Some Facts about Diamonds.

From Dr. Feuchtwanger's treatise on gems we take the following statements in reference to the diamond:—

"A letter was lately published from Sir David Brewster, on a curious optical phenomenon that had occurred in the construction of a diagonal lens. The diamond, previous to working, had all the appearance of internal brilliancy; but, after being polished, it presented a series of stratified shades, which rendered it useless for the required purpose. It afterwards appeared that lapidaries were acquainted with this appearance, which rendered them extremely unwilling to take the risk on themselves, of cutting up diamonds for optical purposes. On a minute examination of this phenomenon, it appeared that these different shades occurred in regular strata, each section being about the one-hundredth part of an inch, and each stratum having a different focus, and being of a different degree of hardness and specific gravity. The inferences drawn from the above facts were—that the diamond was a vegetable substance, and that its parts must have been held in solution and subjected to different degrees of pressure at different stages of existence. If, on the contrary, as it has been generally believed, it is subject to the laws of crystallization, its crystals must necessarily be homogeneous.

"The diamond being the hardest of all substances, yields to no file; scratches all other minerals, and is not touched by any. This character has become the most important of the diamond since the late discovery of the amorphous or compact diamond. It is very frequently tinged light-green, but more rarely with orange, red, blue, or black; but in setting, these shades disappear, particularly in the smaller diamonds; but there are also known diamonds of rose and pistachio-nut green colors. The blue color is very rare. The blue diamond of Mr. Hope of London, is one of extreme beauty and rarity, and is of immense value; the yellow diamond in the Museum of Natural History, in Paris, is likewise very remarkable for its color and size. The black diamond, which is perfectly black, although plainly crystallized, occurs most frequently in small bristled balls, but crystalline points; the crystals are very small grouped together in an irregular manner, and extremely refractory to the cut; it is considered the hardest of all diamonds. The green diamond is also very rare, but I have seen some beautiful specimens in the Jardin des Plantes and in Freiberg, the first in the cabinet of Abbe Hauy, and the latter in the cabinet of Werner.

"In Russia, the first diamond was discovered in July, 1829, by Humboldt and Rose, when on their journey to Siberia, on the west side of the Uralian mountains, in the gold-washing establishments of Krestowosdwisheaski, belonging to Count Schuwalow. The locality, in connection with the other circumstances of the place where the diamond was found, bears a striking resemblance to the diamond district of Brazil. The predominating rock of the spot on the Uralian mountains is a quartzose chlorite, talcose schist (itacolumite), with an admixture of iron pyrites and mica, wherein we find beds of red oxide of iron, talcose schist, limestone, and dolomite.

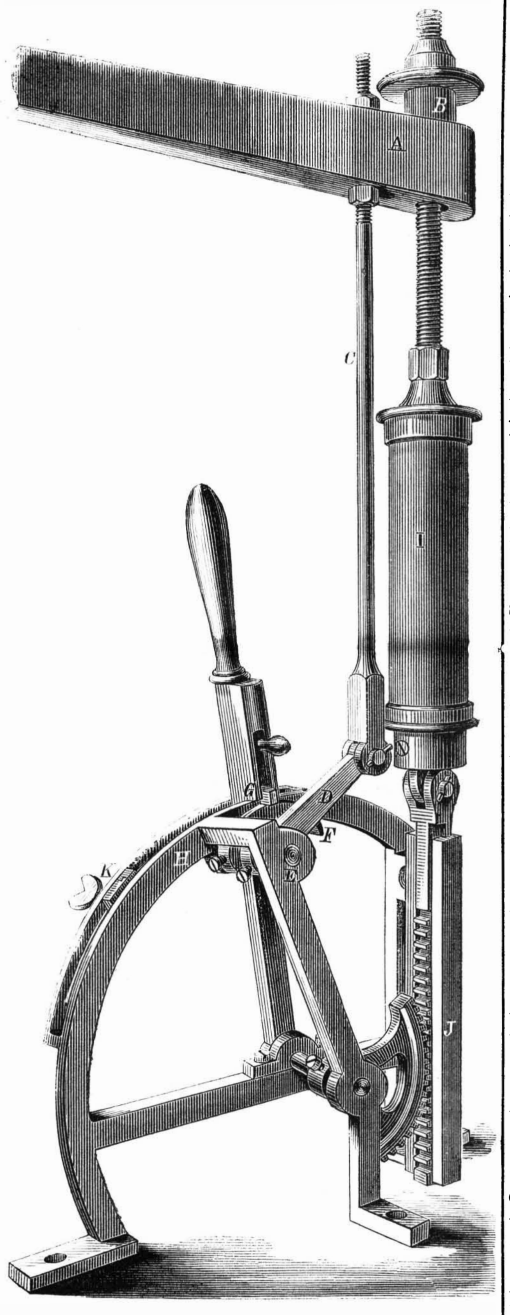
"At a most extensive sale of diamonds, which took place in the summer of 1837, at the auction of Rundell & Bridges, London, there were twenty-four lots put up, which produced the sum of forty-five thousand eight hundred and eighteen pounds, nearly two hundred and twenty-nine thousand dollars! Some of the prices were as follows:—The celebrated Nassak diamond, which weighs three hundred and fifty-seven and a half grains, and is of the purest water, was purchased for thirty-six thousand dollars. It is considered to have been sold at a price considerably under its value. A magnificent pair of brilliant ear-rings, weighing two hundred twenty-three and a half grains, formerly the property of Queen Charlotte, were bought for fifty-five thousand dollars, a price infinitely below their usually estimated value. A sapphire, seventy-five and a half carets, set with brilliants for a brooch, two thousand four hundred and sixty-five dollars.

