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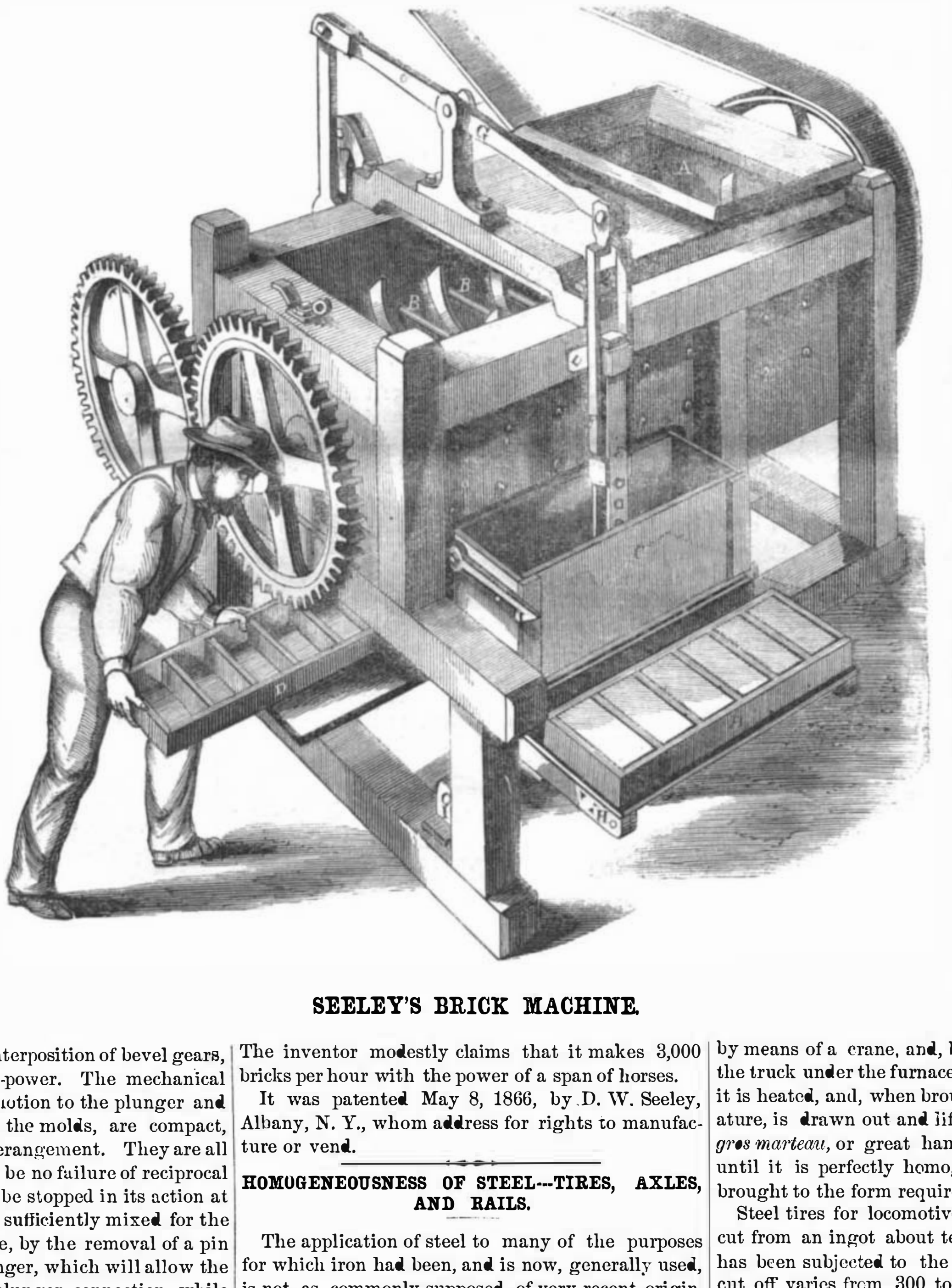
Improved Brick Machine.

