March 25, 1952 F. B. AUBERT 2,590,486

SCLEROSCOPE AND CLUTCHING MECHANISM THEREFOR

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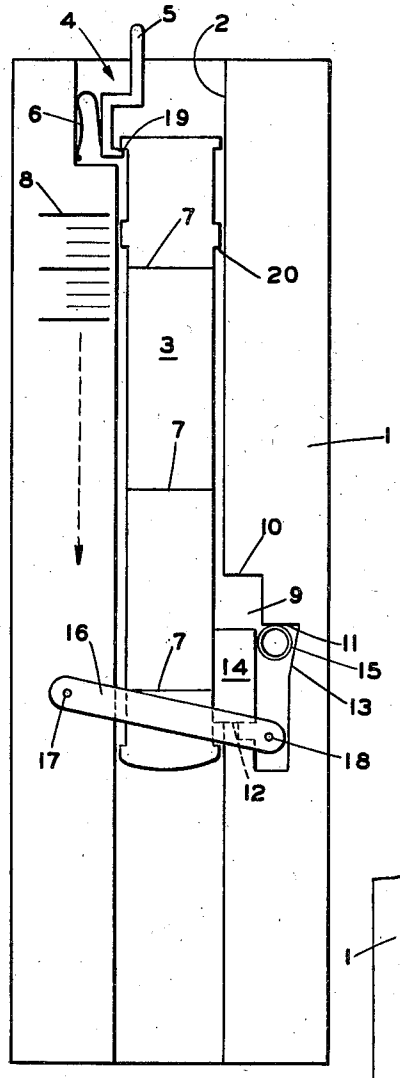


FIG. 1

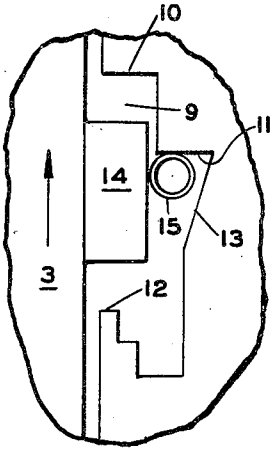


FIG. 2

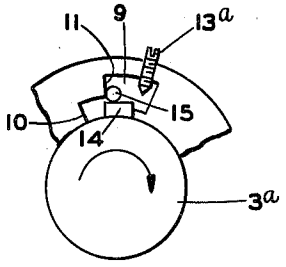


FIG. 5

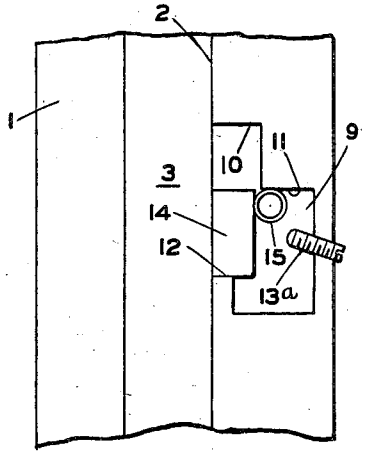


FIG. 4

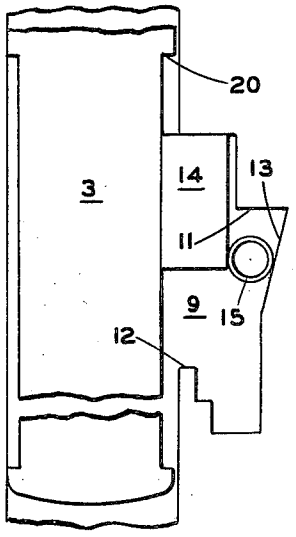


FIG. 3

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SCLEROSCOPE AND CLUTCHING MECHANISM THEREFOR

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12 Claims. (Cl. 73—79)

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This invention relates to new and useful improvements in hardness testers of the type known as scleroscopes and more particularly to braking or clutching mechanisms therefor.

One of the objects of this invention is to provide a scleroscope of new and improved construction.

Another object is to provide a scleroscope having a new and improved clutching mechanism for stopping the test plunger at the maximum height of rebound.

Another object is to provide a magnetically actuated clutching mechanism for scleroscopes or the like.

Another object is to provide a clutching mechanism including a magnetically actuated wedge mechanism for stopping a reversably movable member at the point of maximum movement in one direction.

