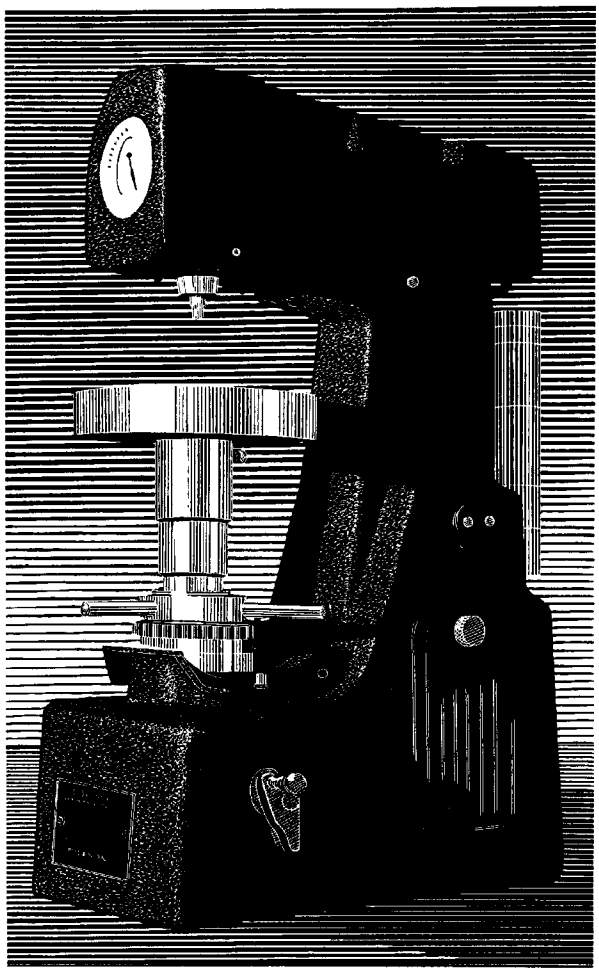

"ROCKWELL"
HARDNESS TESTER

Answer to a Question

You may seek a quick and sure answer as to the merit and dependability of these Hardness Testers that we mark with our Trade Mark — ROCKWELL — and which we alone make. Here, we believe, is the answer.

Thousands of our Testers have been used to determine hardness limits for purchase or production specifications. These values were then put on tens of thousands of blueprints.

Other thousands of our Testers have been used to inspect the parts or material made to meet those specifications. Makers and users of parts and materials have found such specifications thoroughly practical because of the agreement in readings of fifteen thousand and more of our machines. *Their use in that manner is common knowledge.* The many years that thousands of our machines have been so used give complete assurance also of the *durability of accuracy* that is characteristic of them. So the answer as to merit comes not from us but from the thousands who have found they can depend on our Testers.

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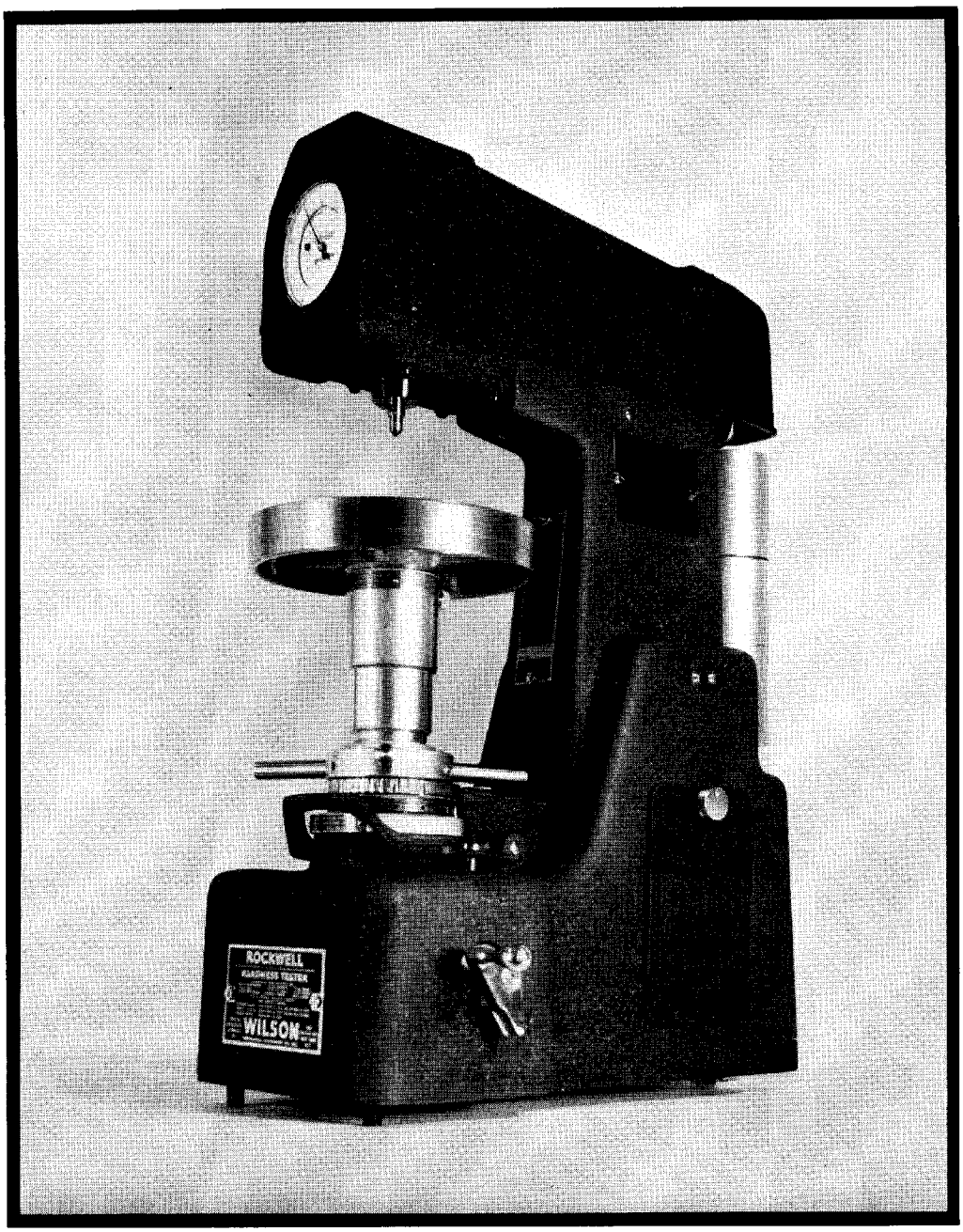
"ROCKWELL" *
HARDNESS TESTER

Made in several sizes



The modern "ROCKWELL" Tester has the patented full-floating, frictionless, plunger system. That is important, as friction cannot be standardized.

It is for the measurement of hardness of all metals, hard or soft, polished or unpolished, flat, round, tubular or odd in shape.

It is widely used for research and precision testing in the laboratory, quantity inspection testing in production and in toolrooms.

**Trade Mark Reg. in U. S. Pat. Off.*

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(Near Bronx Entrance to Triborough Bridge)

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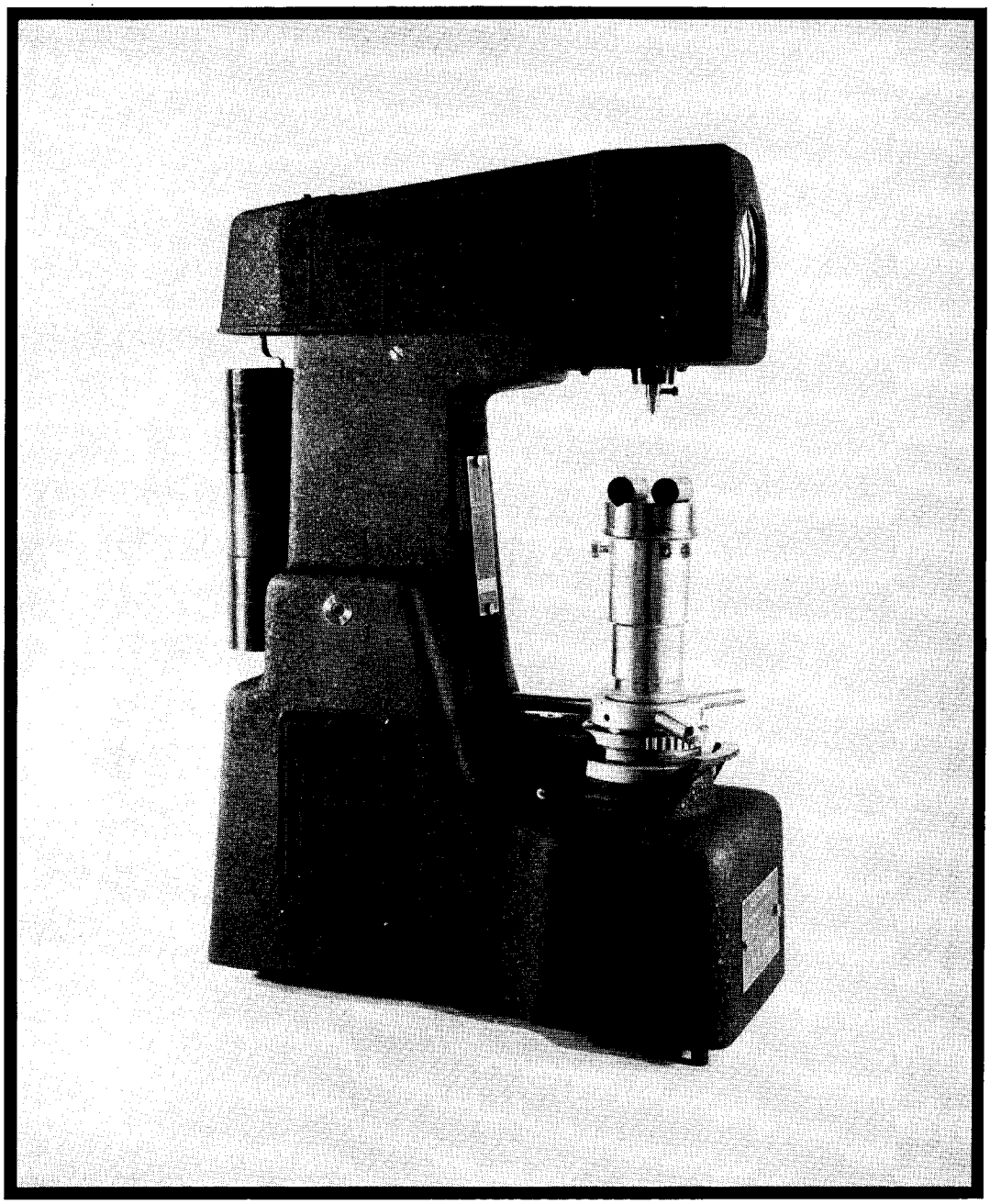

"ROCKWELL"
HARDNESS TESTER

Equipment for a Toolroom

The illustrations on front and back of this leaf show the 8″ vertical capacity machine, Model 3-JR, with large Cylindron Anvil on this page and, on reverse page, the 8″ diameter Testing Table. These form the equipment recommended for general toolroom use but are frequently supplemented by the Cylindron Anvil, the Vari-Rest and the Jack Rest, which are illustrated elsewhere. Protective Sleeve Set over elevating screw is useful even in toolroom.

Standard equipment is specified in printed current net price list.

