

Filed Jan. 19, 1956

COMPUTER DRUM CONSTRUCTION

3 Sheets-Sheet 1

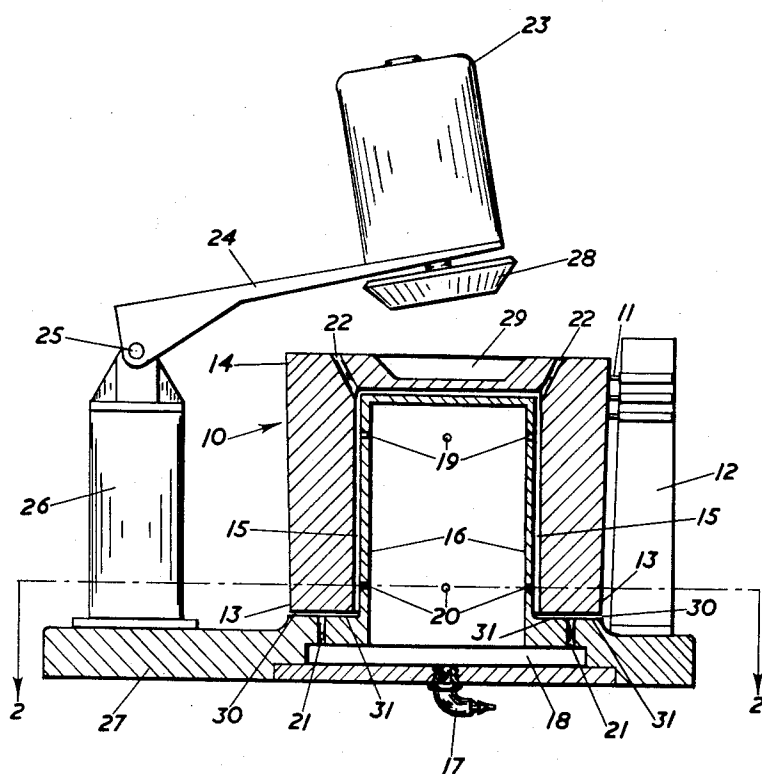


FIG.1

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2,929,671

Filed Jan. 19, 1956

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FIG. 2

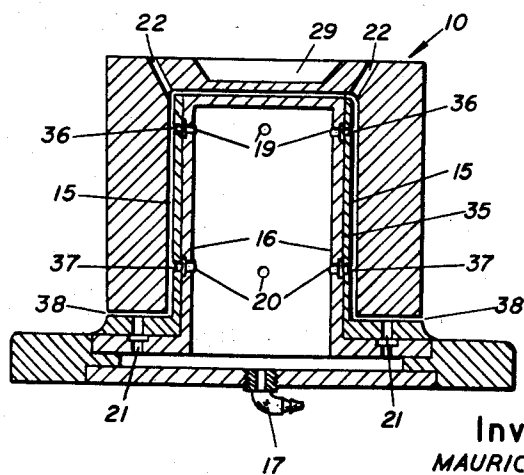
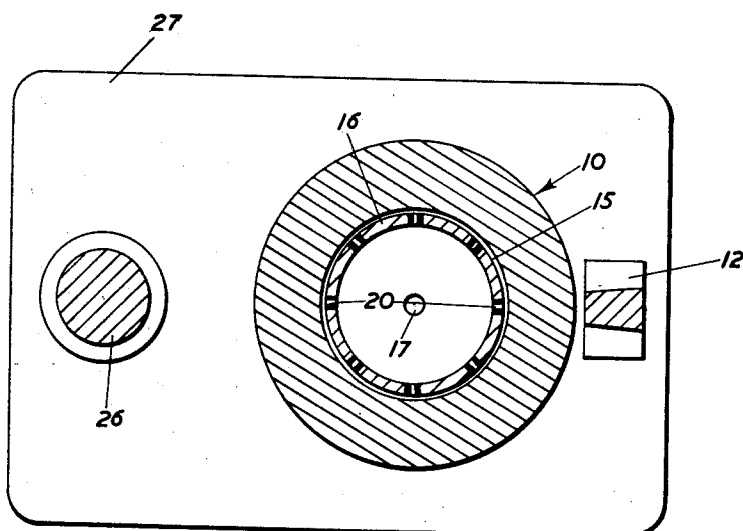


