Removing Paint from Iron.

Mr. A. J. Bishop, of Cleveland, O., says: The greatest difficulty I have found in using potash has been to have it remain where put, and not run off of the work. By making various experiments, I have found that good lime used in proper proportions with the potash will not only make it remain where put, but is also a benefit to the strength and quickening of the potash, the lime acting upon the grease more readily: when too great an amount of lime is used, it has a tendency to harden upon the work, and then is as difficult to remove as the paint when first starting. One can also, I find, use too great an amount of potash; in like manner, if the liquid is too strong and lime is used, it has a tendency to crystallize and become hard. There are some objections to using potash, as it may injure the hands or clothes of the user, but to avoid this I have made use of hemp packing fastened to a stick, say two and a half or three feet in length; this gives the workman plenty of distance from his work, and he does not injure himself or his clothes, and also gives him a good swab or brush with which to apply the potash.

Another objection is the surplus of potash which may be left to remain upon the work, which, if not thoroughly removed, is injurious to the durability of the paint when repainted; but this can be avoided by extreme care being taken to remove the potash. In making tests to obtain proportions and results of different strengths of potash and lime, I obtained the following: My first was composed of 5 pounds lime, 6 pounds potash, and 7 quarts water; my second, 5 pounds lime, 4 pounds potash, and 7 quarts water; and I found that the latter was two hours the quickest in removing the paint from drivers of the same engine. Another trial was made with 14 pounds lime, 12 pounds potash, and 21 quarts of water for four pairs of drivers, and with this I found that it required equally as much time to remove the surplus of lime left upon the drivers as it took in the first place to remove the paint. Other tests, being made of 1 pound lime, 4 pounds potash, and 6 quarts of water, I found to work much better than any previously tried, and am satisfied that this proportion is about right. These tests were made with crushed potash. The average time required to remove paint from two pairs of drivers has been two men, seven hours, while the time for scraping for same men would reach three and four days for same work. The paint has been removed from a tank by two men in seven hours, and other parts of a locomotive in a proportionate length of time, while with heat for burning same, or scraping cold, the time is beyond mention for comparison.

Ordnance for Harbor Defense.

The report of the Armament Board appointed in pursuance of an act of Congress to make certain tests of artillery has been made to the Secretary of War. The Board interpreted the act of Congress under which it was appointed to refer only to mortars and guns of high power for the defense of harbors, and did not take into consideration the lighter guns required for the flank defense of permanent works. The Board first directed its attention to the depth of water in the channels leading to all of the seaports, and then ascertained the number and thickness of armor of the known ironclads of the world which would enter these harbors. The powers of the guns necessary to penetrate these armors were then calculated, and the number of guns considered essential for a proper defense of the harbors was decided upon. In that determination the Board was guided by a list of guns and mortars which had been prepared by the Board of Engineers for Fortifications after careful study of the subject.

The Board submits tables which embody its views, and which, summarily stated, call for 125 eight inch guns 21·5 feet long, to weigh 13 tons each and to carry projectiles weighing 285 pounds; 226 ten inch guns 26·875 feet long, to weigh 25 tons, and to carry projectiles of 575 pounds; 306 twelve inch guns 35·11 feet long, to weigh 48 tons, and to carry 894 pound projectiles; 50 sixteen inch guns 45·93 feet long, to weigh 107·77 tons, to carry projectile of 1,031·4 pounds each; 512 twelve inch mortars 10·33 feet long, to weigh 13·06 tons; and to carry 610 pound projectiles. These guns will have a penetrating force at 5,000 yards through thicknesses of wrought iron as follows: 8 inch caliber, 10·39 inches; 10 inch caliber, 15·16 inches; 12 inch caliber, 17·25 inches; 16 inches caliber, 23·20 inches.

In conclusion the Board states that it deems it of the utmost importance that the guns and mortars above specified should be procured at the earliest date practicable.

A Formula for Nervous Headache.

