draulic press, and the metal subjected to compression until its temperature had fallen below that at which bubbles would be reformed. We do not know whether or nor Messrs. Révollier and Co. are still using the compressing process, nor what success has attended their latest experiments with it, but we know that during their earlier use of it they produced some very compact sound ingots, but also many failures. Not content with treating ingots, Messrs. Révollier and Co., also compressed —with varying success—more complicated castings, such as tyres, rings for guns, etc., but in dealing with such a manufacture they had to contend against the difficulty of running the metal at a lower temperature than was consistent with efficient compression, the initial temperature of the metal on leaving the furnace being reduced by its transfer by the ladle, etc. The result was that, to obtain the necessary liquidity in the molds, they were compelled to resort to the use of a metal containing a higher percentage of carbon and hence a lower melting point, but this metal again was unfitted for tyres, etc., on account of its hardness and brittleness, and hence failures. One great difficulty connected with the affair thus was that by the Siemens-Martin process it was not possible to deliver a mild steel into the ladle at a temperature so much above its melting point as to allow of it at length reaching the molds at a temperature suitable for undergoing compression. With the Bessemer process less difficulty is experienced in this way, the initial temperature being higher; but even where Bessemer steel is compressed, as at the Neu erg Works in Austria, it is found to be very important to keep up the temperature of the steel before compressing by heating the ingot molds before the steel is teemed, and by getting the molds under the press as promptly as possible after they have been filled.

The arrangements for compressing steel which have for some years been in use at the Neuberg Works were planned by Herr Von Stummer-Traunfels, and they have proved very successful, while they are also very simple. At Neuberg the steel from the convertersis run into a receiver which is lifted by a powerful hydraulic crane on to a suitable carriage, and is then run on to a bridge over the press pit. At the bottom of this pit is a line of rails, so that the ingot molds mounted on carriages can be brought under the bridge to be filled with steel from the receiver and then promptly run under the press.

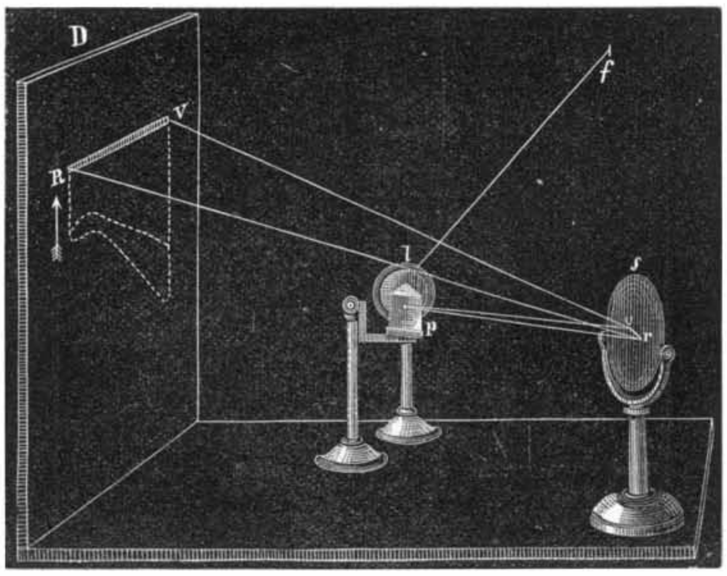
The ingot molds are, as usual, made for conical ingots, the section at the lower part being the ordinary one of an irregular octagon—or rather a square with the corners chamfered off—while at the upper part this section changes to circular, the upper portion of each mold being cylindrical, internally, for a length of about 6 inches, so as to form a guide for the press plunger. Externally the molds are circular, and they are turned slightly conical, while steel hoops are shrunk on them to enable them to resist the internal pressure. The conical form of the ingots would of course cause the fluid metal to exert an upward pressure, leading to separate each mold from its base, and to resist this the molds are furnished with strong flanges by which they can be secured to their bases. The mold bottoms, we may add, have a slight depression in the center, and in this is placed some fire clay on which the metal falls when teemed. This arrangement is employed to prevent the bottom from being injured by the pouring of the metal, it being important to keep the bottom sound, as it might otherwise give way under the action of the press.