FIG. 3

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3 Sheets-Sheet 3

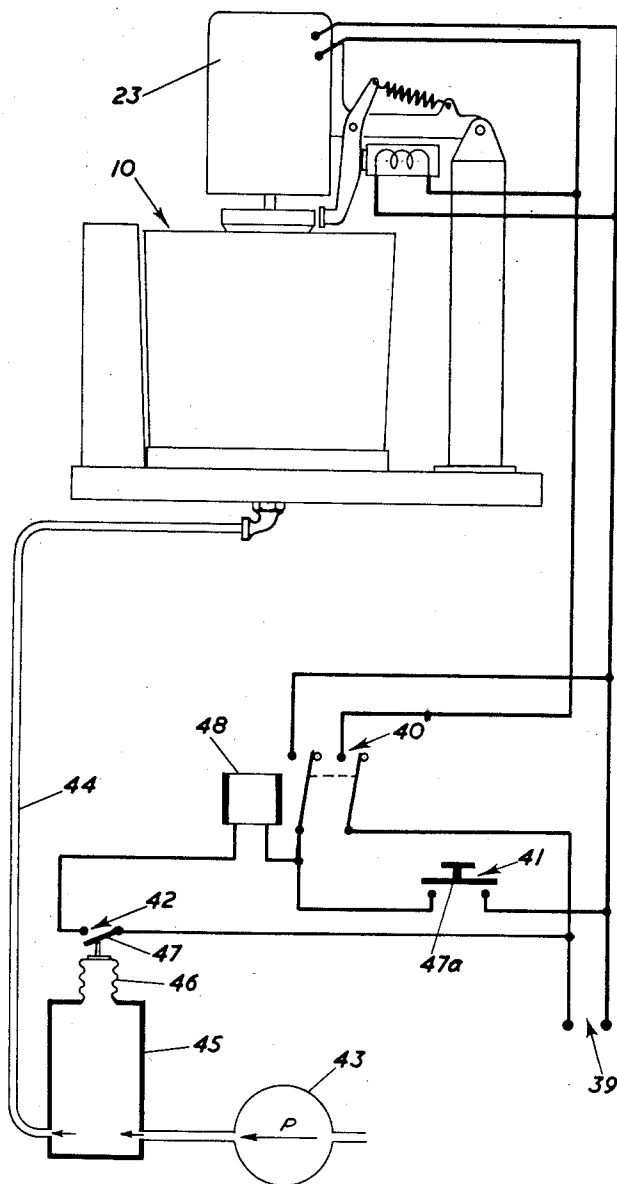


FIG. 4

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COMPUTER DRUM CONSTRUCTION

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Application January 19, 1956, Serial No. 560,259

5 Claims. (Cl. 346—74)

This invention relates to a drum construction for a computer machine.

In computer equipment it is usual to store information on drums which are coated with a magnetic material and which, in operation, are adapted to rotate with respect to a magnetic head. In most cases the magnetic heads are stationary and the drums rotate.

The provision of a satisfactory bearing construction for the cylinder has in the past always been a mechanical problem of quite some importance in the manufacture and operation of this equipment. Bearing constructions previously used have on the whole been costly, delicate to adjust, and not easy to remove. I have invented a bearing construction and a drum construction which I believe has substantial advantage over those previously tried.

Apart from the bearing construction, I have invented improvements in the side wall surfaces of the drum which greatly facilitate its removal from its mounting spindle in use.

Generally speaking, my storage drum is cylindrical in cross-section and has side walls that taper outwardly from the lower end thereof. The lower end is formed with a cylindrical bore that extends longitudinally of the drum. In use, the cylindrical bore is dropped over a hollow cylinder and air under pressure is admitted to the cylinder. Passage means are provided in the cylinder walls to permit air to escape from the interior thereof to the space between the drum and the exterior cylinder walls. Escape passage means are provided in the drum to permit the air to escape from the bore at a predetermined rate so that, in effect, the air forms a bearing for the drum on the cylinder in use. The magnetic heads which engage the sides of the drum engage the tapered exterior walls thereof so that as the drum is withdrawn from the cylinder the spacing at the top of the cylinder between the heads and the cylinder walls increases whereby there is a considerable amount of side movement permitted in the drum as it is withdrawn from the cylinder without affecting the adjustment of the magnetic computer heads and without damaging the drum surface by reason of contact with the heads.