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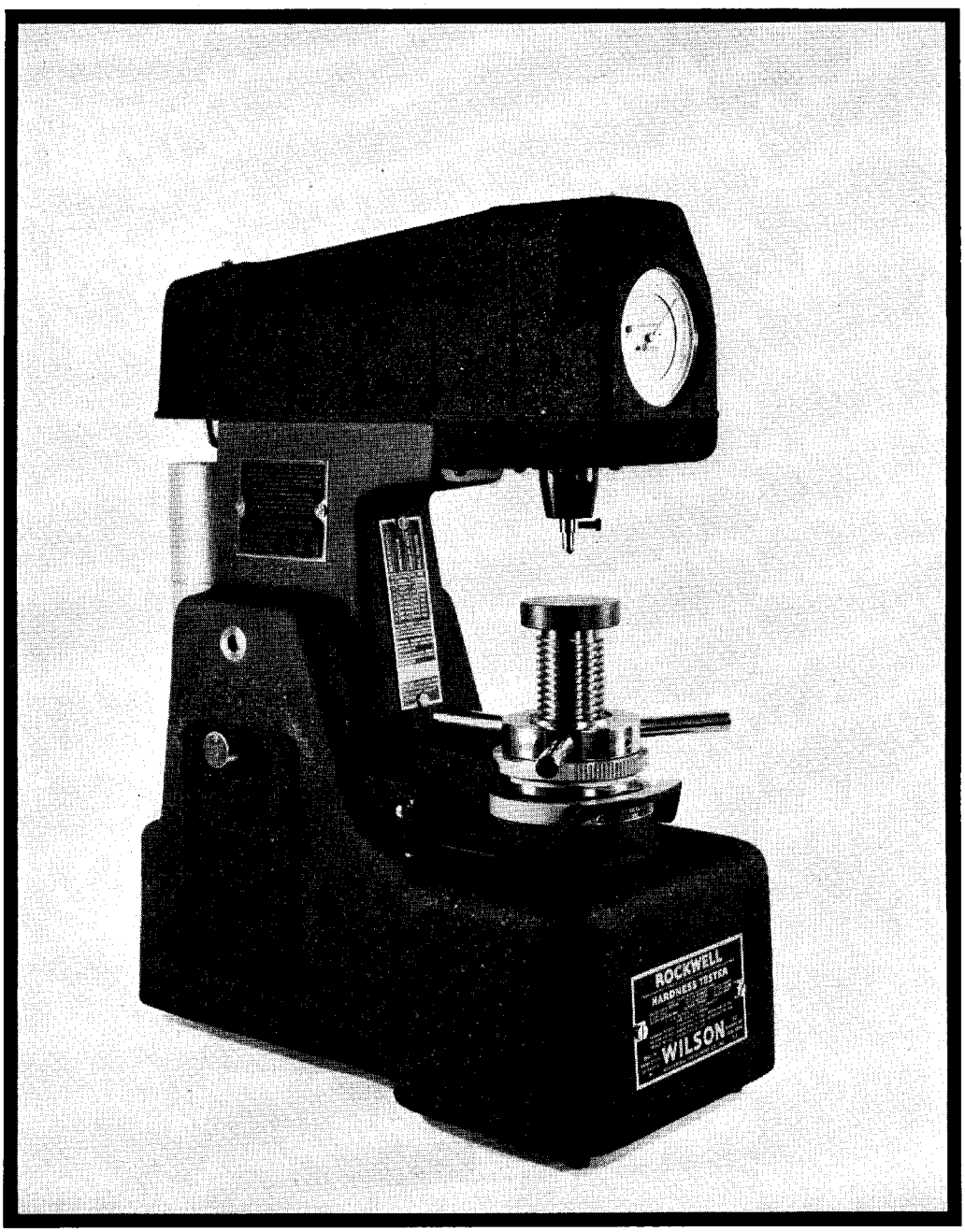

"ROCKWELL"
HARDNESS TESTER

Model 1-JR, vertical gap 3¼"

This is the most compact size and is used for testing small parts and by most mills rolling sheet metal (except for very thin sheet which requires the light loads and extra sensitivity of the JS type machines for T and N scale testing described elsewhere). Model 1-JR has 5½" horizontal reach. Special work supports such as the 8" Testing Table and the Vari-Rest are not suggested for this size tester as they would consume much of the vertical gap. The Dial stands 16" above bench. A Protective Telescopic Sleeve Set is made for this size screw.

Standard equipment is specified in printed current net price list.

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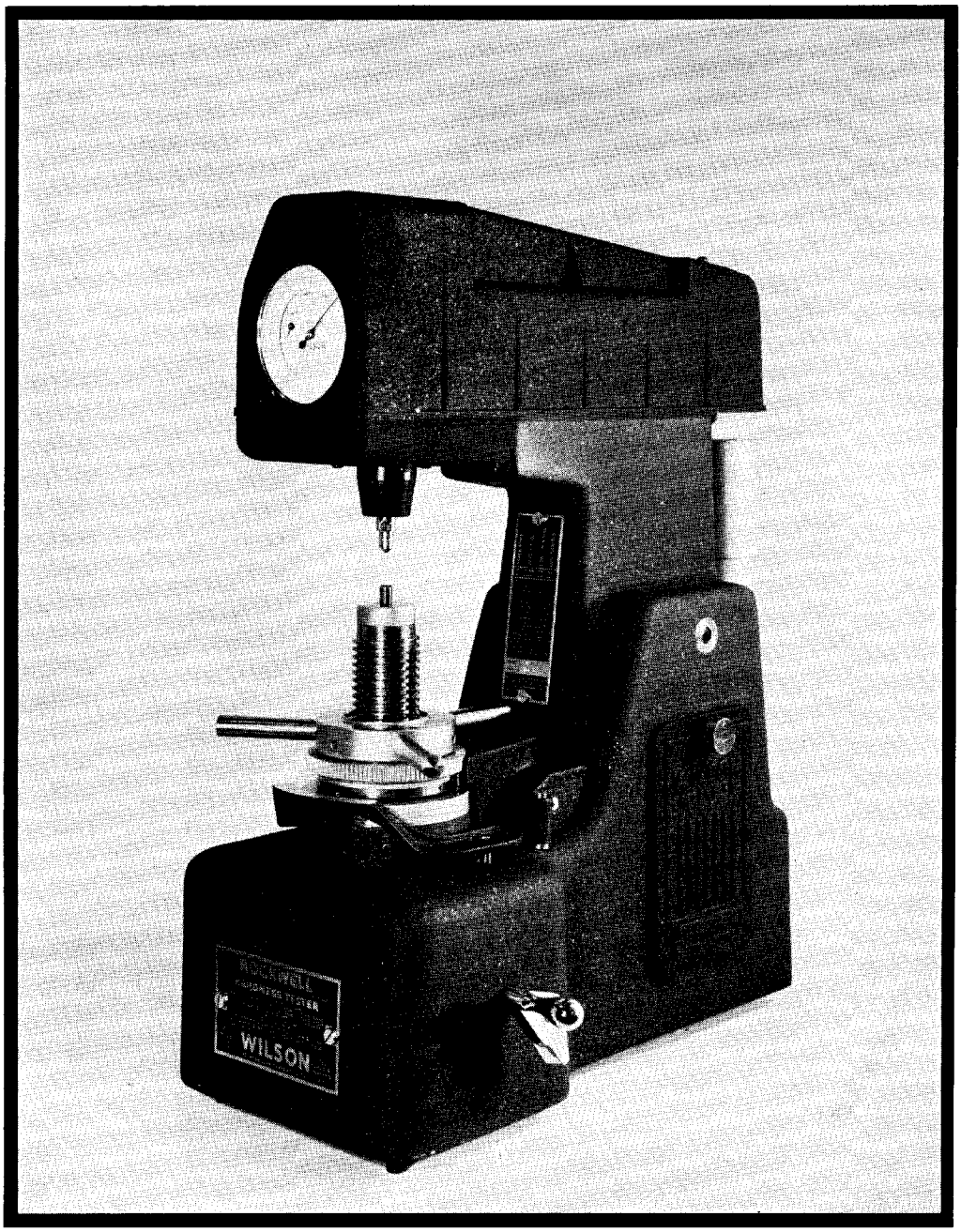

"ROCKWELL"
HARDNESS TESTER

Model 1-JR, smallest made

The Spot Anvil illustrated above is one of the four standard anvils furnished with every model and is used when checking the tester by test blocks and for testing most small parts or flat stock. The plane surface anvil on opposite side of this leaf, the Cylindron Jr. Anvil illustrated on LEAF 24, and an anvil with a shallow V notch are always furnished.

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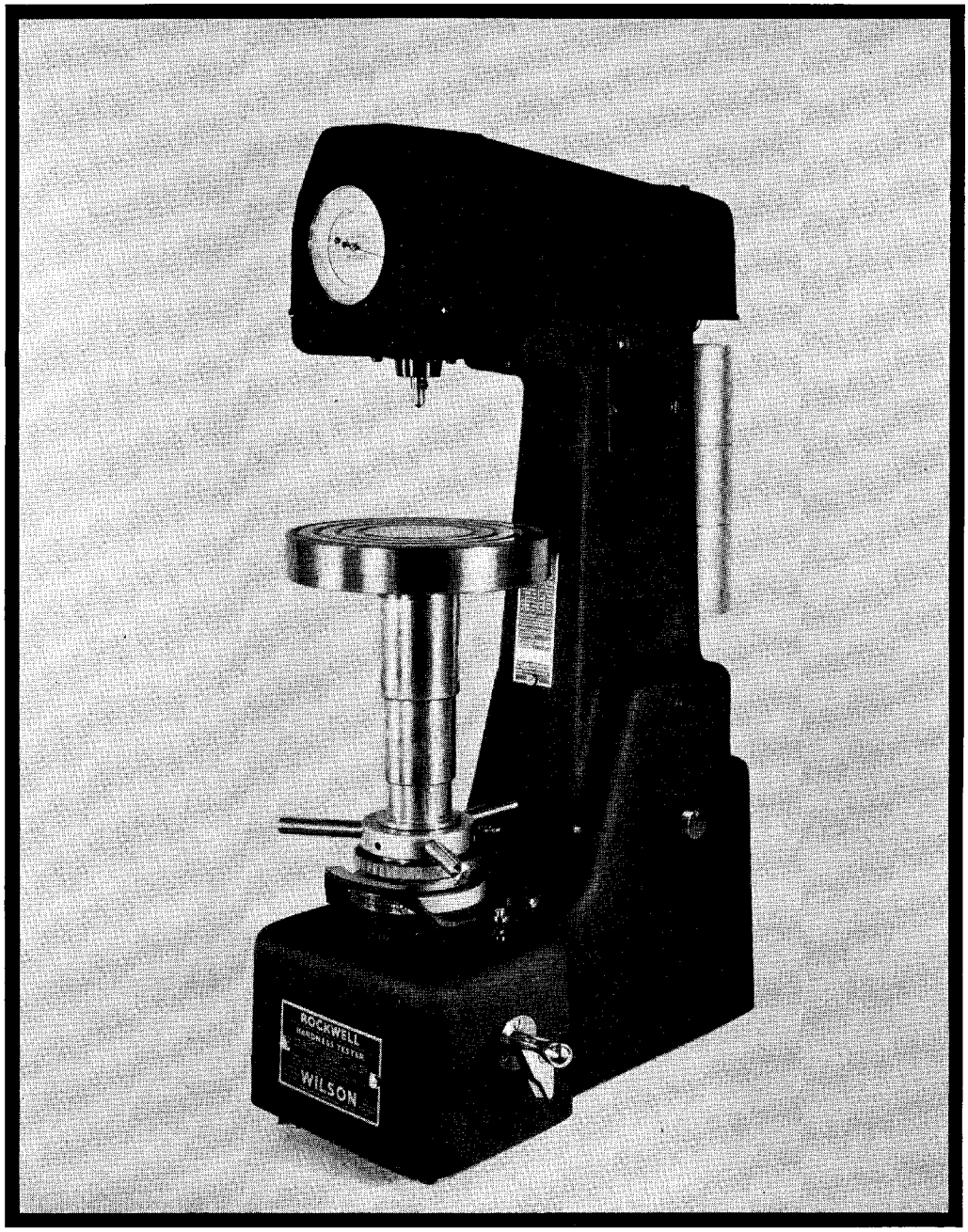

"ROCKWELL"
HARDNESS TESTER

Model 4-JR, vertical gap 12"

This machine has 5¼" to 5¾" horizontal reach and is next to the tallest of our standard models. The diamond "BRALE" penetrator should be ordered by those who intend to test hardened steel. The Testing Table is an accessory separately priced, but four hard steel anvils are in the standard equipment. When considering suitable size to cover all work take into account the vertical space required by cradles or holding fixtures you may make as work supports to rest upon the testing table, which itself reduces capacity by one inch. Dial stands 25" above bench. A Protective Telescopic Sleeve Set may be used over elevating screw, as shown.