Each ingot mold is mounted on its own carriage, the latter carrying it at such a hight that, when run under the press, the top plate of the carriage, on which the bottom of the mold rests, is clear of what we may term the anvil of the press, this being a strong casting fixed on firm foundations. The pressure imposed by the press varies from 400 to 700 tuns, and it is evident that the ingot carriages could never be made to resist such a pressure. To avoid the necessity for this, the lengths of rails on which a carriage rests when under the press are balanced so that, when they are merely loaded with the weight of the ingot, mold, and carriage, they are maintained on a level with the other rails; but when the press is brought to bear on the ingot, they descend and allow the top plate of the carriage to take a solid bearing on the anvil just mentioned. On the pressure being removed, the rails rise again and the carriage can then be run on to make room for another. The general arrangement of the press and press pit at Neuberg is shown by the annexed perspective view (Fig. 1.)

It should be mentioned that, when an ingot is being teemed in the press pit, a kind of funnel of wrought iron plate is placed in the mouth to prevent the latter from being injured by the molten metal. When the mold has been filled, this funnel is withdrawn, and a short plunger is inserted by means of tongs specially constructed for the purpose. The mold is then run under the press and subjected to pressure for from half a minute to one minute, it being found that this period is amply sufficient to insure the desired result. We may add that no difficulty is experienced from metal endeavoring to squeeze out around the plunger. Any metal so endeavoring to escape becomes at once so cooled as to solidify.

At the Vienna Exhibition of 1873, some excellent specimens of compressed steel were exhibited by the Neuberg Works, and amongst others the broken ingot from a photograph of which the annexed Fig. 2 has been prepared. This ingot was shown side by side with another broken ingot of the same steel, but uncompressed, an engraving prepared from a photograph of this second ingot being shown by Fig. 3.

If these two figures be compared, it will be seen that, whereas in the ingot represented by Fig. 3 there are a great number of bubbles near the outside—and in fact only protected by a thin skin, which might be injured in the reheating furnace—in the compressed ingot, shown by Fig. 2, there is one bubble only, and that at the center of the ingot, where it would most probably be thoroughly closed during the subsequent treatment of the ingot, or where, if it continued to exist, it could do little harm. Altogether we believe that the practice at Neuberg has been very successful.—*Engineering.*



RICCO'S EXPERIMENTS ON COLOR VISION.

Edward H. Tracy, C. E.

Edward H. Tracy, for several years past the Chief Engineer of the Croton Aqueduct of this city, died recently at Carmel, N. Y. He began his engineering career as a rod man, and from that humble position rose, by industrious attention to the duties assigned him, to be an assistant engineer under John B. Jarvis, on the Chenango canal in this State. Subsequently, under the same chief, he assisted in the construction of the main line of our great aqueduct. He was afterwards engaged in several other important works, involving dock and railway construction. For the last five years he has been Chief Engineer of the Croton aqueduct.

Chloroform as a Preservative.

At a recent session of the British Pharmaceutical Society, Mr. J. B. Barnes stated that vegetable infusions may be preserved indefinitely by the addition of a minute quantity of chloroform. A mucilage of gum acacia and a malt infusion have been satisfactorily experimented upon, and the action of the chloroform appears to be to destroy the ferments. Mr. Barnes considers that the discovery may be applied to preserving solutions of citrate of ammonia, lemon juice, and other very alterable organic substances.

Correspondence.

Bee Culture.

To the Editor of the Scientific American:

I can confidently recommend bee culture, as well adapted to the sphere of women both in city and country. I speak from experience, having been engaged in this pursuit for over twelve years. In my first attempts at bee culture, I used the old fasioned box hive. These hives were readily constructed with little or no reference to giving a profit in surplus honey obtained from them. The losses in such hives, from various causes, especially in winter, were very great, and profits were small at the best; $10 to $12 profit from the sale of surplus honey from such hives in one season was considered an extraordinary yield. I have for several years used a hive of my own invention. It is constructed with special reference to securing a good yield of surplus honey, in the most convenient marketable form. My hive is so arranged and constructed that I am able to prevent or contrive the natural swarming of bees, and, when desired, to turn their whole force to storing surplus honey in the parent stock instead of swarming out, as they often do (to their great damage) under ordinary management. It is surprising to note how much more honey will be stored by a stock that does not swarm (yet has the same increase of bees) than by one that casts one or more swarms. I often obtain from 200 to 300 lbs. honey in small glass boxes from a hive in a season.

There is in my opinion no pursuit which offers greater inducements to women as bee culture. There are very many whose occupation confines them indoors nearly the whole time, excluding them from the air and sunshine, to the great injury of their health; while at the same time, after this great sacrifice, they barely succeed in obtaining a livelihood. To such, bee culture offers special inducements, such as health and a greater recompense for labor performed. I hope that ere long bee culture will receive from my sex the attention it deserves. I am acquainted with many who have lately commenced in the business who are meeting with great success.