Another object is to provide a scleroscope having a new and improved non-return clutch which is easily and inexpensively manufactured and assembled.

Other objects will become apparent from time to time throughout the specification and claims as hereinafter related.

This invention comprises the new and improved construction and combination of parts, which will be described more fully hereinafter and the novelty of which will be particularly pointed out and distinctly claimed.

In the accompanying drawings, to be taken as a part of this specification, there are clearly and fully illustrated two preferred embodiments of this invention, in which drawings:

Figure 1 is a view in front elevation showing this scleroscope and its clutch mechanism just prior to actuation,

Fig. 2 is an enlarged detail view of the clutch mechanism shown in Fig. 1 in a partially actuated position,

Fig. 3 is an enlarged detail view similar to Fig. 2 and showing the clutch mechanism in a "locking" position,

Fig. 4 is a fragmentary view of an alternate form of clutch mechanism, and

Fig. 5 is a fragmentary view of this clutch mechanism applied to rotary motion.

Referring to the drawings by numerals of reference there is shown in Fig. 1 a supporting member generally designated as 1 and having a guide passage 2. There is a movable member or hammer plunger 3 of a magnetic material such as iron or steel slidably positioned in the guide and held in an initial predetermined position by

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a catch 4 having a manual operating finger 5 and biased to catching position by a spring 6. The plunger 3 has one or more indicator lines 7 thereon adapted to be read against spaced indicia 8 adjacent the guide 2. There is a recess 9 adjacent and open to the guide 2. The recess 9 has an upper stepped end wall having portions or shoulders forming upper stops 10 and 11 respectively. The recess 9 also has a lower wall a portion of which forms a lower stop 12 and an inclined side wall or other appropriate stop surface 13. A permanent magnet 14, preferably rectangular in shape, is positioned in the recess 9 abutting the plunger 3 and held thereagainst by magnetic attraction and initially seated on the lower stop 12. Positioned beside the magnet 14 in the recess 9 and initially carried by the upper end thereof against the stop 11 there is a wedging member 15 of a magnetic material such as iron or steel. The wedging member 15 is preferably of circular cross-section and is shown as a hollow cylinder although other suitable shapes might be used. For releasing the cylinder 15 from a wedging or locking position there is provided a reset arm 16, pivoted as at 17, and having an actuating pin 18 extending into the lower end portion of the recess 9. The plunger 3 has an upper shoulder 19 receiving the catch 4 and a lower shoulder 20 or other suitable means operable to prevent the plunger from dropping past the magnet 14 out of the guide.

Operation

For purposes of describing the operation of this invention it is not believed necessary to provide a detailed description of the theory of the scleroscope as it is well known in the art. Briefly, a hammer plunger is dropped from a predetermined height on the surface to be tested. The height of rebound is a measure of the hardness of the material being tested. The plunger is usually dropped in a calibrated tube and a clutch mechanism provided to stop the plunger at the maximum height of rebound. The clutch mechanisms heretofore used have depended upon gravity for operation, using ball bearings, ratchet gears or the like, and have given erratic results and have been generally unsatisfactory.

The present invention provides an improved clutch mechanism which is positive in its action and is particularly adapted to small portable units.

In operation, the supporting body member 1, with the plunger in an "up" position is posi-

tioned against the surface to be tested and vertical thereto. The finger 5 of the catch 4 is deflected to release the plunger 3 for dropping movement. The cylinder or wedging member 15 when held by the upper end of the magnet is spaced from the inclined wall 13. As the plunger 3 falls it slips past the magnet 14 which is prevented from moving downward by the lower stop 12. The plunger 3 strikes the surface to be tested with an impact and rebounds to a height dependent upon the hardness of the surface. As the plunger 3 rebounds upward the magnet 14 is carried along with it by magnetic attraction. As the magnet 14 moves upward it slips past the cylinder or wedging member 15 which is prevented from moving upward by the upper wall or stop 11. This point of operation is shown in detail by the enlarged detail view in Fig. 2. As the magnet 14 moves toward its upper stop 10 it moves past the cylinder 15 until the cylinder is positioned at a point below the point of zero flux of the magnetic field of the magnet which is known as the "zero point" or "axis point" of the magnet. When the cylinder 15 is thus positioned below the zero point of the magnetic field it is pulled positively by magnetic attraction to the lower end of the magnet and wedged between the magnet and the inclined wall 13 (see Fig. 3). When this wedging movement occurs the plunger 3 may still continue its upward movement but when it reaches its maximum height of rebound and attempts to fall downward the downward force of the plunger acting through the magnet will tend to roll the cylinder more tightly into the space between the inclined wall and the magnet thus acting as a clutch or brake to stop downward movement. The height of rebound may then be measured by reading one of the indicator lines 7 against the indicia 8 which may be calibrated directly to standard hardness readings such as "Rockwell" or "Brinell" numbers.