Standard equipment is specified in current printed net price list.

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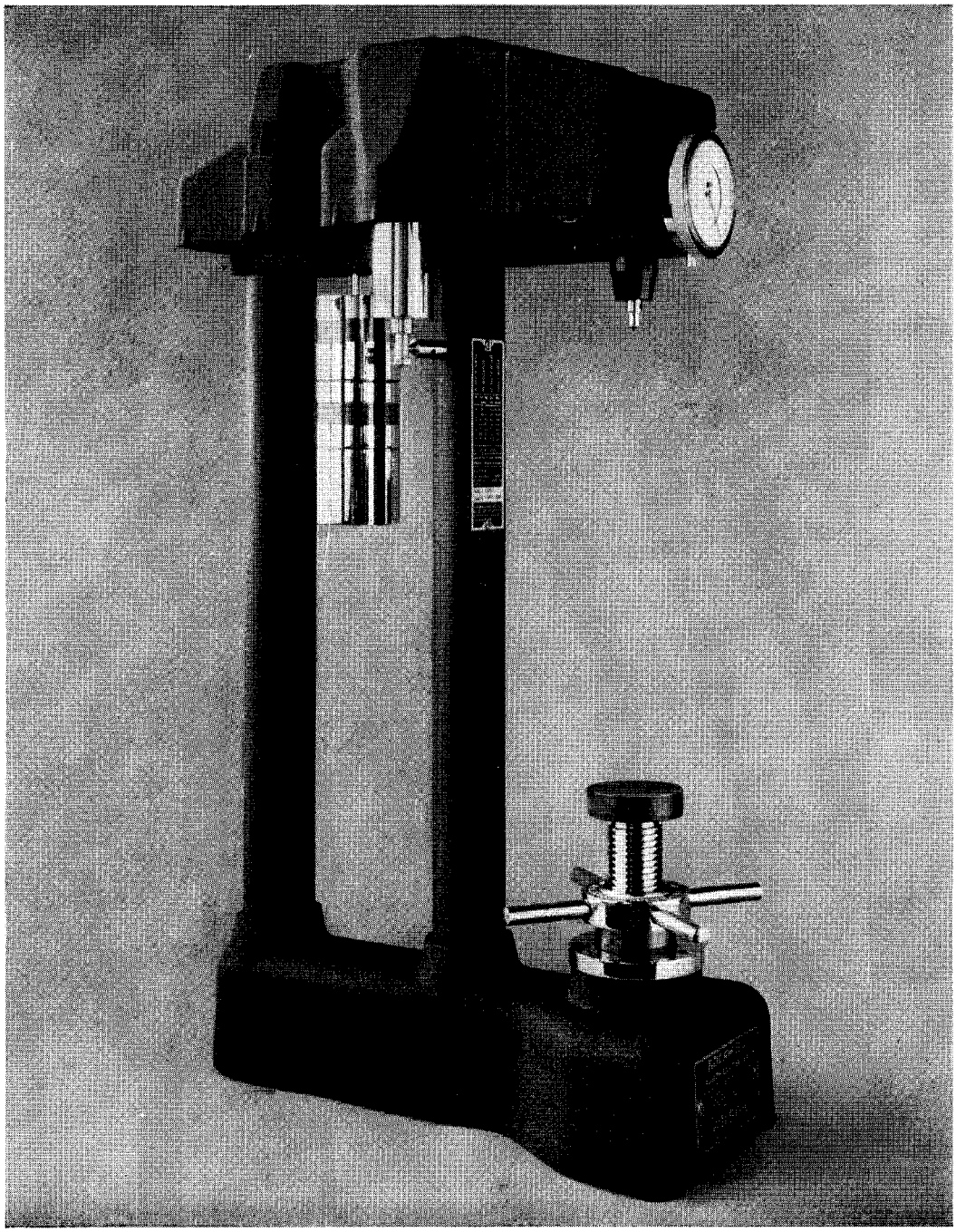

"ROCKWELL" HARDNESS TESTER

Tallest standard Model, 5-EM

This large machine for tall or large work has 16″ vertical capacity and 5½″ reach. Crank handle for releasing and lifting major load is located just to right of dial. Zero setting of Dial Gauge is done by turning bezel of dial. As Dash Pot and all testing mechanism are located at top of tester, this type can be made in special sizes by suitable length of pillars and screws.

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Standard Equipment

The price of the tester in each size in which it is regularly made, as well as the prices of accessories, spares and renewals, are given always in a printed, current net price list which will be sent on request.

Each tester is equipped with $\frac{1}{16}$" steel ball penetrator chuck with 50 additional balls used in "B" scale testing. Every "ROCKWELL" Tester goes with the dead weights needed for applying, as desired, the 60 kg., 100 kg., and 150 kg. major load. Included are two "B" scale and two "C" scale test blocks of different hardness and an enamel-cloth overall cover. For supporting pieces to be tested there are included four anvils, all of which have hardened supporting surfaces. One is a plane surface anvil, another has a small raised spot at the center, and for supporting rods, tubing and other cylindrical shapes there is an anvil with a shallow V slot for small diameter pieces and our new "Cylindron Jr." Anvil for cylinders from ¼" to 3" diameter. Cowl (*cover*) over testing head and telescopic sleeve set (*cover*) for elevating screw are part of standard equipment furnished with each tester.

All other equipment is charged for separately. The sphero-conical diamond "BRALE" Penetrator is needed for testing hardened steel, but those interested in testing only steel as rolled or the non-ferrous metals do not require and so need not order the "BRALE" Penetrator.

Other Accessories

These will be found illustrated in the catalog and prices are given in current net price lists.

Chucks for ⅛", ¼" and ½" ball penetrators.
Testing Table of 8" diameter.
Cylindron Anvil (large size).
Vari-Rest No. 7 or No. 8.
Jack Rest, 8", 12" or 16".
Additional Test Blocks.
Gooseneck Adapter No. 1503.

Warranty

Our warranty of products made or sold by us is limited to an agreement to repair or replace at our factory, without charge, any instrument or part found defective within one year from date of delivery to the original purchaser, while diamond "BRALE" Penetrators and diamond spot anvils, on account of the severity of their usage, are not even subject to such replacement unless returned unused, and no further warranty, express or implied, or obligation of any kind, contractual or otherwise, will be assumed by us, either to the original purchaser or any other person. Parts worn or injured through night and day work under bad conditions of atmosphere or grit or from abnormal or abusive use or from lack of proper care or maintenance shall not be deemed defective. No agent or representative is authorized to assume for us any liability except as set forth above.

Shipment

Our experience in shipping precision instruments has shown that it is best to ship by express or, for long distances, "store to door" freight and, if our warranty above is to apply, the "ROCKWELL" must be shipped by some quick, careful handling method.

The "ROCKWELL" Hardness Tester is a micrometer measuring instrument which is capable of injury if not properly and speedily cared for in transportation.

The excess of express charge over combined cost of freight and trucking is low in proportion to the cost of the instrument and is negligible when the value of the work to be done by the tester is considered, for in its accuracy lies its whole value.

"ROCKWELL" Specifications

are accepted everywhere for practically all steel mills and non-ferrous mills throughout the world have equipped themselves with "ROCKWELL" TESTERS to meet specifications as requested by their customers.

The "ROCKWELL" Tester is used in thousands of plants for testing metal coming from the mill, the tools employed to work it, the finished parts produced and, in the laboratory, specimens for research and control.

The "ROCKWELL" Tester is as easy to use as a center punch, as sensitive and accurate as a precision balance, and as durable as a machine tool.

Consult Current Net Price List

WILSON
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"ROCKWELL" HARDNESS TESTER

Penetrators for Soft and Hard Metal

For testing hard steel the sphero-conical diamond "BRALE" Penetrator is required.

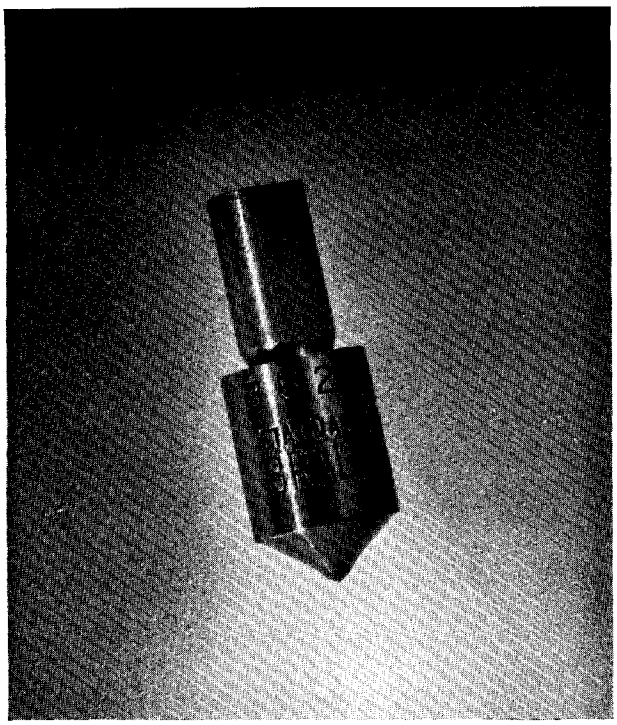

Photo Magnification to twice actual dimensions.

Only those who will test hardened steel should purchase this diamond penetrator, the grinding of which to mathematical and microscopic accuracy is imperative. When the fixed testing load is applied, if this penetrator is so shaped that it indents .00008" too much or too little, the hardness reading will be in error 1 point. That would mean you would probably discard properly hardened work or pass as acceptable what you desire to reject at the inspection bench. These sphero-conical diamond "BRALE" Penetrators must all be alike as to angle and radius and the spherical tip must be truly tangent to conical surface.

Every "BRALE" Penetrator is ground to precision of shape under enormous magnification and is also standardized on many test blocks in our standardizing laboratory. Every diamond penetrator marked with our trade mark "BRALE" is accurate to the degree required even for a research laboratory.

Quantity inspection testing needs accuracy in shape of penetrator, otherwise all the other accuracy of the "ROCKWELL" machine itself is absolutely thrown away. As well have the machine wrongly calibrated as have the penetrator inaccurately shaped. The shape of our "BRALE" Penetrator is patented, and no other shape can possibly give true readings at various points on the dial.

"C" Scale Testing

The standard major load for use with the "BRALE" Penetrator is 150 kgs., giving what we designate as "C" scale readings on the black lettered scale of the direct reading dial. The limits of use are C20 to C100. The "BRALE" Penetrator is charged for extra because it is needed only by those testing hardened steel or hard alloys.

The word "BRALE" is a registered trade mark in the United States and other countries. The shape of this diamond penetrator was originated by us to best meet testing requirements and is patented.

"B" Scale Testing

The penetrator customarily used on unhardened steels, phosphor-bronze, brass, cast iron and many alloys and metals not extremely hard, is a hardened steel ball $\frac{1}{16}$" diameter, mounted in a chuck which is designed to permit replacement of ball in a few seconds. The $\frac{1}{16}$" steel ball penetrator with 100 kgs. major load gives, on the red lettered scale on the dial, what we designate as "B" scale readings.

Special chucks for $\frac{1}{8}$", $\frac{1}{4}$" and $\frac{1}{2}$" ball penetrators for very soft metal testing can be supplied as extras and other scale designations apply when those are used. They are also used on hard plastics.

Minute Indentation Mark

On hardened steel with diamond "BRALE" Penetrator the depth of impression is as little as .0025" to .0035" and on softer steels with the diamond cone or on soft brass or soft iron with the steel ball and 100 kg. load, the deepest indentation is about .01". This very inconspicuous indentation is too small to mar the appearance of the work tested.

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WILSON
MECHANICAL INSTRUMENT CO., INC.

