

South African Diamonds.

Hon. Theophilus Shepstone has pointed out that Africa, south of the equator, consists of a great central, irregularly shaped basin, the outer edge of which varies in height from 4,000 to 10,000 feet above the level of sea, and that through this rim the Orange River to the southwest, and the Limpopo River to the northeast, cut their way. It is near the exit of the former, from the enormous basin, that the diamond fields lie, while gold in large quantities is being obtained from the northeastern district. The author of this paper conjectures that this basin is the dry bed of an enormous inland sea, and that the diamonds which are found in it are formed by carbonic acid gas, ejected by the action of subterranean heat through fissures in the earth's surface, into the bed of the dried-up sea, the water of which was sufficiently deep to imprison and liquefy the gas after its evolution. The discovery of the process by which this liquid gas became crystallized, whether by electric or magnetic current, or by the potent influence of iron in some of its numerous forms, must be left to future scientific investigations.

Dr. Robert Mann, late Superintendent of Education in the Colony of Natal, states that, since the serious working of the diamond fields in 1871, large numbers of diamonds had been obtained, and it was estimated that in 1872 there were no less than 20,000 miners engaged in searching for them. So large had been the yield that a very material diminution had been brought about in the value of the larger gems in the home market, and the diggers are now leaving the diamond fields for the more profitable northeastern gold fields. The result of the discovery of these fields has been to develop South African commercial enterprise, and to civilize the wild tribes in that part of the continent.

Mr. Sopen, a diamond merchant, states that the number of diamonds of the purest water received from the Cape was very small, not amounting, on the whole, to more than two or three per cent, while of ten carat stones not one in 10,000 was perfect. In consequence of the large quantity of second class stones received from the Cape, such gems were now sixty or seventy per cent cheaper than they were three years ago. Stones which some time since would have realised \$7,500 would now only fetch \$1,000. The first class diamonds, however, were rather dearer than formerly.

IMPROVED PORTABLE OILER.

Our engraving illustrates a novel combination of an oiler with a pair of tongs, in such a manner that, by compressing the tongs, the oiler will be turned so as to bring its spout downward. The handles of the tongs are of sufficient length to enable a person to reach journal boxes overhead without the necessity of a step ladder. In the center of the flat sides of the oil can are secured journals, one of which is simply pivoted in an arm of the tongs, while the other, A, is made strong and with a quarter turn twist. This, playing in a slot in the other jaw of the tongs, gives the oiler a quarter turn when the former are compressed. After the jaws are brought together so as to meet the side of the can, further pressure squeezes the latter, forcing out the oil, and this is continued until the handles are freed, when the spring, placed at B, pushes the jaws apart, and thereby causes the oiler to return to its upright position. The wire pin or point, C, is designed for picking out the holes in boxes before oiling. This, when the tongs are compressed, turns around out of the way. This ingenious device was patented by Mr. Gabriel W. Crossley, of Cleveland, Ohio.



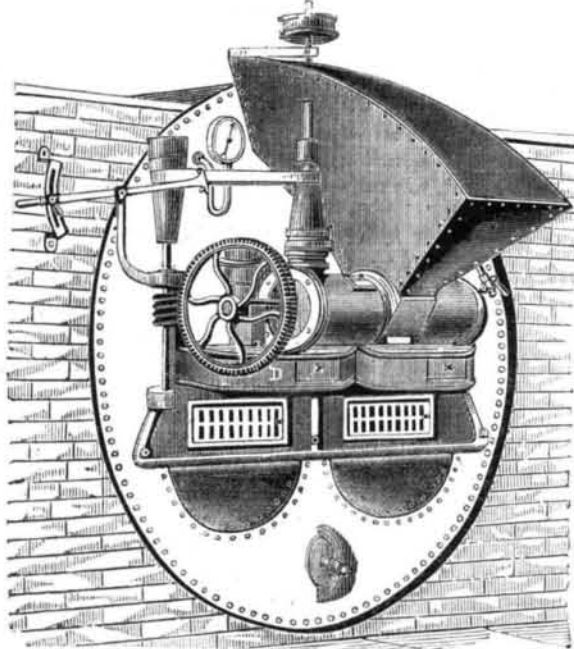
Mechanical Stokers.

Contrivances for mechanical stoking appear to be among the most promising devices for economizing fuel. The attempts to supply an automatic feed for furnaces are usually, and perhaps wisely, imitations of the hand method, which is in the main so good that, whenever volumes of smoke are perceived issuing from a chimney, it may be inferred that the stoker is somewhat in fault.