"According to Spix and Martius, there have been produced in Brazil, from 1772 to 1818, 1,298,037 carats of diamonds—that is, in the time of the Royal Administration; but that during the Lease, only 1,700,000 carats were produced, which together make 2,998,037 carats, or 1301¼ pounds, thus averaging from fourteen to fifteen pounds per year; those brought into market by contraband being excepted.

"The largest diamond is in the possession of the Grand Mogul, and according to Tavernier, resembles in form and size, half a hen's egg. Its weight is two hundred and ninety-seven and three-sixteenths carats. It was found in 1552, in the mine of Colore, a short distance to the east of Golconda, and is valued at 11,723,000 francs. It is cut as a rose-diamond, and is perfectly limpid, with the exception of a small flaw at the end of the girdle."

HUNTINGTON'S SELF-ACTING SAFETY-VALVE.

When a safety-valve rises to let off steam it does so gradually and gently, and as the pressure increases it continues rising until it can go no further. In many cases the distance to which the valve lifts is not



equal to the area of the pipe, so that the passage is much obstructed, and the boiler unnecessarily strained in consequence. The machine shown herewith is designed to obviate this evil, and to permit the steam to blow off as fast as it is formed. It is self-acting, and requires no attention; when it is once set the engineer may leave the cab and go to his dinner in perfect confidence that the valve will unhook itself at the proper time if the pressure becomes too great. No slacking off of the spring balances is required with this arrangement, as a single motion of the lever throws the balances up so that they are relieved from strain.

In the engraving the front of the spring balance is toward the engineer, as usual, and the safety-valve lever, A, is shown running from it to the dome. The rod of the spring balance passes through this lever and has a nut, B, on top to regulate the pressure.

There is an additional rod, C, which passes through the lever and connects to an arm, D, on the shaft, E. This rod trips the valve-lever, A, through the medium of the toe, F.

It will be seen that as the valve lifts, the small rod is drawn up, so that by degrees the toe, F, rises against the stop, G, which sets in a slot in the quadrant, H. When it has raised far enough to trip the toe or throw the stop, G, out of its seat, the lever, A, flies up immediately and quickly enlarges the area of the safety-valve passage. The spring balance is only held down by the rack and sector, J, and these in turn are held by the shallow recess in the quadrant, H, so that when the stop is pushed out by the toe, F, the lever goes up instantly, as before described. The check piece, K, limits the distance to which the valve lever rises, and it may be set at any point desired.

This invention was patented through the Scientific American Patent Agency, February 9th, 1864. For further information address Wm. S. Huntington, Andrusville, N. Y.

THE CALORIMETER OF BOILERS.

It is always well that terms should be exactly understood. The word "calorimeter" is so strictly technical that many of our readers might possibly be at a loss to comprehend its meaning without some definition. The calorimeter of a boiler, then, is simply the area of the orifice or orifices of its flue tube or tubes, and the proportion which this bears to the area of the interstices of the fire grate exerts a very important influence on the economical and positive efficiency of every steam generator. It is a pity that this fact has hitherto been very much over looked. It is too much the custom to construct boilers with the largest possible amount of tube surface, under the idea that thereby heat which would otherwise be wasted is saved up and converted to a useful purpose. The fact is, that the generation of caloric by combustion is one thing, and its subsequent use quite another; and, as we have before endeavored to show, the value of heating surface depends on a great many conditions, independently of its mere extension. Thus, boilers with crowded tubes cannot steam well because the contact of the water with the metal surfaces is prevented by films of that steam which cannot disentangle itself from the water with sufficient rapidity for want of room. There is in such boilers a want of circulation, and the result is that the tubes are burned out.

It is well understood now that very small and long tubes are inefficient. Stephenson's long boiler locomotive could not make steam without such a contracted blast-pipe that all the saving due to the reduction of temperature in the smoke-box was re-absorbed by back pressure in the cylinders. The locality of the waste was changed; its amount remained unaltered. The larger a flue tube is within certain limits the better; but if it is attempted to keep up the superficial area of heating surface by increasing their number, it is certain that the calorimeter must be injuriously increased in a nearly equal proportion; and it follows that a boiler with a few tubes of moderate diameter will be actually more efficient and more economical than one with either a greater number of tubes of equal diameter, or another with a larger number of tubes of small diameter, although the calorimeter is thereby in some degree kept within proper limits; and this is especially true of coal-burning engines. This statement may appear paradoxical; it is not the less true. In the first place, large tubes, from reasons which we pointed out in a recent article, permit a certain amount of combustion to go on within them. This cannot take place in very small tubes. The value of any heating surface increases in a very rapid ratio with the intensity of the heat to which it is exposed, and it follows that, as very small tubes cannot be traversed by flame, or even by very highly heated air—most of the caloric being given up in the first foot of length—they must be inferior inch for inch to those of fair dimensions, say three inches in diameter. If to this we add the loss due to contracted water-way, and the absence of circulation, it is easy to see that a limit is quickly reached beyond which no advantage whatever can be derived from the extension of tube surface. The worst defect