable receptacle is normally aligned with the housing entrance opening thus requiring that the disc be rotated whenever an acceptable core is tested.

The novel features that are considered characteristic of this invention are set forth with particularity in the appended claims. The invention itself both as to its organization and method of operation, as well as additional objects and advantages thereof, will best be understood from the following description when read in connection with the accompanying drawings, in which:

FIGURE 1 is a diagrammatic view of magnetic core handling and testing apparatus in accordance with the present invention;

FIGURE 2 is a vertical sectional view through the separating device illustrating in detail the internal construction thereof; and

FIGURE 3 is a vertical sectional view taken substantially along the plane 3—3 of FIGURE 2 illustrating the solenoid apparatus for selectively rotating the separating device disc.

Attention is now called to FIGURE 1 of the drawings which illustrates the article handling and testing apparatus incorporating the improvement of the present invention. The apparatus includes a bowl 10 having a spiral ledge 12 built therein. The bowl 10 is mechanically coupled to some type of vibrator 14. Articles, e.g. magnetic cores are deposited in the bowl and in response to the bowl being vibrated, the cores tend to walk up the spiral path 12 in the bowl. Coupled to the bowl 10 at the uppermost portion of the spiral path is a chute 16 into which the cores fall. The chute 16 has dimensions which are sufficiently small so that the cores falling therein of necessity queue up.

The lower end of the chute 16 is open-ended. Adjacent the open end of the chute 16 is a finger mechanism 18 which is reciprocally moved by a control apparatus 20. The finger mechanism 18 picks up one core with each forward stroke and projects it between first and second probes 22 and 24 extending from a testing apparatus 26. The testing apparatus 26 closes the probes 22, 24 on the core inserted therebetween and holds the core while the apparatus 26 performs appropriate magnetic and electrical tests thereon. A succinct account of what is typically desired in the way of core tests is mentioned in Patent No. 2,817,809 issued on December 24, 1957.

Subsequent to the completion of the tests, the probes 22 and 24 open thus dropping the core into an entrance opening 28 defined in the housing 30 of a separating device 32. The separating device 32 directs each core deposited therein into either an acceptable receptacle 34 or an unacceptable receptacle 36. The separating device 32 is controlled by a signal provided by the testing apparatus 26 and applied to a solenoid apparatus 38.

Attention is now called to FIGURES 2 and 3 which illustrate the details of a separating device constructed in accordance with the present invention. Mounted within the housing 30 is a disc 40 secured to a spindle 42. First and second passageways 44 and 46 are defined in the disc 40. In its normal position, as shown in FIGURE 2, a first end of passageway 44 is in alignment with the entrance opening 28 in the housing 30. The second end of passageway 44 communicates with an opening 48 in a base 50 supporting the housing 30. By rotating the disc 40 in the direction of the arrow, the first end of passageway 46 can be moved into alignment with the housing entrance opening 28. The second end of the passageway 46 thus communicates with opening 52 in the base 50.

The walls in the housing 30 immediately above the base openings 48 and 52 are inclined as at 54 in order to direct any cores falling thereon into the openings. A solid trapezoidal member 56 is supported on the base 50 between the inclined walls 54 and beneath the disc 40. The walls of the trapezoidal or deflection member 56 are likewise inclined to also assure that any cores falling thereagainst are directed into one of the openings in the base 50.

A hole 58 is defined in the center of the trapezoidal member 56. The hole 58 communicates with a hole 60 defined in the base 50. The holes 58 and 60 function as a dust chute to tend to prevent the accumulation of dust between the top of the trapezoidal member 56 and the periphery of the disc 40, which accumulation might tend to inhibit the rotation of the disc.

The spindle 42 is supported by first and second spaced bearing blocks 62 and 64 having ball bearings 66 therein. A coupling mechanism 68 couples the end of the spindle 42 remote from the housing 30 to a shaft 70 of a rotary solenoid 72. The rotary solenoid 72 forms part of the solenoid apparatus 38 previously referred to.

In the operation of the illustrated apparatus, cores deposited in the bowl 10 successively reach the open end of the chute 16 and thus are successively carried by the finger mechanism 18 to the probes 22 and 24. At the completion of a test, the cores are dropped into the entrance opening 28 of the housing 30. Concurrently, the testing apparatus 26 generates a signal if the tests indicate that the core is acceptable. In response to the generated signal, the rotary solenoid 72 is actuated to in turn rotate the spindle 42 and disc 40 to move the passageway 46 into alignment with the entrance opening 28. Thus, an acceptable core will be passed through the passageway 46 and the opening 52 and be deposited in the acceptable receptacle 34. On the other hand, in the event that the test apparatus 26 did not supply a signal to the rotary solenoid 72, the core would fall through the passageway 44 and into the unacceptable receptacle 36.

It is important to note that in the event of a malfunction which inhibits rotation of the disc 40, any cores dropped through the entrance opening 28 will fall into the unacceptable receptacle 36 rather than the acceptable receptacle 34. This action is desirable inasmuch as the per core cost is very nominal and it is much more desirable to waste a small quantity of acceptable cores than it is to permit some unacceptable cores to be deposited in the acceptable receptacle.

From the foregoing, it should be apparent that a mechanical separating mechanism has been provided herein which functions to separate acceptable articles from unacceptable articles after the characteristics of such articles have been tested. It is pointed out that the

structural simplicity of the described mechanism assures reliable and inexpensive operation. Moreover, inasmuch as the rotary solenoid 72 need only be operated when acceptable cores are deposited in the separating device, rather than once for each core, considerably longer solenoid operating life is assured.

What is claimed is:

1. Magnetic core handling and testing apparatus including a pair of electrical probes; means for placing a magnetic core between said electrical probes and for closing said probes to hold said magnetic core; means for testing the characteristics of said magnetic core held between said probes and for generating a signal when said core is acceptable; means for opening said probes subsequent to said testing to thereby permit said core to fall in a predetermined path; a separating means including a housing having an entrance opening aligned with said path; a disc in said housing mounted for rotational movement about its axis; first and second tubular passageways, each having first and second ends, extending through said disc parallel to the plane thereof; means normally orienting said disc for positioning said first passageway first end in alignment with said entrance opening; solenoid means responsive to said signal for rotating said disc to position said second passageway first end in alignment with said entrance opening; a deflection member having first and second inclined surfaces; means supporting said deflection member adjacent the periphery of said disc substantially in alignment with said axis and with said first and second inclined surfaces being respectively disposed adjacent said second ends of said first and second passageways when the first ends thereof are in alignment with said entrance opening; and a dust opening defined in said deflection member extending therethrough between said first and second inclined surfaces.

2. The apparatus of claim 1 including first and second receptacles, each respectively positioned proximate to said first and second inclined surfaces.

References Cited by the Examiner

UNITED STATES PATENTS

2,717,693	9/1955	Holmes	209—111.5
2,999,587	9/1961	Campbell	209—81

FOREIGN PATENTS

139,005	6/1961	Russia.
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OTHER REFERENCES

Büchen, German printed application No. E 10229, published March 1956.

ROBERT B. REEVES, *Primary Examiner*.