The patent mechanical stoker of Mr. Dillwyn Smith, illustrated herewith, is, like the others, an attempt to work the hand-stoking method by mechanical means. A hopper machine, known as Standley's, was in use forty years ago, and was considered to act well; but was so complicated in its parts that, owing to the rough nature of the material with which it had to deal, it was liable to continually get out of order. Mr. Smith claims to have entirely overcome these difficulties in his machine. The first object which he seeks to attain is the saving of coal. The first step towards this is by regular distribution of the fuel, which is brought from the hopper by a screw, and falls upon a pair of fans running at a high speed, which project it over the fire and spread it

with remarkable evenness. Consequent upon this regular feed, the gases, which are usually lost and go up the chimney as smoke, are consumed. Not the least advantage of improved methods of stoking is the boon of freedom from the dense smoke which now hangs over our manufacturing towns, especially when this now worse than useless substance is turned to profitable account. Another source of economy in fuel is found in the rocking bars supplied with the machine, which so far do away with the opening of the fire doors that, in some boilers, the doors are only opened when the works are stopped for meals.

From experiments with measured coal and water the results on land are stated to be, as contrasted with ordinary Cornish boilers with specially good hand firing, a saving of



from ten to twelve per cent by the use of this machine, apart from the avoidance of the smoke nuisance, and the saving to the boiler, and of labor to the fireman.

But beyond its value upon land, it is even of more importance in its application to steamers, especially those which sail to tropical climates. A strong recommendation of these mechanical appliances is the fact that, by their use, the heat in the stokehole on board the *Lisboness*, under the equator, was reduced by thirty degrees, and that this steamer made a faster run with six fires than she had ever done previously with eight. The saving in the cost of fuel alone is, in this case, alleged to have been 80 per cent. Anything which promises so favorably as this must be well worthy of the serious consideration of all steamship owners, especially as a decrease of stokers' labor to the extent of 70 per cent is also recorded in favor of the machine.

In mechanical, as in hand stoking, there are three principal points—a regular supply of fuel, its equable distribution over the bars, and a very carefully adjusted supply of air. Each of these is so intimately dependent upon the other two that all three must be effected together if the problem which mechanical stokers attack is to be solved at all. Mr. Smith's seems to be a praiseworthy attempt to deal with it, and the recorded performances of his machine appear to be very satisfactory.—*Iron*.

Labor Legislation in California.

The Legislature of California recently passed a bill providing that no conductor or driver of a street car should be compelled to labor more than twelve hours a day without extra pay. Governor Booth vetoed the bill, giving his reasons in the following language:

"I am clearly of opinion that [under the operation of the inexorable law of supply and demand the wages of labor cannot be fixed by legislative enactment; and that the practical effect of this bill would be to reduce wages in the two instances specified, in the same proportion as the hours are reduced, and compel an additional reduction by the friction it creates. The laborer, too, often has to sell Monday's labor to buy Tuesday's bread, and every artificial obstruction in the sale of Monday's labor only tends to make the bread of Tuesday harder and scantier. The bill in effect says to the man seeking employment as driver or conductor: Whatever may be your necessities or hopes, you shall not labor for one employer more than twelve hours per day. All occupations are equally open to drivers and conductors with all other men. Can the law make a better contract for them than they can make for themselves? If a man prefers to work in his vocation fifteen hours for \$2.50, rather than twelve hours for \$2, is the law which prevents him a substantial kindness to him? That the necessity which lies behind such a choice, or which induces him to make either contract, is a hardship is too true. If the law could remove that, it would indeed be blessed. But, since it cannot, does not attempt it, cannot even judge of its extent in individual cases, is it wise to prevent the individual from making his own choice in his individual case? No man will accept employment for more than twelve hours per day, except to escape from some greater hardship. Is it right to close this avenue of escape—to cut off his right to choose for himself between want in his family and extreme toil for himself? The classes this bill seeks to benefit would hardly admit that there was anything in the nature of their employment to differentiate it from that of all other free labor, and assimilate it to that of servitude, which the law must of necessity regulate in the absence of

