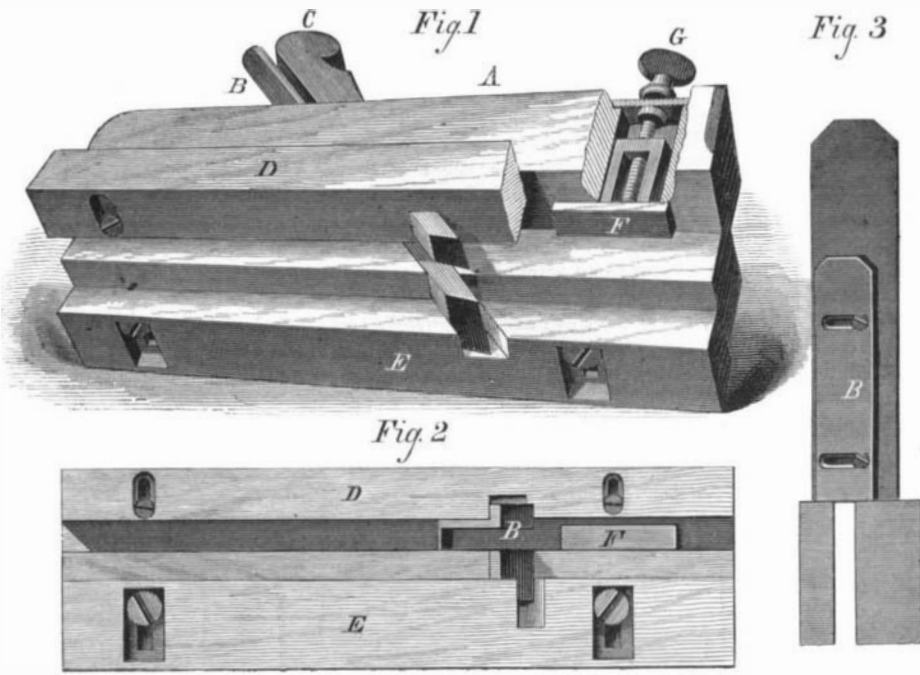


IMPROVED MATCH PLANE.

We illustrate herewith one of those ingenious devices which in a single instrument combines the capabilities of a variety of tools. It consists in a match plane which, by suitable adjustments of its parts, may be set to tongue boards of any thickness.

A is the main stock, B is the iron, and C the key, shown in the side view, Fig. 1. The face of the tool, Fig. 2, is formed in two parts, one of which is an adjustable piece, D, which, fitting into a rabbet of the stock, is made adjustable laterally thereon by screws passing through slots, as shown. By moving this piece out or in, the length of the mouth of the tool is varied so as to correspond with the width of the adjustable iron, B. The latter, Fig. 3, is made in two portions, also connected by screws and slots so that the space between the cutting edges may be made broad or narrow to receive the tongue, which is cut of corresponding size.

E, Fig. 2, is a guide adjustable on the face of the tool by the same means as above described, and F is a gage operated by the thumbscrew, G, for regulating the depth of the cut. Any ordinary plow iron may be used in the grooving tool, and the tonguing tool may be adjusted to suit the groove. With a single pair of implements therefore, it is claimed, the operator is enabled to perform work which ordinarily calls for the use of a multiplicity of devices, thus saving much expense and trouble. Patented through the Scientific American Patent Agency, June 10, 1873, by Mr. James Edwards, of No. 323 Fifth avenue, Brooklyn, N. Y., from whom further particulars regarding sale of patents or State rights may be obtained.



EDWARDS' MATCH PLANE.

THE GLOBE STEAM GAGE.

The amount of correspondence concerning boiler explosions, which has been lately published in scientific journals points out the importance of a trustworthy pressure indicator, which can be relied on, at all times, to show any variation in the force within the boiler, and to indicate the same accurately after long continued use.

The invention which we illustrate herewith is a steam gage of quite simple construction, which we are informed has been in use on the Erie railroad for four years past, during which period it has not varied one pound from the test gage with which it was first compared. Various certificates from railroad officials and others, submitted to us by the owners of the patent, speak highly in recommendation of the instrument, so that it may be fairly considered as having successfully withstood the test of actual experience.