Perhaps next to the indispensable pump, the brick-making machine has been the subject of as many patents as any other combination of mechanical movements. The engraving represents a very neat and compact, and apparently efficient machine, which is now extensively used, giving, we are told, excellent satisfaction.

The clay is fed into the mill at A, where it is ground by means of curved screw blades rotating between fixed horizontal arms, B, which serve to disintegrate the mass and to mix it thoroughly. The side curve of the blades gradually forces the mass to that portion of the mill in the rear of the mold box, C, where the blades are at right angles to the shaft, and not, as are the others, set spirally. The effect of this alteration in the set of the blades is to force the clay into the receiver, where it is compressed into the molds, D, by means of a plunger worked by the slide and arms, E and F, and the walking beam, G. The molds fed in at D traverse a bed, H, provided with rollers, the front part of which, under the receiver, C, is hinged and sustained by a spring which serves to keep the molds tightly against the bottom of the receiver, so that in the movement from under the receiver, they are "straked" off smoothly. The spring also gives if a stone or any other foreign substance offers resistance to the plunger. The stand, I, sustains one end of a shaft, bearing cams or eccentrics, by which the bed, H, can be raised or lowered to accommodate any size of bricks.

It may be driven by a belt, or, by the extension of the main shaft and the interposition of bevel gears, it may be worked by horse-power. The mechanical movements, which give motion to the plunger and the device for feeding in the molds, are compact, simple, and not liable to derangement. They are all absolute, so that there can be no failure of reciprocal action. The plunger can be stopped in its action at any time, if the clay is not sufficiently mixed for the production of bricks or tile, by the removal of a pin from the shank of the plunger, which will allow the vertical movement of the plunger connection, while the plunger itself is at rest. The plunger stroke can, by similar means, be graduated to any point desired.

Standing only four feet high, while others rise seven, eight, and nine feet, it is handy and can be easily fed. As the power can be applied at a distance from the machine, a team is never in the way, if animal power is used, as is the case where the machine forms the center of the sweep. If steam power is employed, the driving pulley can be placed at the geared end of the machine, and not be in the way of the feeder. This machine makes three revolutions of the cutters or grinding shaft to one operation of the plungers, thus insuring the thorough grinding of the clay. As the power that drives it is not necessarily applied directly to the machine, it can be worked close to the clay bank. It is now used also for the manufacture of peat, and is said to be efficient for this work. At the New York State Fair and the Albany County Fair it received the first premium.



SEELEY'S BRICK MACHINE.

The inventor modestly claims that it makes 3,000 bricks per hour with the power of a span of horses.

It was patented May 8, 1866, by D. W. Seeley, Albany, N. Y., whom address for rights to manufacture or vend.

HOMOGENEOUSNESS OF STEEL---TIRES, AXLES, AND RAILS.

The application of steel to many of the purposes for which iron had been, and is now, generally used, is not, as commonly supposed, of very recent origin. Many patents have been issued for its application in large masses, or for its employment in situations where iron proved to be inconveniently weighty and bulky. As long ago as 1828 a suspension bridge at Vienna, over the Danube, was built, which was supported by steel chains. If our memory serves us right, built wheels for railway cars were imported into this country by one of our oldest railroad companies, when the road was first opened, which had welded steel tires. It is some years ago when this metal was first employed as the material for boilers.

But the difficulty in producing steel in sufficiently large masses, at a comparatively low cost, and free from flaws, with a perfect homogeneousness of material, seemed to present almost insuperable objections to its general employment in place of iron. Cast steel made by cementation, while possessing superior hardness, lacked tenacity. If tough, it was soft. If hard, it was brittle. In 1851, however, Krupp, of Essen, Prussia, showed in the London Exhibition an ingot of cast steel weighing 4,500 lbs., the heaviest then ever known. In 1862 he exhibited another one weighing 20 tuns, in the form of a solid cylinder, nine feet high and three feet eight inches in diameter. It had been broken across to show its fracture. Under a good microscope it would not exhibit a single flaw. Since then he has produced repeatedly masses of 40 tuns weight. For this purpose M. Krupp has a number of furnaces capable of melting 50 tuns each; but his great engine is the immense steam hammer, costing for construction and working about $600,000. It is rated as a 48-tun hammer, no other in the world being above 20 tuns. This hammer, or the movable part, is over twelve feet long, five wide and four thick, and is driven by a steam cylinder six feet in diameter.