To reset the device for another operation it is simply inverted and then righted again. This inversion will move the plunger past the catch 4 to the top of the guide and when righted the plunger will be locked in that position by the cylinder 15 as if it had rebounded to that height in normal operation. The reset member 16 is then moved upward causing the pin 18 to engage and dislodge the cylinder 15 from engagement with the inclined wall 13. The plunger 3 will thereupon drop into catching relation with the catch 4 and the cylinder 15 will have moved to the upper end of the magnet as shown in Fig. 1, the device now being ready for another operation. It should be noted that the distance between the stop shoulders 10 and 11 must be such as to move the cylinder past the zero point of the magnetic field of the magnet 14 upon upward movement thereof.

Construction and operation of Fig. 4

In the form of scleroscope shown in Fig. 4 the plunger 3 is shown as completely filling the guide passage 3. The inclined wall 13 of the recess 9 has been replaced with an adjustable abutment or screw member 13a which is of magnetic material and which proivdes a side stop. In braking operation the wedging member or cylinder 15 will assume a wedging position between the magnet 14 and side stop or abutment 13a, the operation being otherwise as previously described. The adjustable abutment 13a serves a dual purpose. Firstly, by being adjustable its position relative to the braking cylinder 15 can be varied to compensate for variations in size of the cylinder 15, magnet 14, and plunger 3. Secondly, being magnetic it will have an attraction for the cylinder 15 when in wedging position to reduce any possible tendency to slip.

Although the two forms of "non-return" clutch or brake mechanism just described have been illustrated in connection with a scleroscope either could be used in any application where it is desired to permit a movable member to move in one direction, then in the opposite direction, and lock it at the point of maximum movement in said opposite direction against return movement in said one direction. It should also be noted that although this clutch mechanism has been described for reciprocal rectilinear motion its principle of operation would be equally applicable to rotary motion, as shown in the fragmentary view Fig. 5. In applying this clutch to rotary motion the plunger 3 would become a rotary member 3a and the magnet 14 would be curved in the direction of rotation, fitting the surface of the rotary member as a brake shoe. This variation is believed to be so obvious as not to require further description, its operation being the same as that described for Figs. 1 and 4. For other possible applications of this invention it might be noted that it could be used in an impact test machine, or pressure or temperature recording apparatus for recording maximum values.

Having thus described the invention what is claimed and desired to be secured by Letters Patent of the United States is:

1. A scleroscope comprising a supporting member defining a guideway, a hammer plunger of a magnetic material positioned for dropping and rebound movement in said guideway, upper and lower stops disposed along said guideway, said guideway having a lateral recess between said stops having a portion of reduced width forming a side stop, a magnet movable between said stops and initially seated against the lower of said stops, said magnet being movable by said plunger toward said upper stop upon rebound movement thereof, and a wedging member of magnetic material in said recess and initially adjacent the upper end of said magnet and movable by said magnet into wedging relation to said magnet and said plunger upon movement of said magnet to said upper stop.

2. A scleroscope as defined in claim 1 wherein there is provided an upper stop for the wedging member adjacent the magnet, the wedging member is of circular cross-section, and the distance between the upper stops is such that movement of the magnet to its upper stop positions the wedging member below the zero point of the magnet to cause the same to be attracted into a wedging position between the lower end of said magnet and said side stop to wedge said plunger against one wall of said guideway.

3. A scleroscope comprising a supporting member defining a guideway, a hammer plunger of a magnetic material positioned for dropping and rebound movement in said guideway, a releasable catch member engageable with the upper end of said plunger and operable to drop the same from a predetermined height, upper and lower stops disposed along said guideway, said guideway having a lateral recess between said stops having a portion of reduced width forming a side stop, a magnet movable between said stops and initially seated against the lower of said stops, said magnet

being movable by said plunger toward said upper stop upon rebound movement thereof, a wedging member of magnetic material in said recess and initially adjacent the upper end of said magnet and movable by said magnet into wedging relation to said magnet and said plunger upon movement of said magnet to said upper stop, and a movable reset member engageable with said wedging member to dislodge the same from said wedging relation after movement of said plunger to a point above said catch member.