Fig. 1 gives the appearance of the dial of the apparatus, and Fig. 2 a section showing the essential portions. A is the case, and B a metal spring, the space, C, in rear of which contains water. Steam enters from a pipe at D, and presses the spring inwards into the position of the dotted line. The motion of the spring, by suitable lever and other mechanism, is transmitted to the dial needle which registers the pressure in accordance with the amount the spring is driven inward. The instrument is very sensitive and accurate; and it is claimed that it will withstand a heavy pressure without the spring becoming permanently set, and also that at 140 lbs. pressure the spring is forced out from the center $\frac{1}{2}$ of an inch. Under a pressure of 700 lbs., to which the apparatus was subjected a short time since, at the manufactory in Waterbury, Conn., the spring was reversed in form and blown out, falling some ten feet distant.

It is further stated that the gage does not get out of order, and that when in use upon a locomotive there is no vibration or trembling of the pointer, no matter how high the speed at which the engine may be running.

For further information, address Messrs. Austin M. Hayward & Son, Susquehanna Depot, Pa.

Test for Copper and Tin in Extracts.

The poisonous nature of copper, and, to a less degree, of tin, makes the following method of testing for them in an extract, as described by Hager, both interesting and useful, for either of these metals may have been dissolved from the walls of the vessel in which it was prepared. "The extract is, for this purpose, dissolved in five parts of water, or very dilute spirits, and slightly acidified with a drop or two of hydrochloric acid. A bright strip of zinc is placed in the solution, and, after half an hour, if no impurities are present, the zinc will be found as bright and colorless as when first put in. If, however, copper and tin are present, it will be coated with brown film; if tin alone is present, the film will have a grayish white color. It is washed with water and dried by heating the strip of zinc gently in an alcohol flame, and the copper will be indicated by its well known copper color. Under like conditions the film of tin is a dull grayish white. If copper and tin are both present, and it is desired to determine the quantity of the tin, the film is peeled off with a knife into a test glass and 5 to 8 drops nitric acid added. It

is carefully boiled until entirely dissolved, when 75 drops ammonia is added, the solution shaken and allowed to settle. If tin is present, it will separate as amorphous oxide of tin in white flakes." We venture the suggestion that lead can be determined in a similar manner by precipitating on zinc.

Mineral Oils for Iron.

The use of heavy mineral oil as a preservative for iron is strongly recommended by the *London Oil Trade Review*, the substance referred to being, we presume, one of the pro-

quired. For domestic purposes, for the cleaning of all kinds of household iron work, for the preservation of such things as mowing machines and other garden tools or exposed iron implements, the brown oil should be sold in small bottles at a cheap rate. For manufacturers of iron work and for iron-mongers, to whom it will prove invaluable, it must of course be supplied in larger parcels. At present it can hardly be used at all, on account of the difficulty of obtaining it in retail quantities.

Ruled Test Plates for the Microscope.

In a recent paper read before the Quekett Microscopical Club, London, Mr. William Webb takes the ground that the alleged ruled plates of Nobert and others, purporting to present 200,000 lines to the inch, are illusions, it being a physical impossibility to cut any such number of distinct lines within such limits. He says:

That a micrometer with the lines the one 200-thousandth of an inch apart ruled on glass is an absolute impossibility. That if it be possible to rule lines themselves of the width of the one 200-thousandth of an inch, to make them definable there must be a clearly defined line between them, and a clearly defined line in the same plane of observation. That beyond the first few coarse bands of M. Nobert's tests, there is not, properly so called, a single line. That in the finest bands, except at their extreme sides, there is not half a line. That in the finest bands the only thing certain, except the edges, is the uncertain polarized aerial lines. That the microscopical world has been pursuing a phantom, and adopting a fallacy. That polarization of light in the examination of these and analogous tests is a deceitful servant of the microscopist.

illumination is another deceiver. That if M. Nobert were to attempt to fill his incisions with black, his finest bands would be merged each into one black line of the breadth of each particular band. That a test must be a known thing which some power will either disperse or fail to define, as in the case of a spectacle vendor, who places before an intending purchaser's eyes words printed in types of different sorts as a known test of visual powers. That there are no tests so reliable as a known measured congeries of contorted lines, as in microscopic writings, where the transmitted rays are partially shut off by the black, and in which, the rays transmitted being transmitted by direct illumination, their definition is not interfered with; such rays becoming parallel rays, passing out at right angles with the surface of the glass, the unalterable law of natural optics being that the angle of incidence and the angle of reflection are equal.

The Cincinnati Exposition.