The invention will be clearly understood after reference to the following detailed specification read in conjunction with the drawings.

In the drawings:

Figure 1 is a view partly in section illustrating a magnetic drum according to the present invention.

Figure 2 is a sectional view taken along the line 2—2 of Figure 1.

Figure 3 is an alternative drum and drum mounting construction; and

Figure 4 is a still further alternative construction.

Referring to the drawings, and at first to Figure 1 wherein the recording drum of a computer machine is illustrated, the numeral 10 generally refers to a storage drum. It is coated with a magnetic material and, in use, the cylindrical side walls thereof engage with the magnetic heads 11 mounted on the pillar 12. The broad

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concept of providing a cylindrical drum 10 that rotates past magnetic heads 11 in the storing of information is well known and need not be amplified upon any further in this specification. My invention, as indicated above, relates to an improvement in the drum construction and in its mounting.

A feature of considerable importance about the construction of my drum is the fact that the cylindrical side walls thereof taper outwardly from the bottom 13 thereof to the top 14 thereof. It will be appreciated that it is sometimes necessary to remove drums such as the drum 10 from their mounting, and as they are lifted from their bearing there is a tendency for the lower end portion thereof to move laterally and destroy the setting of the magnetic heads 11. By tapering the cylindrical side walls of the drum as just described it will be apparent that the spacing between the side walls at the lower end of the drum and the heads 11 at the top of the pillar 12 will be increased as the drum is withdrawn, so that a greater lateral movement is permissible without damaging the setting of the heads or the drum as the drum is removed.

A further feature of importance in my invention is the means for rotatably mounting the drum 10. According to my invention the drum 10 is formed with a cylindrical bore 15 which extends longitudinally thereof. It is mounted over a hollow cylinder 16 which is connected to an air supply 17 through the chamber 18 which, in effect, forms a part of the interior of the hollow cylinder 16. The hollow cylinder 16 is formed with passage means 19, 20 and 21 which communicate between the interior thereof and the space between the exterior thereof and the bore 15 of drum 10. Drum 10, it will be noticed, is formed with passage means 22 which communicate between the bore formed therein and the exterior thereof.

It might well be added at this point that the numeral 23 is a driving motor mounted on the free end of the arm 24 which is, in turn, pivotally mounted as at 25 to the post 26, the latter being rigidly mounted on the frame 27 of the equipment. The shaft of motor 23 carries a resilient clutch member 28 that frictionally engages with an opening 29 in the top of drum 10 to rotate it in use, as will be described more fully later.

In use, air is forced under pressure through the connection 17 to the interior of the hollow cylinder 16. It escapes through the passages 19, 20 and 21 to fill the space between the drum 10 and the cylinder 16 with air under pressure, thereby eliminating all frictional contact between the two members. Air escapes from the space between the two members through the openings 22 and from the space indicated at 30 between the lower end of the drum and the shoulder on the base of the equipment. The passages 21 are adapted to lift the drum as a whole by means of the air passing through them from the shoulder 31 of the base 27. Passages 19 and 20 are adapted to prevent frictional contact between the sides of the bore of the drum 10 and the hollow cylinder. Passages 22 in the drum merely permit the escape of air from the space between the drum and the cylinder and prevent a buildup of air pressure which might tend to lift the whole drum from its mounting.

The air pressure under which the bearing is operated must, of course, be sufficient to maintain the air space between the drum and the cylindrical member under the weight of the driving motor 23 at its operating speed. I have found that with a drum having a diameter of about 10 inches and a motor having a weight of about 5 pounds, that an air pressure of 10 pounds per square inch is sufficient. This is a matter of mechanical skill.