"ROCKWELL"
HARDNESS TESTER

A Direct Reading Machine

Each hardness number determined on our "ROCKWELL" Hardness Tester is based on the additional depth to which a test point or ball is driven by a heavy load beyond the depth to which the same penetrator has been driven by a definite light load. Without moving the piece to be tested, the minor load is applied and quickly thereafter the major load is applied and the hardness number is automatically indicated on the dial. Only from five to ten seconds is consumed for the entire operation of testing, including removal of the work preliminary to making the next test. Major loads may be 60 or 100 or 150 kgs.

To eliminate errors in measurement of depth of impression, due to surface imperfections of the work or the varying cold work distortions occurring around the periphery of all indentations, the "ROCKWELL" Tester is designed to make two super-imposed impressions—one with a load of 10 kgs. and the other with a load of 100 kgs. when the $\frac{1}{16}$" steel ball penetrator is used, or 150 kgs. when the sphero-conical diamond "BRALE" test point is used. Total depth of indentation is entirely disregarded as the measurement depends solely on the increase in depth due to increase of minor to major load.

To conform to custom high hardness numbers mean shallow indentation and low numbers mean soft material, all of which is accomplished by the apparatus itself automatically subtracting the depth increment value from the number assigned to infinitely hard material, but the operator is not concerned with this procedure which is all taken care of in the calibration of the scales on the dial.

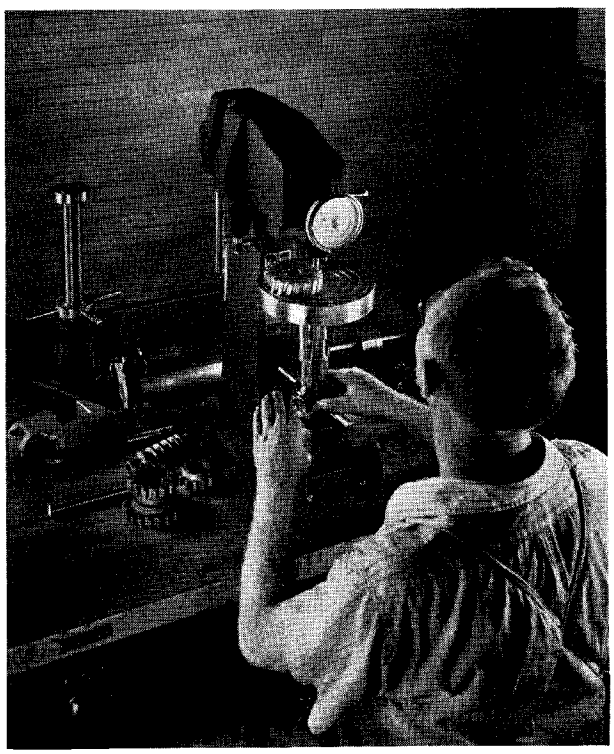
The greatest hardness of metal that can be tested is limited only by the ability of a diamond penetrator to stand the stress.

The "ROCKWELL" Tester is not a press with depth measuring attachment. It is a precision measuring machine with a press as only one of its features. The whole system is one of weights and levers. It is well known that in determining the hardness of the softer metals by measuring any dimension of an impression that the load should be applied both slowly and smoothly. There is an oil dash-pot system on each "ROCKWELL" Tester which controls the smooth application of the load and is adjustable so that the load may be applied as quickly as in two seconds or as slowly as desired. Except on the softer metals it is customarily applied in about three seconds.

In Brief — The basis of hardness measurement is upon increment of depth of penetration due to increment of load.

The load, under dash pot adjustable time control, is applied by standardized weights through a lever, on knife edge fulcrum, and a free floating frictionless plunger system.

The hardness number at conclusion of test is indicated on dial gauge, the moving system of which responds to penetrator movement through a lever that is not subject to stresses of testing load application. No portion of the tester, except the penetrator, contacts the surface being tested, so point of test is completely visible and can be nicely selected.



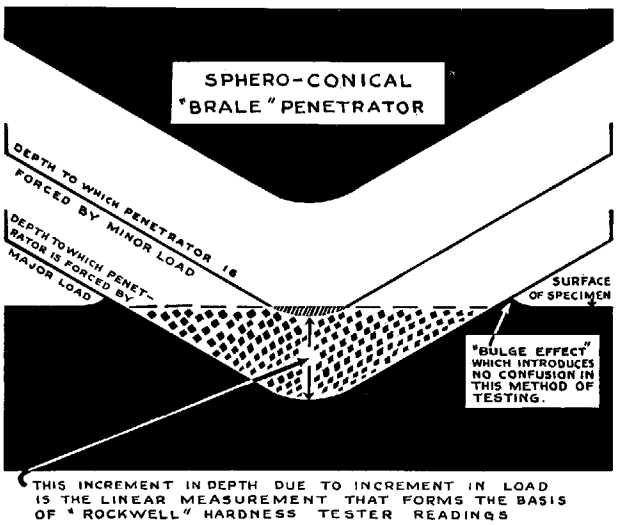
Consult Current Net Price List

WILSON
MECHANICAL INSTRUMENT CO. INC.

"ROCKWELL"
HARDNESS TESTER

Increment—Not Total Depth

In the "ROCKWELL" Tester, although the value given on the dial depends upon the actual depth of penetration, the real measurement that is automatically accomplished by the machine is a measurement of the vertical motion of the plunger rod which carries the penetrator as that plunger rod moves up and down in the head of the machine. This makes the depth measurement quite independent of the behavior of the surface of the steel in the vicinity of the penetration. Another extremely important feature in the "ROCKWELL" is that the dial gauge is not set to zero when the penetrator first meets the surface of the material to be tested. Instead of that there is applied a load of 10 kilograms, called the minor load, which is applied before the dial gauge is set for zero. This means that the "ROCKWELL" hardness number, instead of being based upon the total depth of penetration, is based upon the increment of depth, due to increment of load from minor load to major load. This method contributed greatly to accuracy of hardness measurement and was one of the factors in making a hardness tester of such simplicity in operation that a novice can be taught in a few minutes to do testing with extreme accuracy.

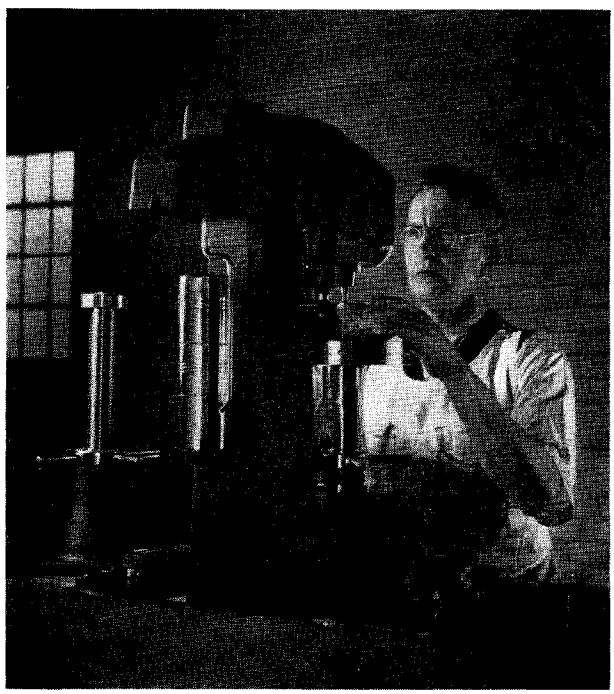


The increment of depth due to increment of load is 0.00008″ for each point of hardness on the "ROCKWELL" scale.

If a piece of steel is as hard as "ROCKWELL" C58 at one spot and C55 at another it means that the depth of penetration is three times 0.00008″ or .00024″ deeper at the softer spot; but that information is given you in terms of hardness on the dial. It is when realizing the small dimensions that must be so accurately measured that one also realizes the importance of being able to disregard the surface condition of the metal tested both before making the indentation and after making it.

Advantages of This Sound and Important Method

The principle of increment in depth due to increment in load instead of measurement of total depth or total diameter was adopted (1) to obtain readings more independent of original surface conditions of specimens, (2) to obtain readings without confusion through the deformation around the indentation at the specimen surface, where cold working distortion of various kinds takes place and (3) to make precision testing possible at a rapid rate of testing without loss of accuracy. All three objects were good, all were important and all three objects were attained.



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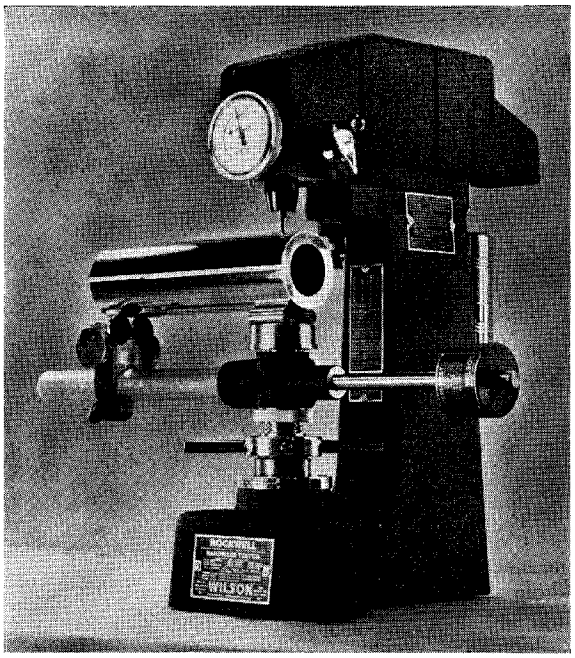
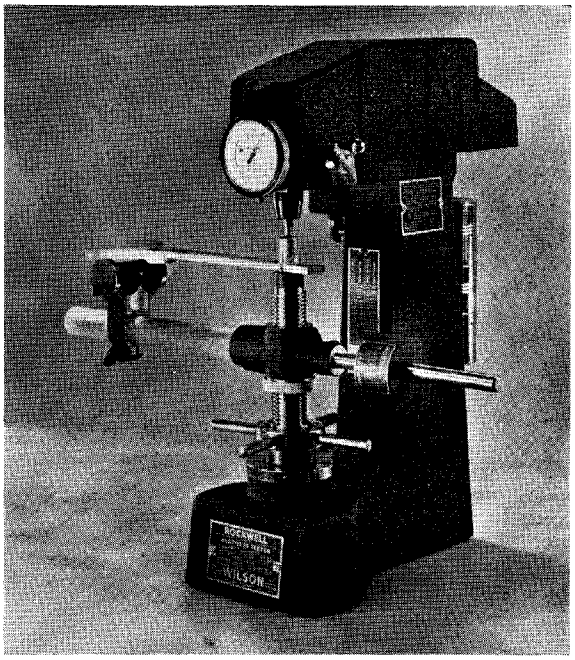
Work Support Accessories for pieces of long overhang



Vari-Rest No. 7 as used for supporting tubing or rod. The support arm extends 14" from center of elevating screw. The counterbalance slides and has a lock. Construction is mostly of aluminum with hard steel discs. Knurled nut on elevating screw adjusts height. A smaller, simpler Vari-Rest No. 6 is made for use with the small No. 1 size testers.

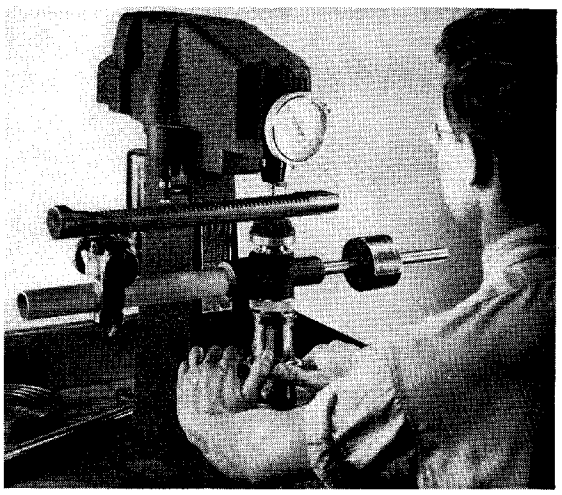


Vari-Rest No. 7 has two eccentric discs facilitating support of warped shapes as indicated above. Vari-Rest No. 8 is similar but larger.