From the *Maryland Medical Journal* we note that Dr. A. L. Hodgdon, of Farmwell, Va., recommends the following recipe for nervous headache:

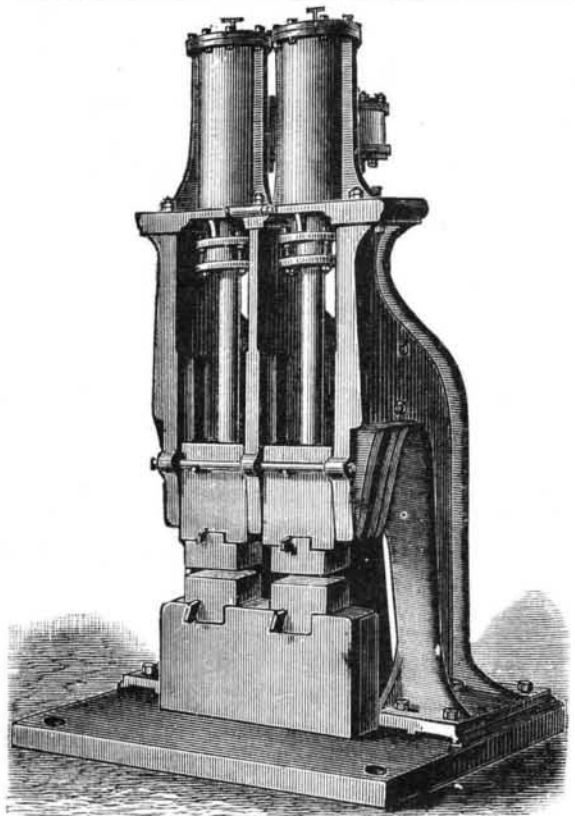
℞. Alcohol dilut. .... ℥ iv.
Olei cinnamom .... ♏ iv.
Potas. bromid .... ʒ v.
Extr. hyoscyam. fl. .... ʒ iss.
Fiat lotio.

S.—One to two teaspoonfuls, if required.

Dr. Hodgdon has used this combination with universal success. It is not disagreeable to take, and has no bad effects.

DOUBLE STEAM HAMMER.

Messrs. B. and S. Massey, of Manchester, have recently constructed for Messrs. Tangye, Birmingham, a specially designed double steam hammer. There are, as shown, two hammers of the same size, which can be worked either together or independently. By this arrangement one hammer may be delivering sharp and rapid blows while the other is striking slowly and heavily, or one may be stopped entirely while the other is at work. This arrangement of double hammers is intended principally for work which requires to be passed quickly from one to another at the same heat, and as the two tups or hammer heads are not more than about 4 inches apart, this can be done with greatest facility. As compared with two separate hammers there is also a reduction in expense, as one base plate, one anvil block, and the central member of the framing are common to both hammers. For the same reason there is also a saving in the foundation and in the floor space required. The falling weight of each hammer, independent of top steam, is 7 cwt. It may be added that the arrangement is applicable to three or more hammers should they be required, and is not confined simply to a pair of hammers, as shown in our illustration



DOUBLE STEAM HAMMER.

FRANKEL'S REGISTERING DYNAMOMETER.

The apparatus shown in the accompanying engraving is designed for ascertaining the stresses that occur in metallic bars under variable loads, and not only for observing them, but also for writing their true history from instant to instant. It makes the bar itself write this, and allows the observer to ascertain when the experiment is ended and what has taken place, and to draw all the deductions therefrom that he pleases.

Every one knows that when we pull on a wire or rod it elongates. If the bar be compressed, it shortens. The whole science of the calculation of resistances is founded upon the simple fact that, in the same rod, the elongations or contractions are proportional to the stresses undergone. And, again, such variations in length are proportional to the stresses per unit of section per square millimeter (1 millimeter = 0·0394 inch), for example, in rods of any dimensions whatever. This is what is taught by the theory of elasticity.

It is this very simple property that Dr. Frankel has utilized in the invention of his registering dynamometer.