It will be apparent that a drum according to my invention is very easily removed from its mounting. It is merely necessary to swing back the motor and lift the

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drum from the cylinder. By plugging air holes 22 the air supply will assist in the removal of the cylinder. Clearances between the drum and the cylinder under operating conditions are in the neighbourhood of between .001 inch and .005 inch, so that it will be apparent that little difficulty will be encountered due to friction in removing the drum.

In Figure 3, I illustrate a bearing construction having an alternative frictional bearing which goes into operation in the event that the air supply for the air bearing just referred to should fail for any reason. In this case I provide a sleeve 35 rotatably fitted about the cylinder 16. Sleeve 35 is formed with slots 36, 37 and 38 elongated in the direction of rotation of the drum over the cylinder, which register with the passages 19, 20 and 21 so that the operation of the bearing as an air bearing under normal conditions is not changed from that described above. In use, if the air supply should fail and the drum 10 should seize to the sleeve 35, the drum and sleeve will together rotate about the cylinder 16 by reason of the bearing surface provided between the cylinder 16 and the sleeve 35.

In Figure 4, I illustrate an electric relay method of protecting the equipment against seizure of the air bearing due to failure of the pump. In this case, the driving motor 23 for the drum 10 is connected to the electric power supply 39 through relay 40, push button 41 and circuit breaker 42. Air pump 43 supplies air through the line 44 to operate the air bearing of the drum 10. A chamber 45 having a bellows 46 which controls the contact 47 of circuit breaker 42 is connected in the air line. Numeral 47a is the contact of the manually operable push button switch 41.

When the manually operable push button switch is closed, and the pressure in the line 44 is sufficiently high to cause the bellows 46 to close the circuit breaker contact 47, the magnetic solenoid 43 operates to close the relay 40. This completes the circuit to the motor 23 and the drum rotates. If the air pressure should drop so that the drum 10 does not have a proper air bearing on the cylinder about which it rotates, bellows 46 would contract to open the circuit breaker 42, the solenoid 43 would be de-energized and the relay 40 would open thereby cutting power supply to the motor and stopping the drum. After the fault is corrected, of course, the equipment can be reset.

I claim:

1. For computer equipment, a storage drum having an outer side wall, a top and a bottom, said drum having a transverse cross section that is round in outline, said side wall of said drum having an outermost peripheral

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layer of magnetic recording material, the bottom of said drum being formed with a bore for mounting said drum for rotation about the longitudinal axis thereof, said outer side wall being tapered outwardly from said bottom to said top whereby the outline of the transverse cross-sections of said drum increases in diameter as the distance from said bottom increases whereby said outer side wall defines a truncated cone, and mounting means for mounting said drum for rotation about the longitudinal axis thereof, said mounting means for mounting said drum including a hollow member adapted to slidably receive thereover said bore of said drum, said hollow member being formed for admitting a gas under pressure to the hollow interior thereof, said hollow member being formed with passage means communicating from the hollow interior thereof to the space between said cylinder and drum for maintaining a flow of gas under pressure to said space, said drum being formed with passage means communicating between the space between 20 it and said hollow member and the exterior of the latter whereby to form an air bearing for said drum on said hollow member and drive means for rotating said drum on said mounting means.

2. Computer equipment as claimed in claim 1 in which said bore formed in the bottom of said drum is cylindrical.

3. Computer equipment as claimed in claim 1 having safety means responsive to air supply failure in said hollow member for preventing damage due to relative rotation between said hollow member and said drum.

4. Computer equipment as claimed in claim 2 having safety means responsive to air supply failure in said hollow member for preventing damage due to relative rotation between said hollow member and said drum.

5. Computer equipment as claimed in claim 3 in which said safety means includes a relay for turning the drive means of said drum on and off.

References Cited in the file of this patent

UNITED STATES PATENTS

1,194,645	Lincoln	Aug. 25, 1916
2,259,715	Woolf	Oct. 21, 1941
2,435,343	Downey	Feb. 3, 1948
2,603,539	Brewster	July 15, 1952
2,631,905	Coppen	Mar. 17, 1953
2,670,146	Heizer	Feb. 23, 1954
2,820,688	Philbrick	Jan. 21, 1958

FOREIGN PATENTS

726,018	Great Britain	Mar. 16, 1955
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