When pieces to be tested are long and have so much overhang that they are not firmly held down on the anvil by the minor load it becomes necessary to give them support by some type of rest at some second place, for the hand and arm of the operator are not steady enough.

All attempts to clamp the piece between the anvil and some portion of the testing head are avoided as that would introduce distortional strains in the frame of the machine. That frame is like the C frame of a hand micrometer, for the machine is measuring closer than to .00004". The overhang weight must be carried by a counterbalance or separate support. When the piece is not very heavy and only a few feet in length the elevating screw of the tester should carry the entire support, and the far end of the specimen should be out on the support arms of the small Vari-Rest No. 7 or the larger Vari-Rest No. 8. That is the most convenient system because the Vari-Rest adjustments can be made to bring the piece into nice relation with the anvil and the whole system of Vari-Rest, specimen and anvil travel up and down together by the mere operation of the capstan hand wheel.

When tubes, bars or other shapes are very long or heavy then some form of independent support of the nature of our Jack-Rest should be provided and for some extra long or extra heavy pieces it has been found preferable to use two Jack-Rests, one on each side of the tester.



The Vari-Rest, for all lengths and weights it will handle, is much simpler and speedier to use than the Jack Rest.

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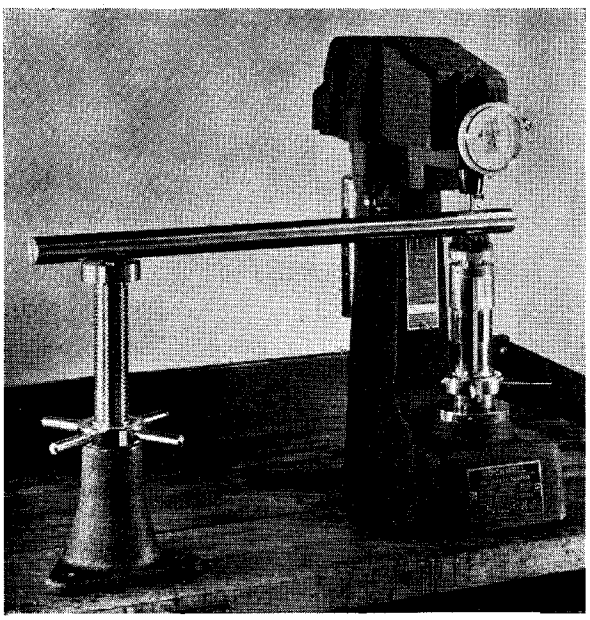
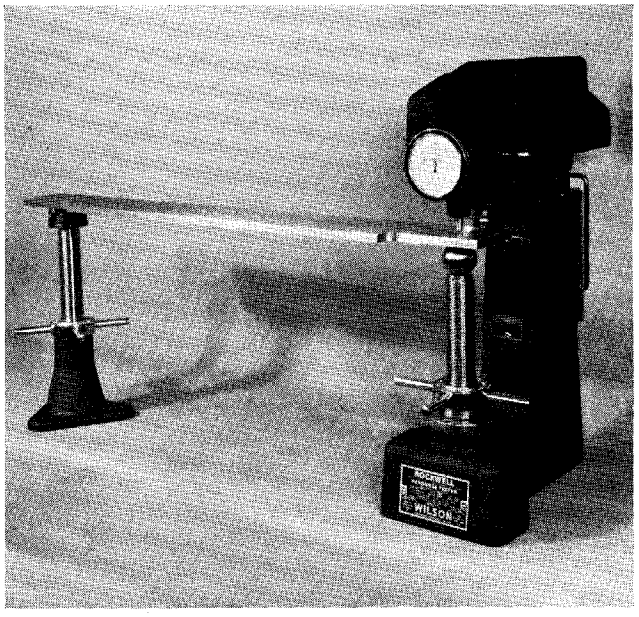
"ROCKWELL"
HARDNESS TESTER

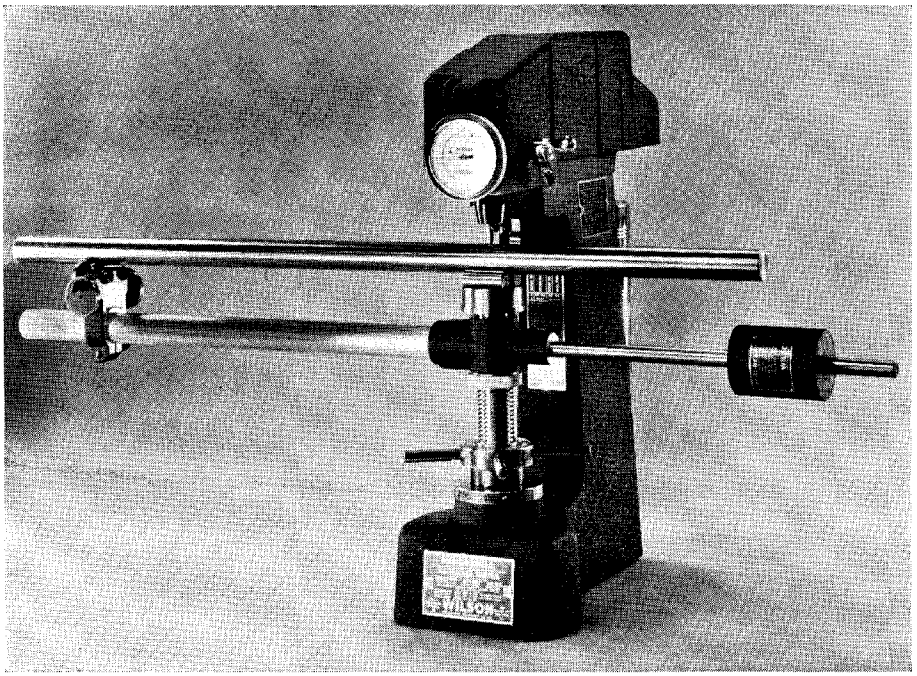
Accessories for Supporting Long Pieces

Illustrations as given here can show only some of the possible set-ups.





The Jack-Rest, for use as shown in the two illustrations above, is made for 8″, 12″ and 16″ adjustment range.



Vari-Rest No. 8 illustrated immediately above is for work too long for Vari-Rest No. 7 and yet not large enough to require the less convenient Jack-Rest. Vari-Rest No. 8 has a distance from center of elevating screw to the end of support side tube of 26″. That long support tube also is made of duralumin. Vari-Rests Nos. 7 and 8 are alike except as to size. The Vari-Rest elevates the entire specimen.

A variety of support accessories at hand is a great time saver where miscellaneous work is tested.

Consult Current Net Price List

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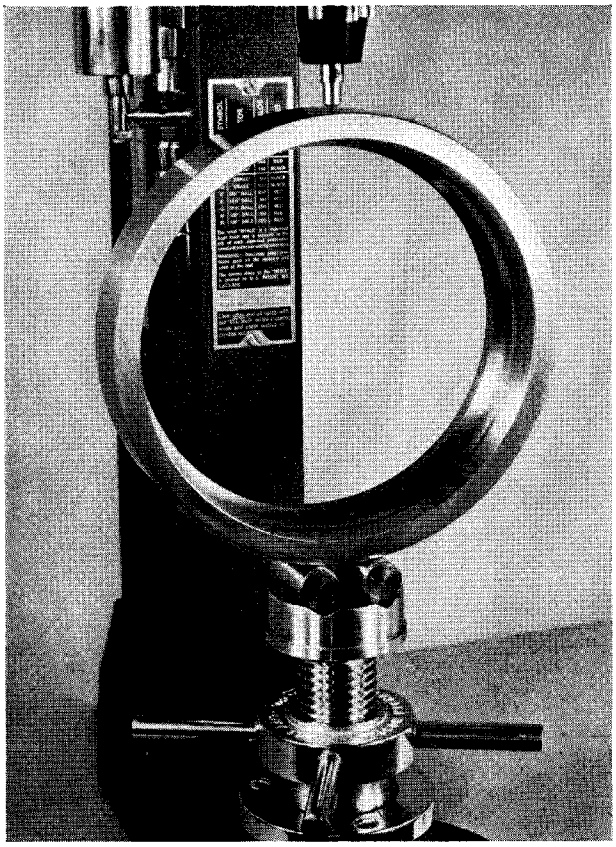
BACK OF LEAF 22.0c

"Cylindron" *and* "Cylindron Jr." *Anvils for Supporting Round Rod and Tubing*



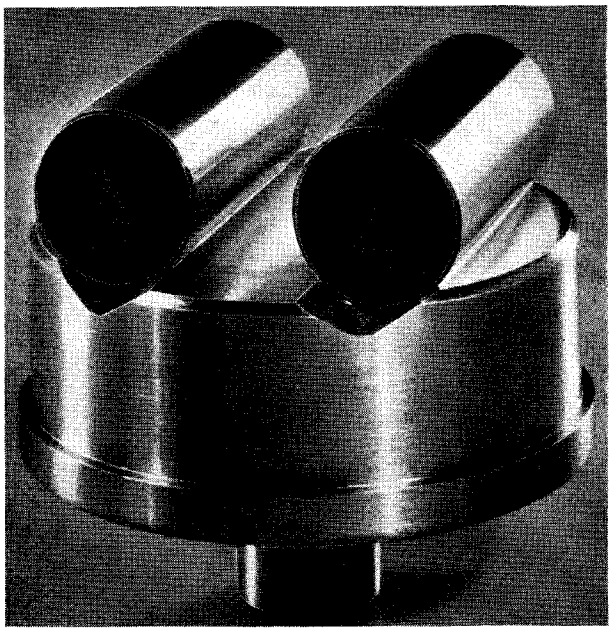
"CYLINDRON" Anvil supporting a ring.

The CYLINDRON Anvil to support cylindrical work is adapted to the support of parts or stock ranging from 2″ minimum diameter to 8″ maximum diameter, if the work is several inches in length axially; or 5″ to 6″ diameter, if the axial dimension is very short, as in the case of ball races for example. The longer the piece, axially, the larger it may be in diameter and still rest firmly on the two hard cylinders.

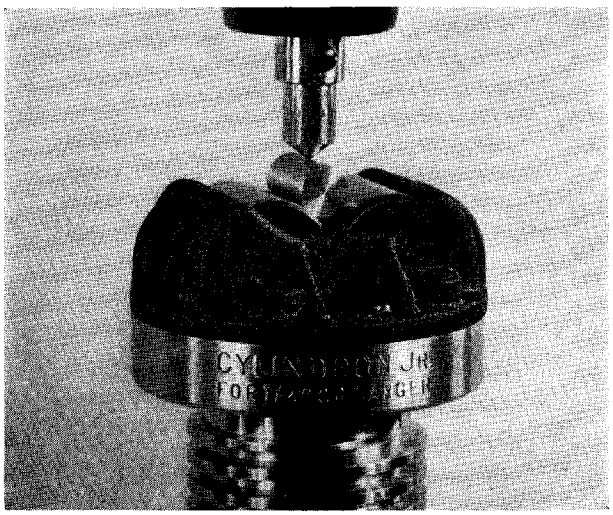
The hard, parallel, twin cylinders of the anvil are each 2″ long, 7/8″ diameter and are set 1 3/8″ center to center. They are rigidly fastened down into the milled V grooves.

The large CYLINDRON Anvil is an accessory, not furnished in the standard equipment.

On back of Leaf 48, will be found illustration of CYLINDRON Anvil supporting a ring for testing of internal cylindrical surface.



The large "CYLINDRON" Anvil—Full Size.



"CYLINDRON JR." Anvil Supporting 5/8″ long x 3/8″ diameter rod.

The CYLINDRON JR. Anvil has two 7/8″ diameter hard steel cylinders of 1″ length clamped to their *base*, and to each other on a line across the anvil center. It is intended for round work 1/4″ dia. (never smaller) up to 3″ dia. It forms part of standard equipment of new machines and is sold as an accessory for older machines.

