June 10, 1930. P. P. ROUDIÉ 1,762,639

IMPLEMENT FOR MEASURING THE HARDNESS OF METALS

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Fig. 1

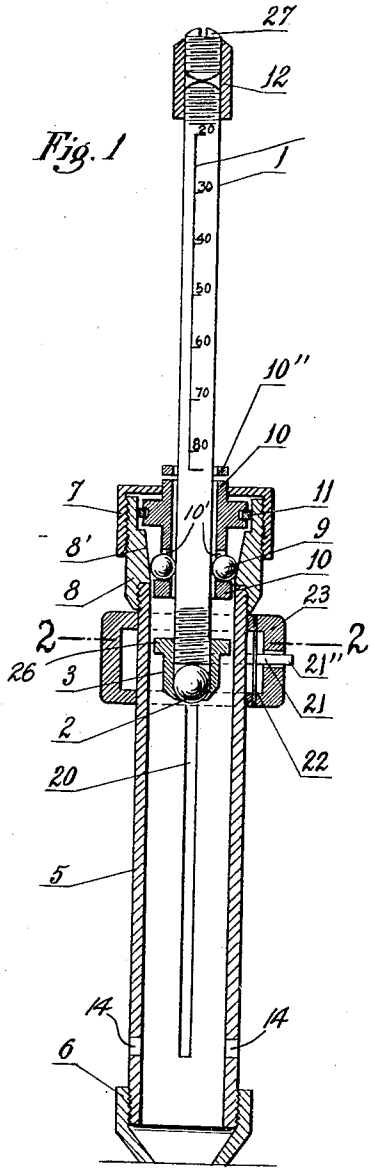
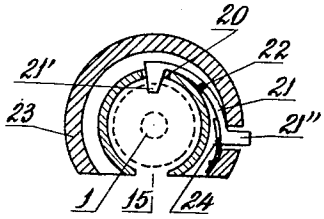


Fig. 2



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IMPLEMENT FOR MEASURING THE HARDNESS OF METALS

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The present invention relates to an implement designated a scleroscope whereby the hardness of a metal under test may be observed at once by a reading upon a graduated scale.

Known implements are in use for measuring the hardness of metals, in which a steel ball is dropped from a given height upon the surface of the test specimen, the ball rebounding to different heights according to the degree of hardness of the metal. The height of the rebound is then measured, and the corresponding hardness is determined from a table. However, such implements require careful manipulation, and their use is confined to the laboratory.

The implement according to my invention has, on the contrary, a substantial construction and affords exact observations. The desired values can at once be read, and by its use I am enabled to make a series of measurements which are quite comparable, in a very short time. The implement is based, as before, upon the elastic deformation of a hard body of suitable shape under the action of a given impact, and the height to which the said body rebounds will show the degree of hardness of the metal under test.

However, the essential feature of the improved implement consists in the fact that when the impact member rebounds after its impact upon the test specimen, it will be held automatically at the maximum height which it reaches during the rebound, which height, as above stated, corresponds exactly to the degree of hardness of the metal. When the impact member is thus held, it can no longer descend, though it is enabled to rise freely, so that it can only be made to drop again for the next test after it has been brought back into the initial position from which it was first dropped, and in this way it will always fall from a constant height.

The impact member may consist of a rod or spindle which can be freely dropped in the interior of a guiding device, and which is provided at its lower end with a hard metal piece which may be separably secured thereto and at its upper end with a suitable head or abutment which is preferably adjustable.

In the accompanying drawing, Figure 1 is a longitudinal sectional view of a preferred form of implement embodying my invention, and Fig. 2 is a cross-section thereof on line 2—2, but with the impact member and connected parts in dotted lines.

As shown in the drawing, the improved implement comprises a drop rod 1 constituting the aforesaid impact member and carrying at its lower end a steel ball 2 disposed within a socket 3 that is screwed on the rod end. The rod is guided in a tube 5 on whose lower end is screwed a cap 6, and on whose upper end a sleeve 8 is mounted; said sleeve having a threaded cap 7 fitted on it.

At the upper part of the implement two clutches or analogous coupling or retaining devices are provided, one of which serves to hold the rod in the position into which it has rebounded after having been dropped upon the surface of the test piece of metal; while the other device is utilized to hold the rod at the height to which it has been raised at the start and from which it is to make its drop. The device first mentioned consists of the sleeve 8 which has its inner wall shaped to form a tapered surface 8′ for coaction with a set of steel balls 9 mounted in a cage or carrier 10 having slots 10′ to receive the balls, which latter can thus be jammed between the tapered surface 8′ of the sleeve and the surface of the rod 1. The cap 7 is formed with a central opening wherethrough the cylindrical top part of the cage 10 projects, such part being cut away or slotted at 10″ to produce a resilient or spring action.

The cage is mounted to have a slight axial or vertical sliding movement within sleeve 8 to effect the clutching or unclutching action of the balls, according to the direction of movement, but it is normally held against displacement by means of an annular spring 11 which is fitted in a circumferential seat or groove in an enlarged part of the cage and is designed to bear against

the inner wall of the sleeve with light pressure.