The ingot of steel is heated, after casting, in a furnace, the bottom of which is a truck mounted on wheels. The sole is of fire-brick laid on an iron platform. The ingot is placed upon it by means of a crane, and, by steam power, run with the truck under the furnace. The doors being closed, it is heated, and, when brought to the proper temperature, is drawn out and lifted by the cranes to the *gros marteau*, or great hammer, turned and worked until it is perfectly homogeneous throughout, and brought to the form required.

Steel tires for locomotives are made from a slice cut from an ingot about ten inches diameter, which has been subjected to the hammer. The quantity cut off varies from 300 to 900 lbs. This section is raised to a red heat and a thin wedge is driven through its center, leaving an oval opening three-quarters of an inch in width. This is further opened by larger wedges, until the mass acquires a lozenge shape, when it is brought to a rough square, and a large mandrel introduced through the opening. By means of the hammer and this mandrel the ring is formed, and when circular is subjected to the action of powerful rollers which bring it to its finished shape. It is then too small in diameter for a locomotive wheel, and, after being heated, is placed upon an iron platform in the center of which is a segmented cylinder, which, by means of a hydraulic press, gradually stretches the tire to its proper size. It is not afterward turned, only cleaned, and the weldless steel tire is finished. M. Krupp also casts steel car wheels in solid disks, which require no turning after leaving the mold. England and her colonies ordered from his works, in 1865, 11,396 steel tires and 564 steel axles.

We have made this somewhat lengthy notice of M. Krupp's method of working steel to show that, with the proper machinery, the fabrication of the articles mentioned is entirely practicable. Indeed, we do not require to go to Prussia to prove this fact. The firm of Winslow, Griswold & Holly, at Troy, N. Y., are busily engaged in this manufacture. Their orders for steel rails, especially, are beyond their present means of production.

There can be no reason, at this late day, and in view of the experiments made in England and on the continent, for doubting the superior durability and the ultimate superior cheapness of steel rails and tires over those of iron. On our railroads it is theoretically correct to say that the weight of a load rests on a point, but it is not practically correct. There is compression. Much of it in the road itself, or the rail, but some of it in the wheel or tire. Yet notwithstanding that it can be demonstrated that this compression makes what would otherwise be a level road one continually up hill, there are persons who advocate a yielding foundation, as there are those who insist on a springing or yielding tire. The mere fact that our ordinary locomotive tires must be occasionally re-turned is a sufficient refutation of their position.

A perfectly rigid bed, or roadway, and as rigid wheels, is the rule that is found by experience to be the best. Soon as a wheel, or tire gets "out of round" it becomes, in operation, a hammer, destroying the rail. Mr. Bessemer at a recent meeting of the British Association at Nottingham, gave an exceedingly elaborate and interesting account of his own system of manufacturing steel, and showed the vast importance that branch of industry had assumed since his patent had come into working operation. By the old system forty pounds of steel was the largest mass of metal operated upon, but by his process as much as twenty-five tuns could be converted into steel in one heating. It had superseded iron wherever large castings were required—such as ordnance of large size, locomotive and marine engine cranks, rails, etc. He mentioned, as showing the superior durability of steel rails over those of iron, that at the station at Camden Town, at a part of the line over which all the traffic passed, a steel rail was placed on one side of the line and an iron rail on the other, and that seventeen faces of the iron were worn away while the first face of the steel rail was still in working order. Steel rails put down four years ago were still in working order. The first cost of steel rails was, of course, much greater than that of iron, but compensation was found for this in the greater durability.