Consult Current Net Price List

WILSON
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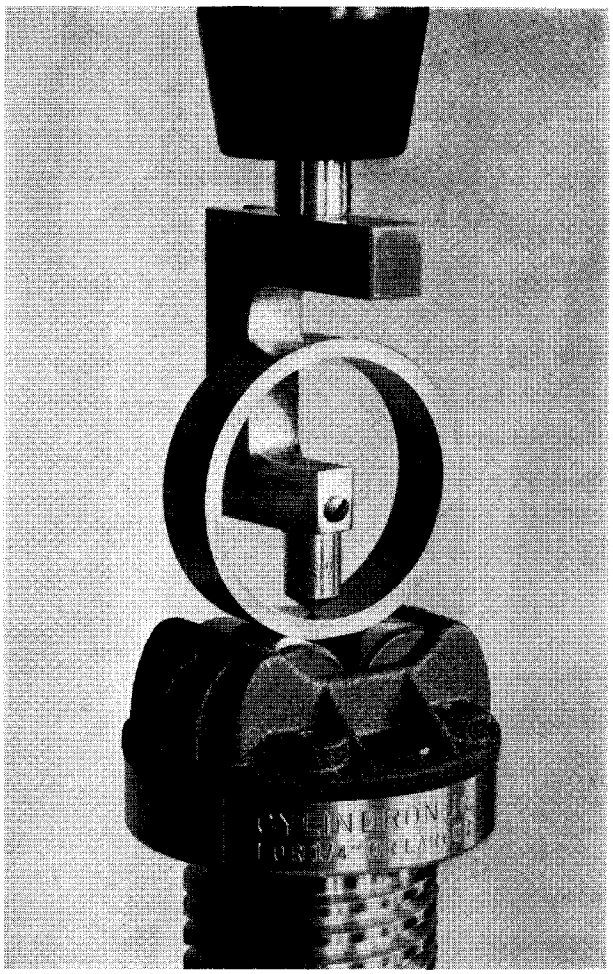
"ROCKWELL"
HARDNESS TESTER

Adapter for Internal Testing



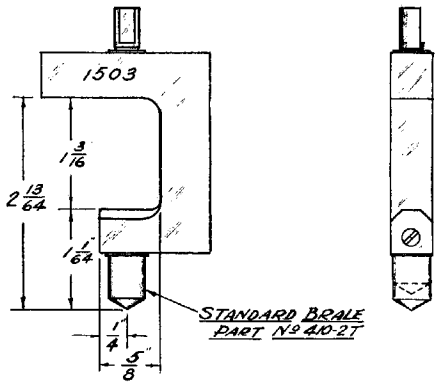
This goose-neck adapter for the penetrator permits testing the inner cylindrical surfaces of many tubes and annular parts.

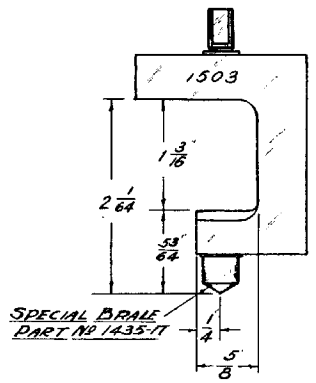
The adapter is machined from tool steel and its making is, and must be, fine tool work or it would impair the accuracy of the test,—for one point of hardness on the "ROCKWELL" Tester corresponds to a difference in depth of indentation of only .00008″ or .002 millimeter.

"ROCKWELL" Adapter No. 1503, illustrated here, is now an available accessory but not included as standard equipment. Its dimensions are given both with a standard "BRALE" penetrator and with a special short nib "BRALE" penetrator No. 1435-IT.

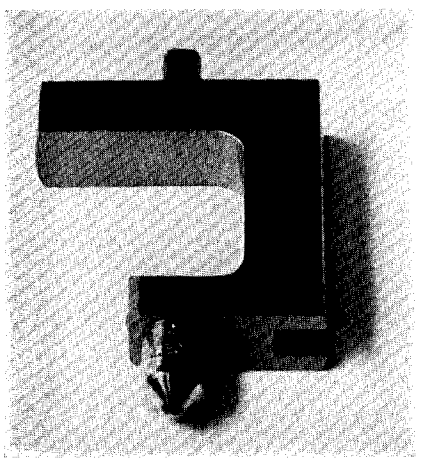
Let your draughtsman lay out your job with the dimensions at upper right and you will know if this standard part meets your needs.

If your ring or tube diameter is too great for this adapter, see our Leaf 47 for ***special machine*** with goose-neck plunger extension.





Use the regular size "BRALE" or ball penetrator unless your tubing is so small you need to order the short nib "BRALE" penetrator.



This adapter No. 1503 may be used with any size "ROCKWELL" Hardness Tester or any "ROCKWELL" Superficial Hardness Tester having 3″ or more rated capacity.

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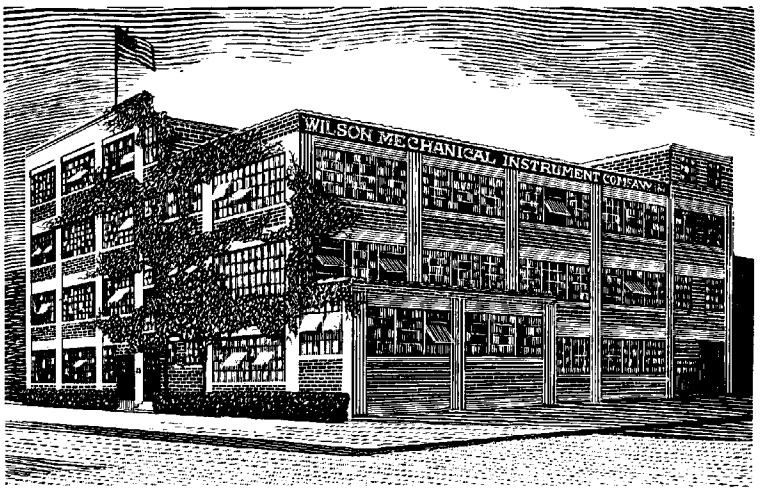
WILSON
MECHANICAL INSTRUMENT CO., INC.

"ROCKWELL"
HARDNESS TESTER

This is 383 Concord Avenue, at the corner of East 143rd Street, New York. It is located near the mainland approach to the Triboro Bridge, which leads in a Y to Manhattan or to Long Island. We are close to the 143rd Street Station of the Pelham Bay Division of the Lexington Avenue Subway.



•

HERE in our precision instrument factory the "ROCKWELL" Hardness Tester was, in 1921, developed into practical shape and usefulness. Here, in enormously improved form, it is made today, in our own fire-proof building. Machine Shop, Engineering Department, Assembly Department, Standardizing Laboratory and also our Packing Department, all work with intense effort for constant betterment.

One point of hardness on the "ROCKWELL" Tester's dial represents a difference in depth of indentation of only 2 microns. One point on the dial of the "ROCKWELL" Superficial Hardness Tester means a difference in indentation depth of only 1 micron (only about 25% longer than the longest wave length of light).

Attainment of precision in hardness testing is far more than mere attainment of precision in machine work — though it requires that too. Yet, even precision in hardness measurement is not our final objective. We have always been seeking ***durable*** precision that sustains itself year upon year. Our twenty-three years of experience in building these testers, and improving them continuously as we built them, is the ***reason,*** just as their reputation is the ***proof,*** that making these machines is a job we have thoroughly mastered. Our skilled workmen have long been with us, we have had and have today continuously unchanged management, we keep our production Machine Shop thoroughly up to date and, finally, we have enjoyed much helpful cooperation and constructive criticism from leading metallurgical authorities who, for the general good of the metal-working industries, have interested themselves in our plans and our work, and to whom we are much indebted.

Having maintained hardness standards through adequate standardization of the many individual factors behind those measurements, for the past twenty and more years, without confusion or difficulty for our many thousands of customers all over the world, we feel that this record is the best justification for your confidence in our equipment.

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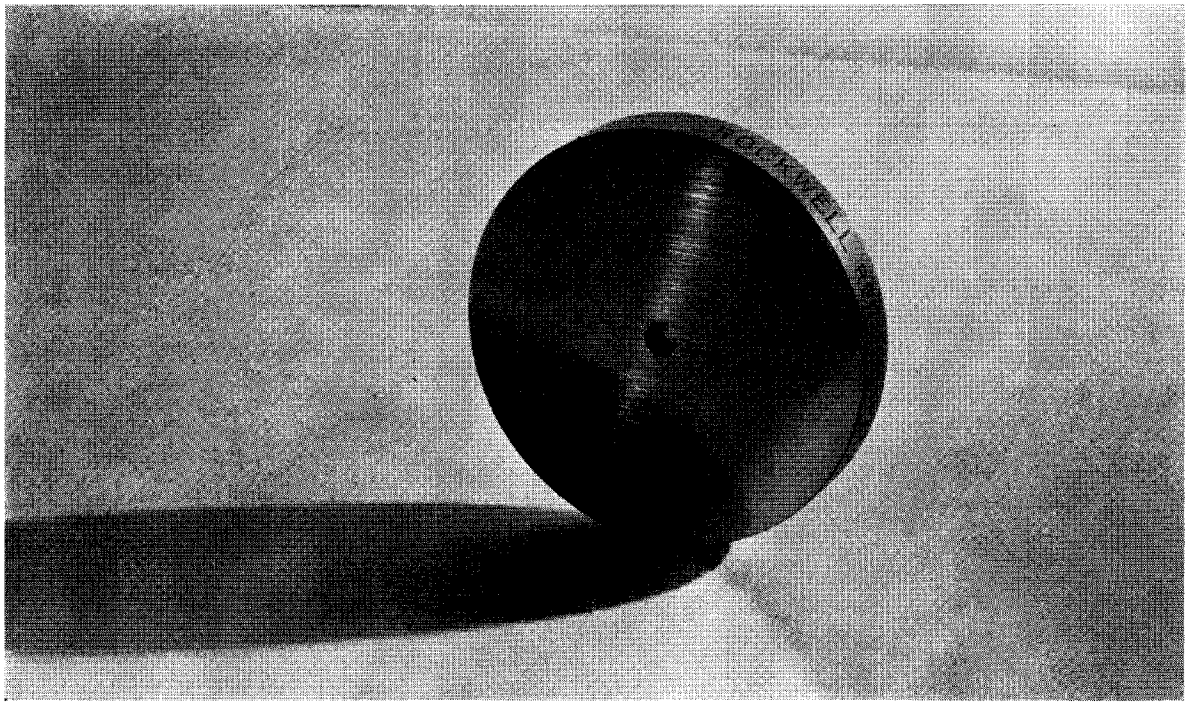
Test Block *A Watchdog of Accuracy*



Full size illustration of one of our C Scale Test Blocks.

OUR REGISTERED TRADE MARK (ROCKWELL) is stamped in each Test Block to prove it was made and standardized by us.

If we could make a "ROCKWELL" Hardness Tester in form as simple as a "ROCKWELL" Test Block that is the way we would make it. We cannot do that and so we build you a machine which in time, can get worn, broken, dirty or be put out of adjustment, just as any sort of machine can; and a *measuring* machine, especially one measuring micrometric values, is in one important way very different from a machine to do *work*. A measuring machine loses not some but all merit when not in fine condition.

Many "ROCKWELL" Testers have been in service from five to twelve years, yet receive little or no checking. These old machines, their penetrators and gauges, used by successive operators on thousands or millions of tests, cannot all be in good condition. Even new machines should be checked frequently to make certain that they are in good order. Start early in the habit of maintaining accuracy.

While it is impossible to give you a mere block with which to measure hardness of your product, we can give you the simplicity of a carefully made test block to check your "ROCKWELL" Tester. Don't be careless, or a gambler in your hardness testing, when there are ways provided for precision testing. Test blocks are cheap,—and cheaper still when ordered three or more at a time. The operation of the "ROCKWELL" Tester is so simple that it is often entrusted to those who have had so little experience in measurement that they do not realize the need for checking. Someone should assume or be assigned that responsibility in each plant. We make the "ROCKWELL" Tester with care and precision. We see that it reaches you in good order. After that the responsibility to ascertain that the machine is in shape for precision testing rests with you, and the test block puts the accuracy of our standardizing laboratory at your service for quick and easy checking.

