

with weights and an escapement that have borrowed from them the greater part of their astronomical or automatic functions. These apparatus show what, in all times, man's efforts have been to obtain a measurement of time. From this point of view alone, it is well to recall the history of them.—Planchon, in *La Nature*.

AMBER, ANCIENT AND MODERN.

THAN amber there is scarce another substance around which has grown so many myths, fables, and quaint imaginations. The substance itself was known almost to the first dwellers on the earth; the beginning of the overland trade in amber is lost in the mists of prehistoric times; and it is believed that a traffic in it was carried on to some extent as early as the Stone Age; while amber ornaments are found in the prehistoric remains of Egypt, Greece and Italy. Prized by the beauties of Greece and Rome, it was one of the first commodities which led the ancients to take an interest in the utmost northern boundaries of the then known world. Its peculiar properties of attracting certain substances when rubbed; of holding within its translucent depths immured bodies; its curious origin, and its inherent beauty—all these have tended to make amber one of the objects of interest and admiration from time immemorial. Therefore it is only in the nature of things that learned men should write books about it—as they have. The last one on the subject has just been published by Messrs. Sampson Low & Co., and is entitled "The Tears of the Heliades." This poetical title is illustrative of the style in which the subject is treated by its learned author, Mr. W. Arnold Buffum—himself one of the greatest living collectors of this beautiful gem. From research, from investigation, and from a deep love of his subject, Mr. Buffum writes as one having authority. His little work is full of allusions to the ancient writers, and quotations from the classics adorn his every page. Indeed, the book is imbued with the poetry of the beautiful and romantic yellow stone of which he writes. Space fails to tell of the legends connected with and the uses made of these wonderful "sun stones," these "clots of sunshine," which Homer did not disdain to mention, and which Shakespeare referred to. Those who would know more of this doubly attractive subject must go for it to Mr. Buffum's pleasant and well written little book, the interest of which is enhanced by some pretty illustrations, including a colored representation of a Cilician necklace of iridescent amber, which is one of the most beautiful things found in this wicked world.

TEST OF A COMPRESSED AIR RESERVOIR TAKEN FROM A HARDIE MOTOR AFTER HAVING BEEN IN USE TWO YEARS.

By HERMAN HAUPT.

TEST made at the works of the Watson Stillman Company, No. 204 East Forty-third Street, New York.

We have this day witnessed the test by hydraulic pressure of the Mannesman tube, 5 feet long, 8 inches diameter, and 7 millimeters thick. It is understood that this tube has been in use upon Hardie air motor for about two years, carrying air pressure at 2,000 pounds to the square inch.

The tube was first submitted to a hydraulic pressure of 2,150 pounds, when it was struck several blows with a 14 pound sledge, having a 3 foot handle. The sledge being swung from the end of the handle and weighing, with the handle, 16 pounds. These blows made no impression whatever.

A second application of pressure was then made up to 5,000 pounds per square inch, at which point the tube began to stretch, and between 5,000 and 6,000 pounds the tube increased one-eighth of an inch circumferentially, when we had to change the pumps to secure a higher pressure.

At 6,100 pounds the tank began to stretch over a small area at a point near its center, and continued to do so until it was ruptured, at about 6,150 pounds pressure.

The character of the rupture was a mere split in the steel, 18 inches long. No pieces were detached and the fracture was quite regular in its form, showing high ductility in the material and freedom from any liability to project detached pieces in case of a rupture.

Signed: THE WATSON STILLMAN COMPANY,
F. H. STILLMAN, Proprietor.

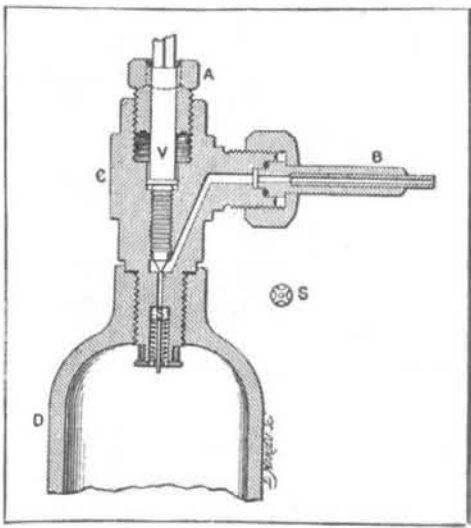
Others in attendance certified to the accuracy of the above report.