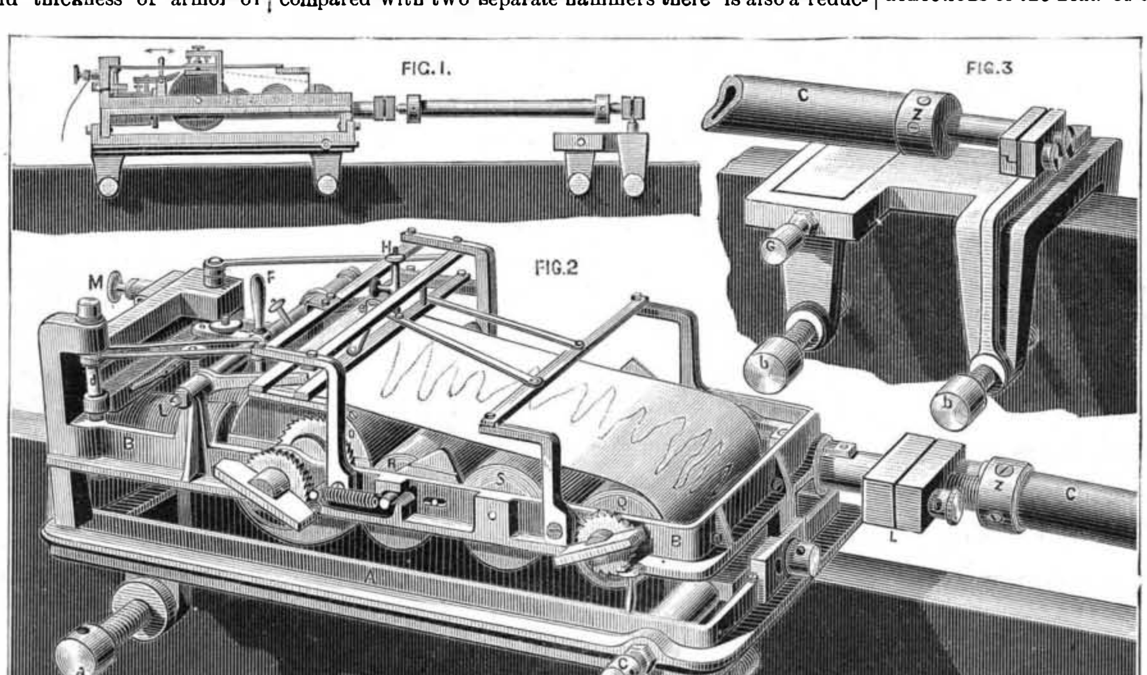
He takes a certain length of the wire that is to be examined, fixes clamps to its extremities, and makes it inscribe upon an unwinding sheet of paper the variations that it is undergoing in length. For example, knowing that with iron a length of one meter (39·4 inches) increases 0·05 millimeter when the tension that is exerted is one kilogramme (2·204 pounds) per square millimeter, it will be easy, by measuring the elongation inscribed upon the paper, to find how much the section of the bar experimented with has been stretched or compressed per square millimeter.

The principal part of the apparatus consists of a cast iron frame, A (Figs. 1 and 2), which is firmly fixed to the rod experimented with by means of a binding screw, and which carries the registering mechanism. Along one of its sides, and parallel with the bar, there is a round movable rod, whose head, L, projects from the frame and receives a small sphere that belongs to another hollow rod, C, about 0·8 meter (31·5 inches) in length. The other extremity of this latter carries an analogous sphere, which is set into a head like the first (Fig. 3), that is carried by an independent jaw fixed to the bar. The screw, *b*, of this jaw, and the corresponding screw, *a*, of the frame, A, determine the length of the bar on which the experiment is made. The head, L, being fixed to the jaw, the rod, C, will be carried along if the bar elongates or shortens, and, while at the same time keeping at a constant length itself, its other extremity will move with respect to the principal frame, A.

Let us imagine, then, that such extremity has a plane surface, and that against it there presses, under the influence of a spring, a small sphere carried by a lever jointed to a fixed axis. This part is unfortunately hidden by the apparatus (Fig. 2). Every motion of the rod, C, will cause the lever to move, and if the proportions of its two arms are properly chosen, its other extremity will amplify the motions of the little sphere that is in contact with the rod. A new transmission of motion, effected by means of a pinion and a toothed sector, will permit of a further amplification of the motions observed, and, without our entering into details, it will be seen that we shall finally obtain, through the inscribing pencil, H, motions that will be an exact multiple of the deflections of the head of the rod, C. In the apparatus, as constructed, this multiplication is always about 170 times the variation of the length to be measured. In starting from the figure indicated above, it will be readily seen that if a millimeter per meter of real elongation of the rod corresponded to a stress of 20 kilogrammes per square millimeter, one millimeter of the diagram obtained would correspond to $\frac{20}{170}$ = 0·117 k. (4·14 ounces) per millimeter (0·0394 inch).

The inscription is made upon a paper which unwinds slowly under the pencil. The cylinder, Q, contains a tension spring which does the unwinding, and the motion of the paper is regulated by a clockwork movement in the drum, D. The other, and intermediate, drums are designed for regulating the tension of the paper and keeping it close to the surface upon which the pencil bears. The rectilinear motion of the latter is obtained by an upper parallelogram, and, in order to have a sure datum point, a second pencil, near a lever handle, F, traces a continuous line to which are easily referred the ordinates of the curve obtained.

As the paper unwinds with a certain velocity, it is important that it be not wasted when no experiment is being tried. For this reason the starting may be effected by hand or electrically by means of the lever, F, and it may be rendered automatic, especially, for example, when a train is about to cross a bridge whose working it is desired to ex-



FRANKEL'S REGISTERING DYNAMOMETER.