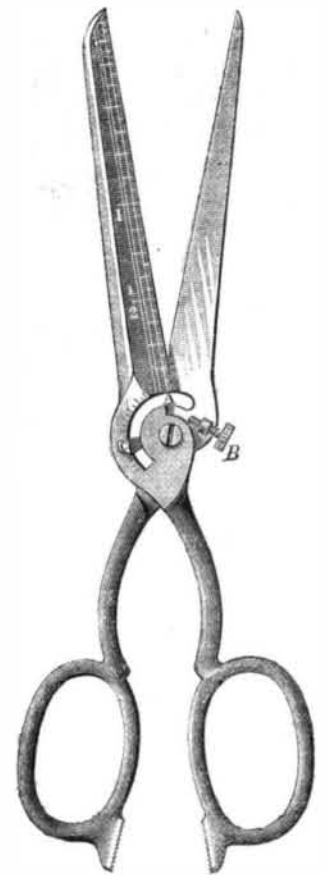
free agency. The fact that any man in a land of plenty is compelled to work more than twelve hours a day to procure bread for his family is a sad commentary upon our civilization and society—the more sad when we know there are hundreds of applicants for so poor a boon as the opportunity to do so. The great evil is not that a few men in one employment do this, but that there are so many who would be glad to. If the necessity for laboring for disproportionate pay, or of devoting the natural hours of rest and recreation to severe toil, were peculiar to the classes named, the law might possibly modify the wrong: or, it is more reasonable to think, society itself would soon supply a complete remedy. It is because the same unadjusted conflict between the right and wrong is active and clearly visible, in many other occupations, that legislation, looking only to one feature of a vast system, is of questionable power. To remember the car driver and forget the seamstress; to pity and provide for the conductor and forget the many who have equal claims to consideration; to guard one class against oppression and neglect a larger number, in whose tacit demands for relief precisely the same principle is involved, is to invest the statute with a character which is partial, and is to make the law invidious. Overwork and underpay are common factors in a great problem; they constitute an evil in all countries. This great central evil there is no attempt to reach. In the sharp competitions of society, in the relations between capital and labor, which are the outgrowth of our imperfect civilization, perhaps any attempt to reach it by direct legislation would be futile. It is a part of the theory of our government that its adult citizens are free agents; that they can select their employments and judge of their abilities and necessities to better advantage for themselves than the State can do for them. Deeply convinced that this is in contravention of that theory, and that it, in practical effect, would be an injury to the class it seeks to benefit, I am constrained to return it without approval."

IMPROVED COMBINATION SCISSORS.

Mr. Casper Van Hoosen, of New York city, is the inventor of the novel form of scissors represented in the accompanying engraving, and has provided a device which, we imagine, will be found a quite convenient addition to the workbasket.

At the inner edges of the blades, and near the pivot of the same, are formed curved slots, which cause said edges to terminate in sharp corners. The slot on the broad blade is shouldered at A, and the projection thus formed, when the scissors are sufficiently closed, strikes against the stop, B, which is a simple screw readily turned in and out of a nut. C is a stop which slides, and is held by friction upon the edge of one slot, as shown, the latter being suitably graduated.

The object of this arrangement is to enable a number of button hole slits to be cut with uniformity and accuracy after the scissors are once adjusted. The operation is as follows: The blades being widely opened, the cloth is carried between them, and its edge led into the curved slot. The distance from the sharp inner lower corners of the blades to the stop, C, measures the space of the inner end of the button hole from the edge of the cloth, and consequently, by moving the stop, C, along its slot, this space can be altered at will. The length of the button hole is governed by the stop, B, which is screwed in more or less, so that the shoulder, A, takes against it sooner or later. The proper adjustment once made, it is evident that the operator can cut as many slits as rapidly as he chooses, and all will be of the same size; and by noting the position of the stop, C, with reference to the divisions on the slot, and also that of the angle formed by the blades when brought as near together as the stop, B, will allow, with reference to the markings on the broad blade, the same adjustment may accurately be remade at any time. Upon the ends of the handles are formed two jaws, so located that, when the handles are brought together, a pair of pliers or tweezers is formed.



CEMENT FOR AQUARIA.—An adhesive cement for aquaria may be made, according to Klein, by mixing equal parts of flowers of sulphur, pulverized sal ammoniac, and iron filings, with good linseed oil varnish, and then adding enough of pure white lead to form a firm, easily worked mass.

DR. HAMBURY SMITH writes to say that our mention of a gallon of water as containing 277.274 cubic inches is an error. The English imperial gallon is 277.274 inches, and is about one fifth more than the American gallon, which is exactly 231 cubic inches capacity.