West Gorham, Me. LIZZIE E. COTTON.

On Color Vision.

To the Editor of the Scientific American:

It is known that a certain length of time is necessary to the perception of light, and that the sensation in the eye does not disappear instantaneously with the disappearance of the luminous object. It is also the opinion of physiologists that the perceptions of the different simple colors require different times; as does likewise the persistence of the sensation remaining in the eye. The laws of these phenomena have not however been yet determined, and the following experiments, in my opinion, may serve that purpose;

A ray of sunlight, *f l*, is made to enter a dark room through a narrow vertical slot, *f*, by means of a *porte lumière*. It falls in an horizontal direction and meets a lens, *e*, a flint prism, P, which disperses it, and a mirror turning about on a horizontal axis, which reflects the rays in the same direction, above the prism, on a white screen placed at a convenient distance to obtain an horizontal spectrum, R V, well enough developed to exhibit at least the principal Fraunhofer lines. The whole apparatus should be so arranged that, when the mirror is slowly made to oscillate, the spectrum may be displaced parallel to itself.

If now the mirror is made to oscillate with a certain velocity, the spectrum will be seen to become curved in an unexpected manner, the extreme red and, still more, the violet remaining behind. On moving the mirror in the opposite direction, the spectrum oscillates with it, gliding and darting like a fish in the water. It will be noticed that the convexity of the anterior outline of the spectrum is in the yellow, which color precedes the others in the motion. On keeping the eye fixed on a point of the screen, it will be observed that the spectrum widens, and that the expansion is greatest in the violet and decreases towards the red.

The same result is obtained by projecting the spectrum directly upon the screw and observing its image in a mirror oscillating in front of it. With the proper diaphragms, which should be black and opaque, some colors may be intercepted, and only two allowed to pass in coincidence with the Fraunhofer lines; this renders comparisons easier.

From this experiment it follows that yellow is the color which most quickly affects the eye; then come orange, red and green, blue, indigo, violet. The persistence of vision is greatest in the violet and successively diminishes in the indigo, blue, green, yellow, orange and red.

This may be verified also with white light. In fact, on moving a watchglass reflecting the sun before a black back ground, and keeping the eye fixed on it, the little solar image will be seen converted into an elegant colored curve, in which the following colors are usually found: yellow, green, blue, indigo, violet.

Modena, Italy, August, 1875. A. RICCO.

PRACTICAL MECHANISM.

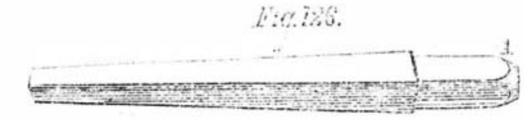
BY JOSHUA ROSE.

NUMBER XXXI.

REAMERS.

For reaming out taper holes, such as are employed to receive taper pins, the square reamer shown in Fig. 126 is em-

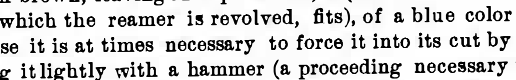
Fig. 126.



ployed. It is a piece of plain taper square steel. This tool should be dipped endwise in hardening, and tempered to a dark brown, leaving the square end, A (on which the wrench, by which the reamer is revolved, fits), of a blue color; because it is at times necessary to force it into its cut by striking it lightly with a hammer (a proceeding necessary with all reamers having appreciable taper upon them), which would break the edges of the square end off if they are left too hard. The edges are beveled off, as shown, to prevent the head of the square end buiging from being hammered. To sharpen it, the flat sides are ground, taking care to keep them straight and the thickness even on the two diameters, so that, the sides being straight and the reamer square, it will cut taper holes whose sides will be straight. If the reamer is not ground square, two only of the edges will be liable to cut, causing the reamer to wabble, and so impairing its cutting power and rendering it liable to break. This description of reamer is sometimes used to cut out holes in boiler plates which do not come fair after being punched.

The half round reamer shown in Fig. 127 will, however,

Fig. 127.



work much more steadily in holes which do not come fair, and will bore at all times more true, though it will not cut so rapidly as a square reamer, when employed to bore a straight hole into a taper one. The method of making this tool is to turn it up and cut away half the diameter, temper ing as directed for the square reamer.

MACHINE REAMERS.

Reamers for use in a machine or lathe are of the form hown in Fig. 128. The serrations forming the cutting edges