The superintendent of one of our most successful railroads informs us that iron rails on that road average about seven or eight years of life. Steel rails have been recently introduced but the test is not considered sufficient to afford proper data for an opinion. Steel tires have been used on the road several years, some of them having already run 70,000 miles, and, while costing double the price of iron, their durability has proved that they are superior to iron ones. No such performance, we are certain, can be recorded for iron tires. The "best iron tires"—according to Thomas Prosser, C. E., who has lately issued a pamphlet on this subject, which should be a satisfactory exhibit to our railroad men—"average only 60,000 miles, during which time four of them will grind up one tun of rails."

It appears to be evident that our railroad companies will eventually save by replacing their iron rails, iron tires, iron wheels, and iron locomotive axles with those of steel, the rails to be laid on an unyielding and permanent foundation. Certainly, this subject of the comparative value of iron and steel for these purposes, is worthy more general attention than has been given it in this country, especially in the construction and "plant" of new lines of railways.

GAS PURIFICATION.

For some months past Mr. George Livesey has been testing, on a large scale, at the works of the South Metropolitan Gas Light Company, an important method, for which he has obtained a patent, of desulphurating the ammoniacal liquor, the object being to employ the ammoniacal liquor so purified for the purpose of removing the sulphureted hydrogen from the gas. It has long been known that caustic ammonia has a strong affinity for sulphureted hydrogen, and some years ago Mr. Laming attempted to utilize this fact by taking the foul ammoniacal liquor and passing it into a box containing oxide of iron, allowing it to stand for a short time, and then drawing it off free from sulphur. The liquor thus desulphurated was employed in a scrubber, and so far purified the gas that, on passing the latter through a vessel containing water only, it was found that the sulphureted hydrogen had been completely removed. Experiments with this process were tried at the South Metropolitan and at the Great Central Gas Works; but although the removal of the sulphureted hydrogen was, we believe, effected, the mode of purifying the ammoniacal liquor by the use of the oxide of iron was an inconvenient one, and the process, therefore, did not come into use.

According to Mr. Livesey's plan, the desulphurating of the liquor is effected by the aid of a portion of the waste gases taken from the chimney stack, the present method of proceeding at the South Metropolitan works being as follows:—A 5-inch pipe is inserted in the retort flue close to the chimney stack, and through this a portion of the waste gases are drawn away by the aid of an old exhauster, the 5-inch pipe being of such a length that, before the waste gases reach the exhauster they are cooled down. From the exhauster, the waste gases pass into a scrubber, 15 feet 6 inches in diameter and 24 feet high, filled with coke, where they are met by a descending stream of foul ammoniacal liquor distributed at the top in the ordinary manner by a couple of revolving perforated arms, or Barker's mill. The active agent in the desulphurating process is the carbonic acid of the waste gases, which displaces the sulphureted hydrogen in combination with the ammonia of the liquor, and thus in place of caustic ammonia a carbonate of ammonia is obtained, which experiments have proved to be quite as effective in absorbing sulphureted hydrogen from the gas as the caustic ammonia. We may mention here that the sulphureted hydrogen set free during the process of desulphuratting the liquor is conducted to the smoke stack and burnt, as its escape would otherwise constitute a nuisance in the neighborhood, but it is expected it will eventually be utilized.

The desulphurated ammoniacal liquor obtained from the bottom of the scrubber just mentioned is then pumped up into elevated tanks, from which it is led into other scrubbers, and employed for the purification of the gas. A scrubber of the size above mentioned has been found by experiment to be capable, under favorable circumstances, of desulphurating 640 gallons of foul ammoniacal liquor per hour; the average rate of working is, however, less than this, or about 550 gallons per hour. The quantity of waste gas required to effect the desulphurating of the liquor has not yet been ascertained precisely: but it has been calculated to be approximately about 2,000 cubic feet per hundred gallons purified. The liquor, after being used for effecting the purification of the gas, is again pumped into the foul liquor tank and re-desulphurated, and it can be used over and over again. It is found, however, that the liquor is slightly weakened by the desulphurating process, this weakening arising from the formation of a certain percentage of sulphite of ammonia, which, by the absorption of oxygen, is finally converted into the sulphate.