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When Hardness Testing must be Shallow,

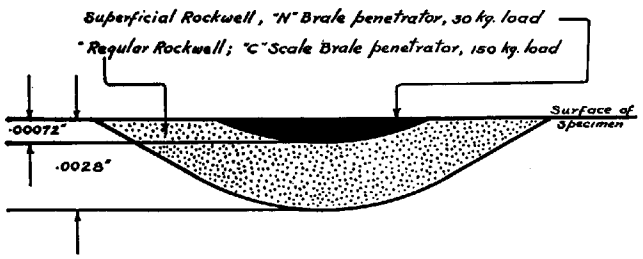
for example, on these

Thin Sheet Metal
Thin Strip Metal
Safety Razor Blades
Cutters for Electric Shavers
Nitrided Steel Parts
Lightly Carburized Steel
Plug and Ring Gauges
Small-Mechanism Parts
Dies, Close to Cutting Edges
Wire and Small Rounds
Laminated Metal
Heavily Cyanided Steel
Tin Plate
Indentations that must subsequently be ground or lapped away

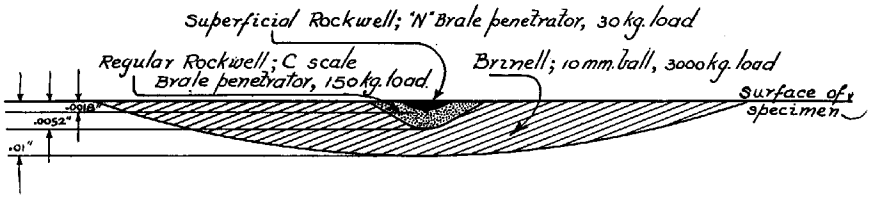
"ROCKWELL" *Superficial* HARDNESS TESTER

The "ROCKWELL" SUPERFICIAL Hardness Tester was designed especially for making hardness tests where, for one or another reason, it is essential that the test indentation be even more minute than is produced in testing with the regular "ROCKWELL" Hardness Tester, and yet where it is also essential that the great sensitivity and accuracy of tests on the regular "ROCKWELL" Tester be fully equalled.

The following diagrams give some interesting comparisons of depths and diameters of indentations made by different hardness testing machines.



Comparative depths of penetration in a piece of hard steel of "ROCKWELL" Tester Hardness C65, as determined on the regular "ROCKWELL" Tester and of hardness 30-N82 on the "ROCKWELL" Superficial Hardness Tester.



Comparative depths of penetration in a piece of metal of hardness C39 on the Regular "ROCKWELL" Tester, 30-N60 on the "ROCKWELL" Superficial Tester and 362 on the Brinell.

Depth of Indentation

Every hardness test made on a "ROCKWELL" Superficial Hardness Tester is based upon a depth of indentation of less than five thousandths of an inch. It is practically always less deep than a tenth of a millimeter. In hard steel the depth of indentation is somewhere about one thousandth of an inch, or about .025 millimeter.

By keeping in mind that any sort of penetration hardness test is influenced by the hardness of the metal tested to a depth of at least ten times the actual depth of indentation, it will be very evident that thin metal or thin, hard cases can accurately be measured only by shallow indentation.

THICK MATERIAL can be tested nicely in our "Superficial" machines provided measurement of hardness near the surface of the material is wanted. If the material is homogeneous in hardness that would also be equivalent to a deeper test.

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"ROCKWELL"
Superficial
HARDNESS TESTER

Operating Principle

The "ROCKWELL" Superficial Hardness Tester operates on exactly the same principle as the regular "ROCKWELL" Hardness Tester, as set forth on Leaf 18 in our "ROCKWELL" Hardness Tester Catalog, but the "Superficial" machine operates with much lighter minor and major loads and has a much more sensitive depth measuring system.

Instead of the 10 kg. minor load and the 60 kg., 100 kg. and 150 kg. major loads of the regular "ROCKWELL" Tester, the "Superficial" Tester applies minor load of only 3 kg. and major loads of 15 kg., 30 kg. and 45 kg.

Whereas hardened tool steel is penetrated to a depth of about .0035″ on a regular "ROCKWELL" Tester "C" scale test, the "Superficial" Tester on metal of the same hardness and with the customary 30 kg. major load, would penetrate to only about .0010″ depth.

One point of hardness for any test made on one of these "Superficial" machines corresponds to difference in depth of penetration of only .001 millimeter (approximately .00004″).

As with the regular "ROCKWELL" Tester the hardness readings are indicated directly on the dial gauge of the machine.

Penetrators

The same 1/16″ diameter steel ball penetrators as used in the regular "ROCKWELL" Tester are employed on brass, bronze and unhardened steel in the "Superficial" Tester.

On hard steel surfaces a sphero-conical diamond "BRALE" penetrator is used but because of the smaller penetration the penetrators for these "Superficial" machines must be shaped with still greater micrometric precision. They are a little more costly and each is marked "N" BRALE to distinguish it from a regular "BRALE" Penetrator. These diamond penetrators are sold separately from the machine because those who test only sheet metal as rolled do not need the N "BRALE" Penetrator. See Leaf 44 in regard to hardness number designations.

Penetrator Chucks to hold balls of ⅛″, ¼″ or ½″ for use in testing dense non-metal materials that are too soft for testing with the penetrators designed for metal testing can be furnished and are inexpensive.

The ⅛″ ball is also sometimes used for very soft metals that tend to flow continuously under pressure; for example, zinc, and then the time of load application should be closely standardized.

Anvils

Four work support anvils of different kinds, two plane, one small V notch and a "Cylindron Jr." anvil, are all supplied as part of the standard equipment. A larger "Cylindron" anvil for supporting cylindrical work, see Leaf 24, is sold as an extra.

Diamond Spot Anvil

At an extra price we furnish an anvil for supporting thin soft sheet metal, which anvil has a polished diamond at the center. This gives standardized anvil surface condition. No guarantee of diamond life. We designate this as Diamond Spot Anvil.

Precautions

Work to be tested on the "ROCKWELL" Superficial must be smoothly finished but need not be polished. There must be no dust, scale or any particles on the under surface of the specimen or on the anvil, for any sinking of the specimen under the testing load would be added to the actual penetration as measured by the dial gauge. It is simply that micrometric measurements of all kinds require more care than do coarser measurements.

Fundamentals in Brief—The basis of hardness measurement is upon increment of depth of penetration due to increment of load.

The load, under oil dash pot time control, is applied by standardized dead weights and lever and not by physical pressure of the operator nor by any means that involves instrumental measurement of load. The hardness numbers at conclusion of test are indicated by dial gauge, the moving system of which responds to penetrator movement through a lever that is not subjected to stresses of testing load application. No portion of the tester, except the penetrator, contacts the surface being tested so that the point of test is completely visible and can be nicely selected.

Standard equipment is specified in printed current net price list.

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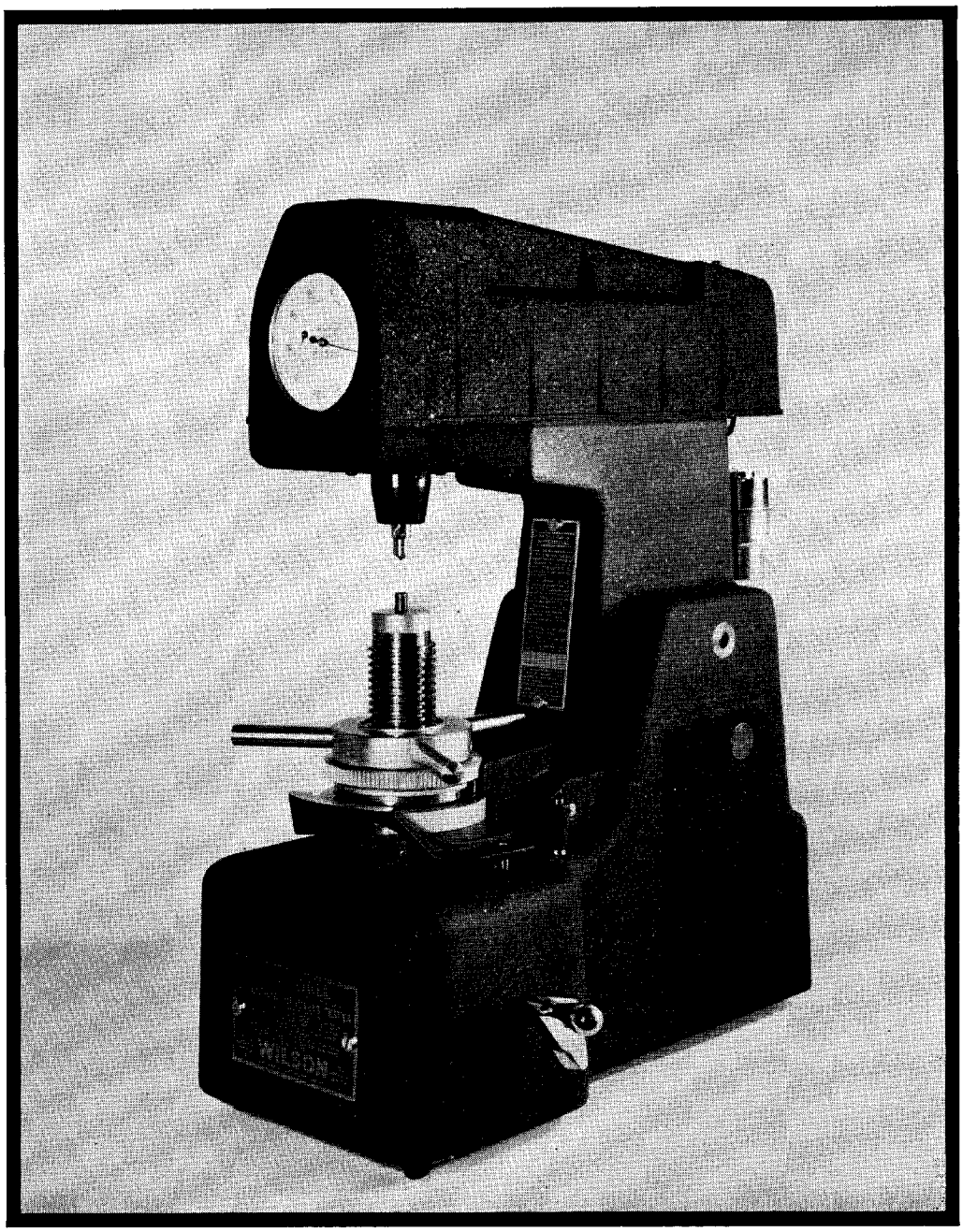

"ROCKWELL"
Superficial
HARDNESS TESTER

Model 1-JS, vertical gap 3¼"

This is the smallest size in which this machine is made and is used for testing sheet metal and small nitrided or carburized parts. It has 5½" horizontal reach. The anvil shown is the "Spot" Anvil for sheet metal support. If the sheet to be tested is both thin and soft, the special Diamond Spot Anvil is recommended. As the 8" Testing Table reduces vertical capacity of tester ¾" and the Vari-Rest reduces it considerably more, those are generally used only with taller sizes of tester. Dash Pot speed control located internally.

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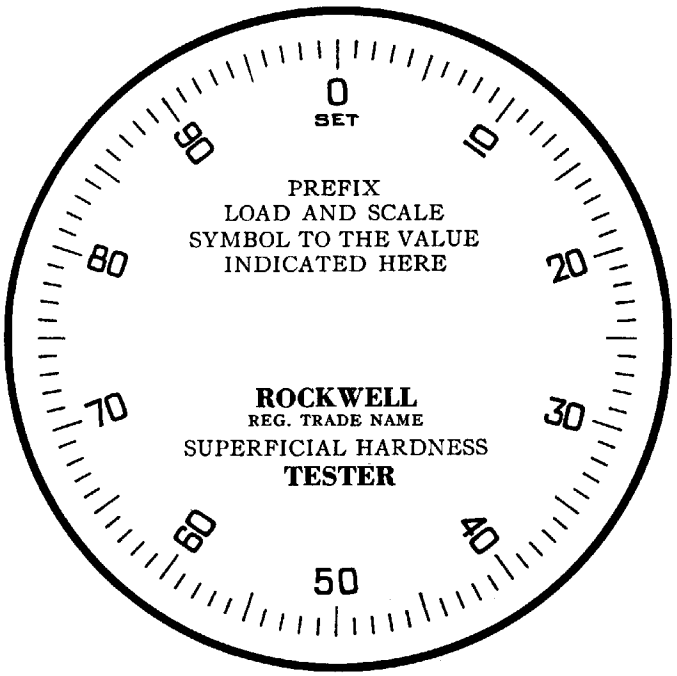
"ROCKWELL"
Superficial
HARDNESS TESTER

Designation and Sensitivity



Full size reproduction of the dial of a "ROCKWELL" Superficial Hardness Tester. The pointer revolves once for one tenth of a millimeter (approximately .004") motion of the penetrator.