4. A scleroscope as defined in claim 3 wherein there is provided an upper stop for the wedging member adjacent the magnet, the wedging member is of circular cross-section, and the distance between the upper stops is such that movement of the magnet to its upper stop positions the wedging member below the zero point of the magnet to cause the same to be attracted into a wedging position between the lower end of said magnet and said side stop to wedge said plunger against one wall of said guideway, and said reset member is so positioned relative to said side stop that upon engaging movement with said wedging member it will move the same past the zero point to the upper end of said magnet.

5. A scleroscope as defined in claim 1 wherein the side stop of said recess is an inclined wall and the wedging member is of circular cross-section and operable to wedge said plunger against one wall of said guideway.

6. A scleroscope as defined in claim 1 wherein the side stop of said recess is an abutment member threadedly adjustable and the wedging member is of circular cross-section and operable to wedge said plunger against one wall of said guideway.

7. A scleroscope comprising a supporting member having a guideway, a hammer plunger of magnetic material positioned for dropping and rebound movement in said guideway, said supporting member having a recess opening into said guideway defining a stepped upper end wall forming two spaced upper stops and a lower wall forming a lower stop and a side wall providing a side stop, a magnet positioned in said recess engaging said plunger and initially seated against said lower stop, said plunger being operable upon dropping movement to slip past said magnet and upon rebound movement to move said magnet toward the one of said upper stops adacent said guideway, a wedging member of magnetic material carried in said recess by said magnet initially at the upper end of said magnet against the other of said upper stops and in a non-wedging position, and said upper stops being so spaced that said magnet in its upward movement will move past said wedging member a sufficient amount so that said wedging member will be positioned below the zero point of the magnetic field of said magnet, the magnetic field of the lower end of said magnet thereupon being operable to pull said wedging member into a wedging position between the lower end of said magnet and said side stop to wedge said plunger against one wall of said guideway.

8. A scleroscope as defined in claim 7 wherein the wedging member is of circular cross-section, the side wall of said recess being inclined downward toward said guideway and forming said side stop, and said wedging member when carried by the upper end of said magnet being spaced from said inclined side wall.

9. A scleroscope as defined in claim 7 wherein the side stop of said recess is an abutment member threadedly adustable and the wedging member is of circular cross-section and operable to wedge said plunger against one wall of said guideway.

10. In combination, a movable member of magnetic material arranged to have movement first in one direction and then in the opposite direction, a plurality of stops adjacent said movable member; a magnet engaging said movable member as a brake shoe, movable between two of said stops, and initially seated against one of said stops; said magnet being movable by said movable member toward the second of said stops upon movement thereof in said opposite direction, the third one of said stops being spaced laterally from said magnet at a point between the other two stops, and a wedging member of magnetic material movable by said magnet into a wedging position between said magnet and the third stop upon movement to said second stop and operable thereby to apply a braking force to said movable member at any point of movement that said movable member attempts to reverse its direction of movement from said other direction to said one direction.

11. In combination, a movable member of magnetic material, means guiding said movable member for movement first in one direction and then in the opposite direction, a plurality of stops adjacent said movable member; a magnet engaging said movable member as a brake shoe, movable between two of said stops, and initially seated against one of said stops; said movable member being operable upon movement in said one direction to slip past said magnet and upon movement in said opposite direction to move said magnet toward the second of said stops, the third one of said stops being spaced laterally from said magnet at a point between the other two stops, a wedging member of magnetic material carried initially by one end of said magnet and spaced from said third stop, the fourth one of said stops being cooperable with said wedging member to prevent movement thereof with said magnet in said opposite direction, and said stops being so spaced that said magnet in its movement in said opposite direction will move past said wedging member a sufficient amount that said wedging member will be positioned beyond the zero point of the magnetic field of said magnet, the magnetic field of said other end of said magnet thereupon being operable to pull said wedging member into a wedging position between the other end of said magnet and said third stop.

12. A device as defined in claim 11 wherein said third stop comprises an adjustable abutment of magnetic material, and said wedging member is of circular cross-section.

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