It is to be observed that the tube tested had been in use in one of the Hardie air motors for a period of two years under a pressure of 2,000 pounds, thus indicating that there had been no perceptible deterioration in use and supporting the assertion that the duration of the reservoirs may be considered as indefinite, and that no allowance in estimates of cost of operation need be made for their renewals or repairs. As these reservoirs

until a pressure of 5,000 pounds had been reached. Consequently, 4,000 pounds, at which all the tubes are tested, is far below the limit of elasticity, and 2,000 pounds, which is the maximum pressure under which the reservoirs are used in the Hardie motors, must be considered to be absolutely safe beyond the possibility of rupture, and even if a rupture should occur, there would be no danger of flying pieces or of any serious accident.

NEW COCK FOR COMPRESSED OR LIQUEFIED GAS RECEPTACLES.

MESSRS. DUCRETET & LEJEUNE recently presented to the Academy of Sciences a new cock designed to be used in vessels containing liquefied or compressed gas. All those who make frequent use of compressed oxygen know by experience that this gas, when sent too quickly, by the simple turn of the cock of the receptacle, into an expander or directly into the rubber tube fixed to an oxyhydrogen lamp, sometimes produces a



STOPCOCK FOR RECEPTACLES CONTAINING COMPRESSED OR LIQUEFIED GAS.

violent explosion, and, in the second case, a combustion of the rubber.

Messrs. Berthelot & Vieille recently pointed out the danger that liquefied acetylene may present under the same circumstances, when it is allowed to flow too suddenly into an expander or into another reservoir of small capacity. The danger would be permanent in the hands of every one.

The new cock devised by Messrs. Ducretet & Lejeune offers greater security. It does not permit the rapid exit of the gas, even when the screw, V, is quickly maneuvered. In the interior of this cock there is a valve, S, that has a permanent and regulated exit orifice. Consequently, the valve permits of a rapid re-entrance of the gas for the filling of the receptacle, D, but prevents an abrupt exit of the gas, as has just been said. An abnormal introduction of the gas into the expander or into the distributing conduit is thus avoided.—*La Nature*.

The Eads Channel, through the South Pass of the Mississippi River, is threatened by the existing crevasse in Pass a l'Outre, and Senator Caffery, of Louisiana, is seeking an appropriation of \$250,000 for repairs at this point, and practically asks that this sum be deducted from the \$500,000 due to the heirs of James B. Eads in 1900. The heirs vigorously protest against this proposition; they say it is no part of their duty to close this break, although they have actually expended \$200,000 in a vain attempt to do so. They affirm their entire ability to maintain a deep channel in the South Pass until 1900, and then their responsibility ends. A syndicate is said to be already formed in New Orleans to deepen the Southwest Pass by jetties, and a similar syndicate will probably be formed to care for the South Pass Channel after 1900 in the mercantile and maritime interests of the people of the Southwest. Meanwhile Congress is asked to repair the damage which originally started by oystermen in digging a harbor in Pass a l'Outre for their boats.

A fact to be noted, in view of the various and diverse opinions concerning acetylene, is that the article is finding its way into the print works, dye houses and bleacheries of England. The coolness of the flame, with its great luminosity, is spoken of as constituting

SELECTED FORMULÆ.

Watchmaker's Oil.—Take the purest and lightest sperm oil obtainable, and place it in a retort with eight times its weight of absolute alcohol. Boil it for ten minutes, decant the liquid and allow it to cool, then let it evaporate until its volume is reduced to a fifth; filter, and keep it in well stoppered and sealed bottles. This is suitable for the finest horological work.

Brilliant Black Varnish for Metals.— Parts by Weight.
Spirit of turpentine..... 10
Sulphur..... 1

Melt the sulphur till a brown tint appears, then add the essence of turpentine. Articles to be varnished with this must first be warmed.

Lacquer for Oxidized Silver.— Parts by Weight.
Alcohol..... 16
Red arsenic..... 3
Essence lavender..... 1

Gold Lacquers for Metals.— Parts by Weight.
(1) Gum sandarac..... 50
Seed lac..... 50
Venetian turpentine..... 24
Dragon's blood..... 6
Gamboge gum..... 2
Spirit of turpentine..... 400

This is prepared by dissolving all the solid substances in the spirit of turpentine over the water bath.