Hardness Number Designations

In recording readings obtained on this Special Model for Superficial Hardness Testing, write first the value in kilograms of the major load used—second, the letter N if "BRALE" N penetrator is used or the letter T if the 1/16" ball is the penetrator—and third, the dial reading.

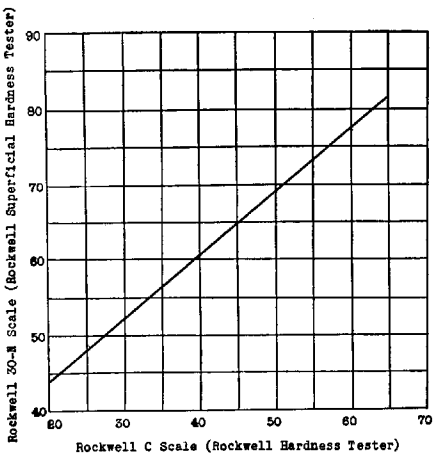
The scale pan alone applies 15 kg major load, and each of the weights 15 kg more, so the load may be 15 kg, 30 kg or 45 kg.

Following are the established prefix symbols:

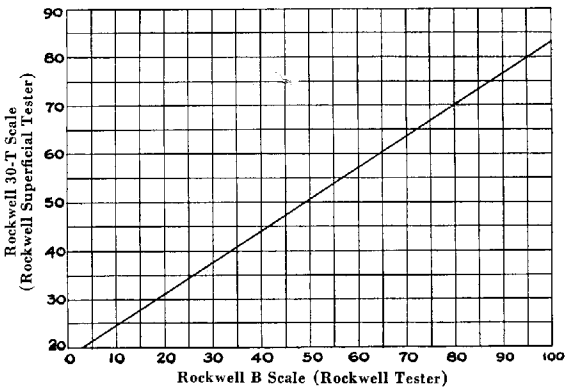
For N "BRALE"		For 1/16" Ball
15-N.....	with 15 kg major load.....	15-T
30-N.....	with 30 kg major load.....	30-T
45-N.....	with 45 kg major load.....	45-T

Sensitivity

The question naturally arises whether sensitivity is lost by making more shallow indentation. It, of course, would be, except that the "Superficial" model of the "ROCKWELL" amplifies the depth measurement to an extent that restores the sensitivity, as the graphs below indicate.



Although the penetration made in testing with "ROCKWELL" Superficial is only a fraction of the depth made by a regular "ROCKWELL" Tester on the same specimen, the scale of hardness of the "Superficial" is very open as is evidenced by the above approximate relationship curve.



For unhardened steel and the non-ferrous metals the above chart gives the approximate relationship between B Scale readings on the regular "ROCKWELL" Hardness Tester and the 30-T Scale readings on the "ROCKWELL" Superficial Hardness Tester.

CHARTS giving relationships between readings on these testers for all scales and readings on regular "ROCKWELL" Testers are sent with each machine.

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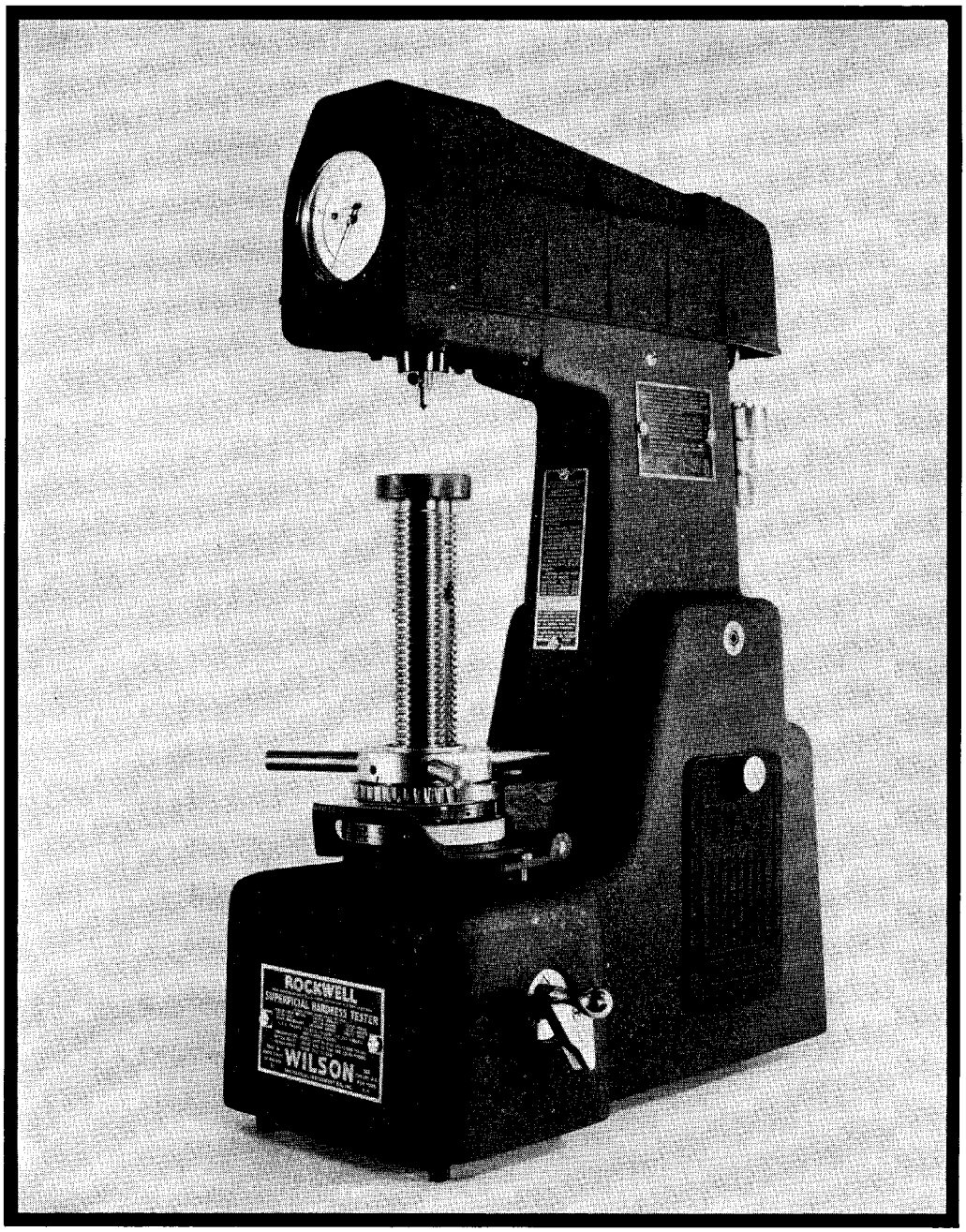

"ROCKWELL"
Superficial
HARDNESS TESTER

Model 3-JS, vertical gap 8"

This is the most frequently used size as it will accommodate most tools and machine parts, yet will test sheet metal and other thin or small work as well as does the smaller size. Horizontal reach, 5¼" to 5½". Testing Table, as illustrated on Model 4-JS, will be supplied at extra charge. The "N BRALE" diamond penetrator for hardened or nitrided steel should be purchased, unless application is to be limited to unhardened steel or non-ferrous metal. A Protective Telescopic Sleeve Set may be used over screw.

Standard equipment is specified in current printed net price list.

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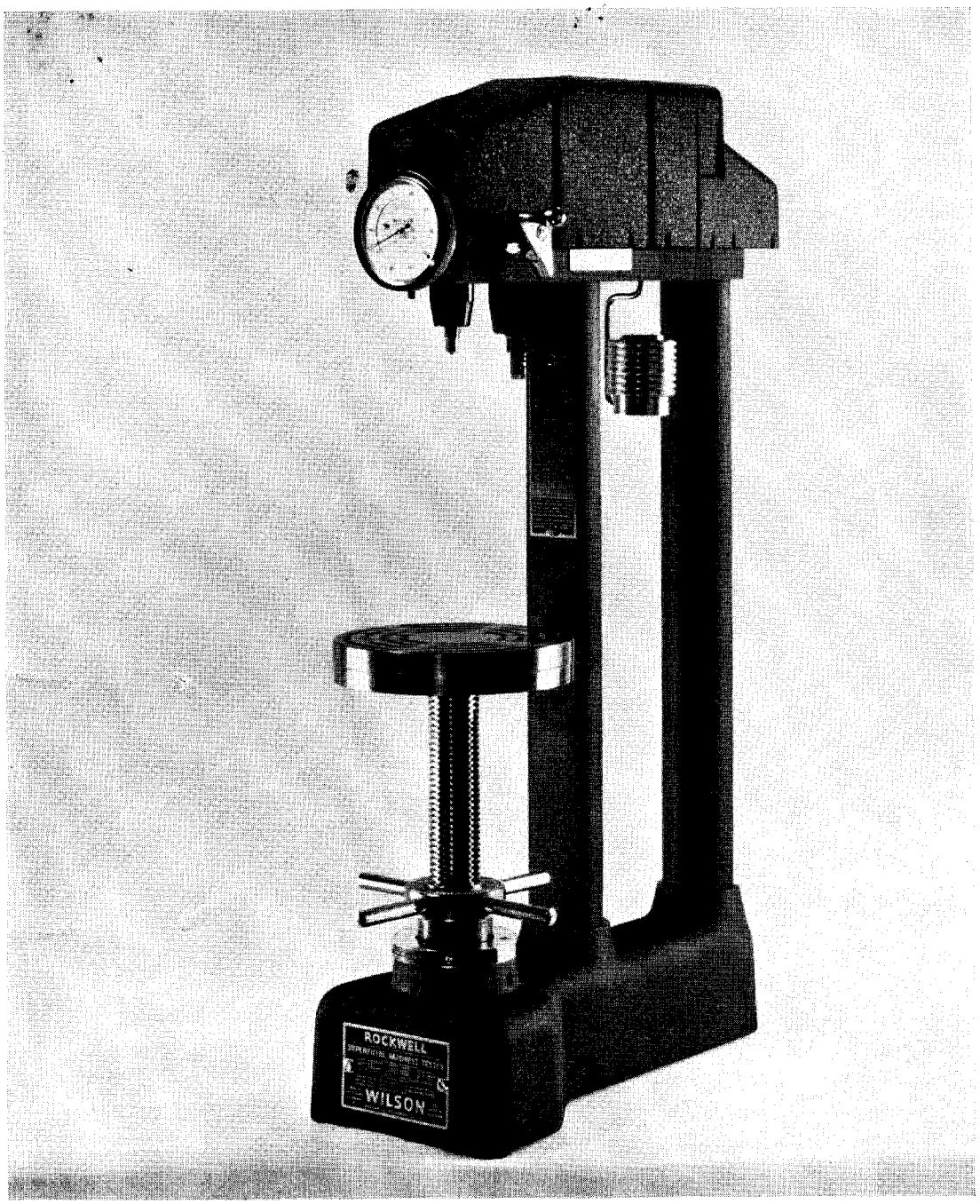

"ROCKWELL"
Superficial
HARDNESS TESTER

Model 5-S, vertical gap 16"

The 8" Testing Table on the elevating screw shown above is not included in standard equipment, but four hard steel anvils for supporting flat or cylindrical shapes of moderate size are included.

We have built, on special order, even taller machines than the tallest standard size here illustrated.

Standard equipment is specified in current printed net price list.

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