After numerous experiments, extending over a period of nine months, had been carried out on Mr. Livesey's process at the South Metropolitan works, a trial on the whole make of gas, amounting to 29,000 cubic feet per hour, took place on the 22d of May last. On that occasion two scrubbers, of the dimensions already given, were used with desulphurating liquor of barely five oz. strength, the first being supplied with 360 gallons and the second with 340 gallons per hour; and there was also a third scrubber worked with water, this being employed to remove the small proportion of ammonia carried over by the gas from the other scrubbers. The results of the trial were that the first scrubber removed between 70 and 80 per cent of the sulphureted hydrogen and about 20 per cent of the carbonic acid from the gas, and on the latter leaving the third scrubber, it was quite free from both sulphureted hydrogen and ammonia, and had given up half of its carbonic acid. The experiment was continued as long as the supply of the desulphurated liquor lasted.

On the 31st of May a more extended trial was commenced, this continuing until the 30th of June, and the make of gas during that time being 18,300,000 cubic feet, or 610,000 cubic feet per day. During this series of experiments one scrubber was used for effecting the desulphurating of the liquor, so as to keep up the supply, and the gas was acted upon by two scrubbers, one worked with the purified liquor and the other with water, the gas after leaving the scrubbers being conducted to the ordinary oxide purifiers as usual. Before the experiments were commenced, the oxide purifiers were "going off" or becoming foul at the rate of about once per week; but after the gas was subjected to the action of the desulphurated liquor only one purifier "went off" during the whole trial, and that not until the end of June. On the 31st of May box No. 2 stained the lead paper, and it was not until June 30th that No. 3 did the same, and this notwithstanding that the "liquor process" was stopped one day through a leaky valve, and on another through the pump getting out of order in the night, making a period of quite twelve hours during which the gas went direct to the oxide purifiers. The single scrubber worked with the desulphurated liquor was supplied with about 400 gallons of the latter per hour, and it was found that it removed 75 per cent of the sulphureted hydrogen and about half the carbonic acid. The bisulphide of carbon and other sulphur compounds were formed by Dr. Letheby's test, on an average taken from a number of experiments, to be reduced to 36 per cent below their amount when the purified liquor was not employed.

At present the plant at the South Metropolitan works does not allow of the process above described being applied to effect the purification of the whole of the gas made; but Mr. Livesey is, however, now erecting two large scrubbers for the desulphurating of the liquor, and is making other preparations for applying the process more completely. We should state, however, that, even when the new apparatus is completed, and the liquor system of purifying in full action, Mr. Livesey does not contemplate the entire disuse of the oxide of iron purifiers, but intends always to pass the gas through one or two boxes containing the oxide, so that in case of any accident hapening to the scrubbers the oxide would come into action and prevent foul gas from being sent out. The scrubbers for desulphurating the foul liquor are being built of brick, and they will each be 17 feet 6 inches in diameter inside and 20 feet high. Beneath them are large tanks, the one capable of holding 18,000 and the other 30,000 gallons of liquor. When the new brick scrubbers are completed, the three scrubbers, 15 feet 6 inches in diameter and 24 feet high, which are now used both for desulphurating the liquor and purifying the gas, will be required for the latter purpose only, and a fourth scrubber of the same dimensions, which is now being completed, will shortly be available for the same purpose. Under the new arrangements the waste gases will be led from the flue through a 12-inch main instead of by a 5-inch pipe, as at present, and it is probable that a condenser of the kind ordinarily used will be placed on the line of the main, so as to effect more thoroughly the cooling of the gases before they reach the exhauster.

At first the liquor was delivered by the pumps directly to the scrubbers; but now an elevated tank has been erected into which the pumps deliver, and from which the supply for the scrubbers is drawn. The tank is divided into four divisions, one being for the foul liquor which is to be desulphurated, and