In conjunction with this device, there is provided a head 12 which is threaded on the upper end of the drop rod so as to be capable of a limited adjustment, and which is held in adjusted position by means of a locking screw 27. This head is adapted to strike against the projecting end of the cage 10, thereby forcing said cage slightly downward with the result that the balls 9 which it carries are set for action. The rod can be readily lifted by means of its head 12; and when it has reached the end of its movement the socket 3 will strike against the cage and raise it slightly, whereupon the clutch balls will be released, the socket preferably having its upper end enlarged or flanged as indicated at 26.

The other device previously referred to consists of a catch or trigger 21 pivoted intermediate its ends on a pin 22 that is mounted vertically in a collar 23 that encircles the upper part of the guide tube 5; such collar having an appreciably larger diameter than the tube and being mounted to slide thereon with a slight degree of friction so that it will be held in adjusted position. The tube 5 is provided with front and rear longitudinal slots 15 and 20, which are located diametrically opposite each other and the former of which enables an inspection of the movements of the drop rod 1 and, in particular, its rebound; the collar 23 being so arranged with relation to this slot as not to cover it. The catch 21 is of arcuate shape, as represented in Fig 2, and is disposed in the space within said collar between the side wall of the latter and the tube 5, and it is provided at one end with a lug or push-piece 21″ that projects outward through an opening in the collar well, and at its other end with a nose 21′ that projects inward through the slot 20 into position to engage beneath the flange 26 on the socket 3 and thus support the latter and, hence, the drop rod 1 in raised position before the drop is made. The catch has a spring 24 associated with it whereby its nose end is normally forced inward.

To measure and indicate the extent of the rebound of the drop rod, as well as to enable the rod to be positioned accurately for the drop, a suitable scale or scales may be provided at some desired point or points on the implement. In the present instance, the drop rod itself is graduated for that purpose, the complemental element in that case being the top face of the projecting upper end of the ball cage 10. Any braking effect which the air contained in the tube or casing 5 might have on the movements of the rod and which would, in consequence, impair the accuracy of the tests and the readings, can be avoided by forming perforations or vents in the lower portion of the tube, as indicated at 14.

The operation is substantially as follows:—The rod 1 is moved upward far enough to enable the catch 21 to engage the flanged edge 26 of the ball socket 3, it being understood, of course, that the collar 23 which carries the catch has previously been adjusted to dispose said catch at the desired height. The rod will thus be held in proper position for the test, and the implement can then be placed in contact at its lower end with the surface of the piece of metal to be tested, whereupon the lug 21″ on the catch is pushed inward. This disengages the nose 21′ from the socket 3, whereupon the rod drops of its own weight and the ball 2 strikes against the test piece. Just as, or before, the rod reaches the end of its down-stroke, its head 12 hits against the cage 10, forcing it slightly downward and setting the balls 9 ready to clutch the rod. The rod rebounds immediately upon striking the test piece, and as soon as it has reached the upward limit of its movement and is about to descend, it will be gripped by the clutch balls and held stationary. The height of the rebound can then be read from the scale and compared with the table of hardness values.

For the next operation, the rod must first be raised far enough for the socket 3 to strike against the bottom of the cage 10, thereby raising the same and, with it, the balls 9 which are unclutch from the rod. The latter is then lowered until its socket rests upon the catch, so that when said catch is released, the rod will fall and the cycle of operations described above will be repeated. The effective stroke of the rod can be varied to a slight degree, independently of the adjustment of collar 23, by adjusting the position of the lower cap 6 on the guide tube, said cap having a threaded engagement with the tube, as has been stated.

I claim as my invention:

1. A scleroscope, comprising a guide tube; an impact rod movable therein and adapted to be dropped upon the surface of a test piece; a ball clutch acting automatically to engage and lock said rod at the top of its rebound; and a controlling device mounted upon the upper part of the rod for operating on said clutch and embodying a head adjustably positioned on the rod.

2. A scleroscope, comprising a guide tube; an impact rod movable therein and adapted to be dropped upon the surface of a test piece; a ball clutch mounted in the upper part of the tube for automatically locking said rod at the top of its rebound, said clutch including a movable cage; and a head adjustably mounted upon the upper part of the rod to strike against and thereby shift

said cage into operative position at the end of the drop.

3. A scleroscope, comprising a guide tube; an impact rod movable therein and adapted to be dropped upon the surface of a test piece; and freely-adjustable means for regulating the height of the drop, said means embodying a ring encircling the tube and adjustable vertically thereon, and a spring-pressed catch carried by the ring and engageable with a part provided on the rod.

4. A scleroscope, comprising a guide tube; a rod movable therein and adapted to be dropped upon the surface of a test piece, said rod being provided at its lower end with a socket having an impact ball therein; and freely-adjustable means for regulating the height of the drop, said means embodying a ring encircling the tube and adjustable vertically thereon, and a spring-pressed catch carried by the ring and engageable with the socket.

5. A scleroscope, according to claim 4, in which the socket is provided with an outwardly-extending flange, and the catch has an inwardly-extending nose to engage under said flange.

In testimony whereof I affix my signature.

PIERRE PAUL ROUDIÉ.