The second Annual Exposition held in Cincinnati is now in progress, and attracting, on an average, some 12,000 visitors per day. We learn that it is the finest and largest display yet made in the West, and fully in accordance with what might be expected from a city inferior, in point of number and variety of its manufactures, only to New York and Philadelphia. Cincinnati alone furnishes one half the steam engines on exhibition, besides a fair proportion of the agricultural and labor-saving machines. There is also a large display of furniture of fine workmanship, coming from the various establishments of the city. Stoves occupy a prominent place in the list of local products; and from the manufacture, it seems probable that Cincinnati may fairly rival Troy and Pittsburgh. The makers of boots and shoes also carry on an extensive business, employing the most approved machinery and selling goods at the rate of \$2,250,000 per year. Miscellaneous goods, and also leather, are exhibited in profusion. Of the latter the city makers, last year, produced \$2,473,800 worth. There are from twenty to thirty different kinds of carriages displayed, the workmanship of which compares favorably with that of the best eastern firms. Pork packing is of course represented on a large scale. The figures of the past two years show a marked increase in this important trade. During the winter of 1870-71, there were packed 481,560 hogs, and in the succeeding winter, 630,301.

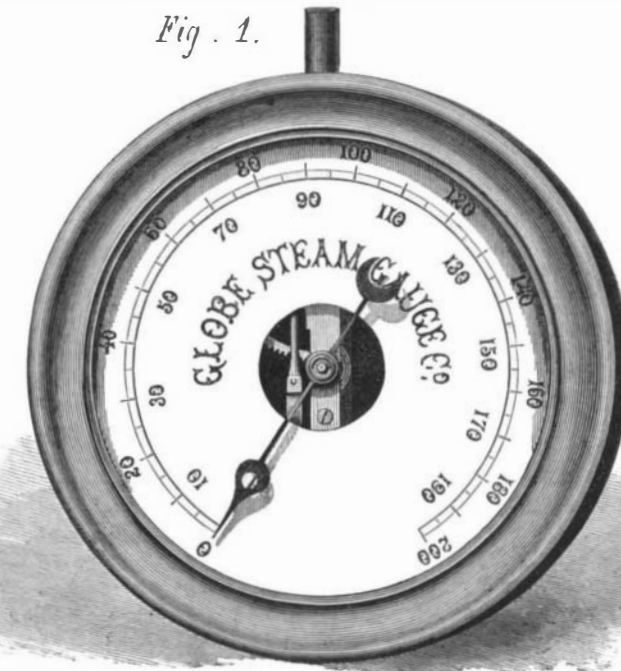
The Exposition is drawing large numbers of the country people to the city, and the attendance appears to be increasing in spite of the rival attractions of the Louisville Fair.

J. W. S. writes to say that he has a perpetual motion in running order, and he will dispose of it for \$2,000,000 for a "plot;" but if he has to carry it to Washington, he will ask \$5,000,000. The existing financial crisis will, we fear, prevent our correspondent from receiving either of the sums he mentions.

DURING last autumn, says the *Journal of the Society of Arts*, there were no less than seventeen companies extracting gold from the auriferous sand of Finland. One of the companies returned a dividend of 70 per cent. The largest nugget weighed 28 pennyweights.

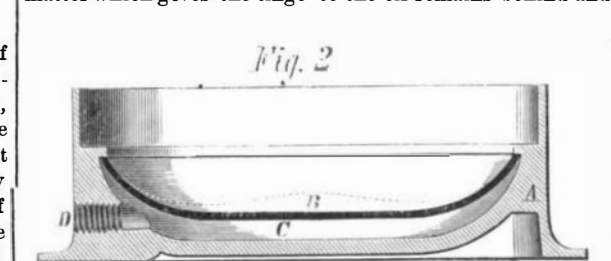
ducts of shale distillation, so extensively practiced in Great Britain. Whether a similar product can be obtained from our petroleum is a good subject for research. Our cotemporary says:

The action of the oil is twofold. First, it is detergent when vigorously and freely brushed over an already rusted surface. It seems to loosen the bulk of the rust and it darkens that which remains. Secondly, it acts as a varnish if applied after the cleansing has been effected, or to new and bright work. Its superiority to vegetable or animal oils depends upon the fact that the bulk of the oil evaporates, and



THE GLOBE STEAM GAGE.

it leaves only a very fine film behind. If the oil is light and fully refined, it evaporates so completely as to do but little good in this way; but if tinged or "once run" oil of sufficiently high gravity be used, the resinous or carbonaceous matter which gives the tinge to the oil remains behind and



forms the thin protecting film of varnish. Ordinary varnish leaves far too thick and obvious a film, while the film of the once run oil does its work of protection without displaying itself. As regards the density of the oil required for this purpose, we recommend that which stands between the burning oil and good lubricating oil; it is known, and sometimes sold, as "intermediate oil." We are satisfied that a good trade may be done by anybody who will bring this before the public in a proper manner, and supply the article as re-