(2) Gum sandarac..... 125
Seed lac..... 125
Dragon's blood..... 15
Gamboge gum..... 5
Turmeric..... 2
Ground glass..... 150
Spirit of turpentine..... 1,000

These are dissolved as before over the water bath—that is to say, in a jacketed pan, in which the water boils in the outer case, and then 50 parts by weight of liquefied Venetian turpentine are added.

(3) Spirit of turpentine..... 24
Linseed oil varnish..... 12
Amber..... 12
Gum lac..... 3

Dissolve the resin, then add the oil, finally the spirit of turpentine.

(4) Spirit of turpentine..... 50
Boiled linseed oil..... 25
Amber..... 25

Golden Lacquer for Copper.— Parts by Weight.
Seed lac..... 170
Ground glass..... 100
Amber..... 60
Dragon's blood..... 30
Gamboge gum..... 5
Saffron..... 2
Boric acid..... 3

This is macerated in sufficient alcohol to cover the solid matter, and then filtered.

Jewel Lacquer.— Parts by Weight.
Seed lac..... 90
Gamboge gum..... 30
Amber..... 30
Dragon's blood..... 2
Saffron..... 1
Sandal wood oil..... 2
Alcohol (95°)..... 600

The resins are rendered soluble in the usual manner, and the ordinary method for the preparation of varnishes is followed.

Transparent Lacquer.— Parts by Weight.
Powdered gum sandarac..... 4
Turpentine..... 7
Spirit of turpentine..... 28

Dissolve the turpentine and the powdered gum sandarac over a water bath, in the spirit of turpentine. Before this varnish is used the bottle should be exposed to the sun for about an hour.

Lacquer for Optical Instruments.— Parts by Weight.
Copal..... 10
Essence lavender..... 50
Powdered camphor..... 1

Dissolve the copal and camphor in essence of lavender, then warm sufficient spirit of turpentine to obtain the necessary fluidity for the varnish, and add the mixture slowly to this.

Red Lacquer for White Metal.— Parts by Weight.
Seed lac..... 20
Powdered sandarac..... 11
Turmeric..... 5
Essence lavender..... 3
Red sandalwood..... 3
Alcohol..... 140

Reduce all these solids into very fine powder and dissolve them in the alcohol, either over a water bath or over a sand bath, the latter being preferable.

Yellow Lacquer for White Metal.— Parts by Weight.
Gum lac..... 100
Small mastic..... 80
Venetian turpentine..... 76
Dragon's blood..... 45
Gamboge gum..... 50
Alcohol..... 1,500

Proceed as in the recipe above.

Varnish for Polished Copper.— Parts by Weight.
Gum sandarac..... 110
Resin..... 30
Glycerine..... 5

Dissolve the two resins in sufficient alcohol and add the glycerine.

Varnish for Steel (Dress Swords, etc.)— Parts by Weight.
Gum sandarac..... 15
Small mastic..... 10
Elemi..... 5
Camphor..... 3

Dissolve the whole over the water bath in sufficient alcohol for the purpose. This varnish is used cold. It preserves the blade from rust, and is transparent.—*Bulletin of Pharmacy*.



TEST OF A COMPRESSED AIR RESERVOIR FROM A HARDIE MOTOR.

take the place of the boilers and fire boxes in ordinary steam locomotives, which are the principal sources of expense, it is evident that the repairs of a compound air motor must be considerably less than those of an ordinary steam locomotive.

Other tests have been made of the rupture of these tubes, one of which, 9 inches in diameter, expanded $\frac{1}{8}$ of an inch before fracture, showing extraordinary ductility, and in all the tests made in Germany and elsewhere upon these tubes no fragments were ever detached and the fracture was always of the same character, a simple longitudinal rent usually near the middle of the tube.

It appears that the tubes did not begin to stretch

the chief point in its favor, and it is said to be produced there now by very simple means. While, however, it is a thoroughly clean, good light for the textile coloring trades, there is one point of special consideration involved in its use; that is, on account of its white light textile colorists have assumed its valuable adaptation for matching colors, whereas, as a matter of fact, it is as uncertain with shades as is the gas light, and compound shades, viewed in the acetylene light, vary according to the proportion of their constituent colors. Experiments made in this direction in Scotland prove that, although to appearance acetylene gives a much whiter and purer light than coal gas, the effects are almost identical in color examination.