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Explosives from Coal Tar.

That coal tar is susceptible of becoming a very deadly explosive in combination with certain acids was proved two years ago by Herr Hellhof, of Berlin, who at this time patented a process for making fulminating compounds from crude coal tar oils by direct nitration with strong nitric acid. Continued experiments in manufacture by the aid of steam have shown that the separate fractions of these oils, even those having the highest boiling point, are capable of nitration, and give a satisfactory yield of nitro-derivatives. So marked is this property, that the treatment of coal tar itself with strong nitric acid is a very dangerous operation, and could not be carried on largely without great difficulty and loss. In later experiments, therefore, a weaker acid is employed to cover the surface of the tar to be treated, the two being gradually stirred together. The pasty mass thus obtained is washed with excess of water, and the acid remaining in its pores is pressed out. The purified product is then mixed with certain oxygen yielding compounds, such as chlorate of potash, the alkaline nitrates, etc. All of these mixtures give new explosive compounds of different degrees of violence. The power of a concentrated nitric acid solution of one of these new nitro-derivatives is shown by the fact that a small quantity, when exploded by a percussion fuse, was able to shatter an iron shell. The great advantages of the new process for obtaining explosives from coal tar, by the direct use of weak nitric acid, are the cheapness of the raw material and of the light acid employed, and also the quiet and regular manner in which the operation of reduction is performed. Explosive nitro-compounds may also be made from the paraffins and similar mineral and wood oils and spirits. The *Deutsche Industrie Zeitung* observes that this branch of production is the more important since the value of tar may be expected to rise with every fresh use that is found for it.

IMPROVED FLOATING ELEVATOR.

We give engravings of a novel arrangement of floating elevator for grain, coal, etc., constructed by James Rigg, of Chester, Eng., who has for some years past devoted considerable attention to the design and construction of appliances for the mechanical handling of coal. The objects attained by this apparatus are the more rapid and economical transfer of certain classes of materials from barges to steamers or to a quay side than has been hitherto possible by cranes or manual labor.

For sectional details of construction, see page 354.

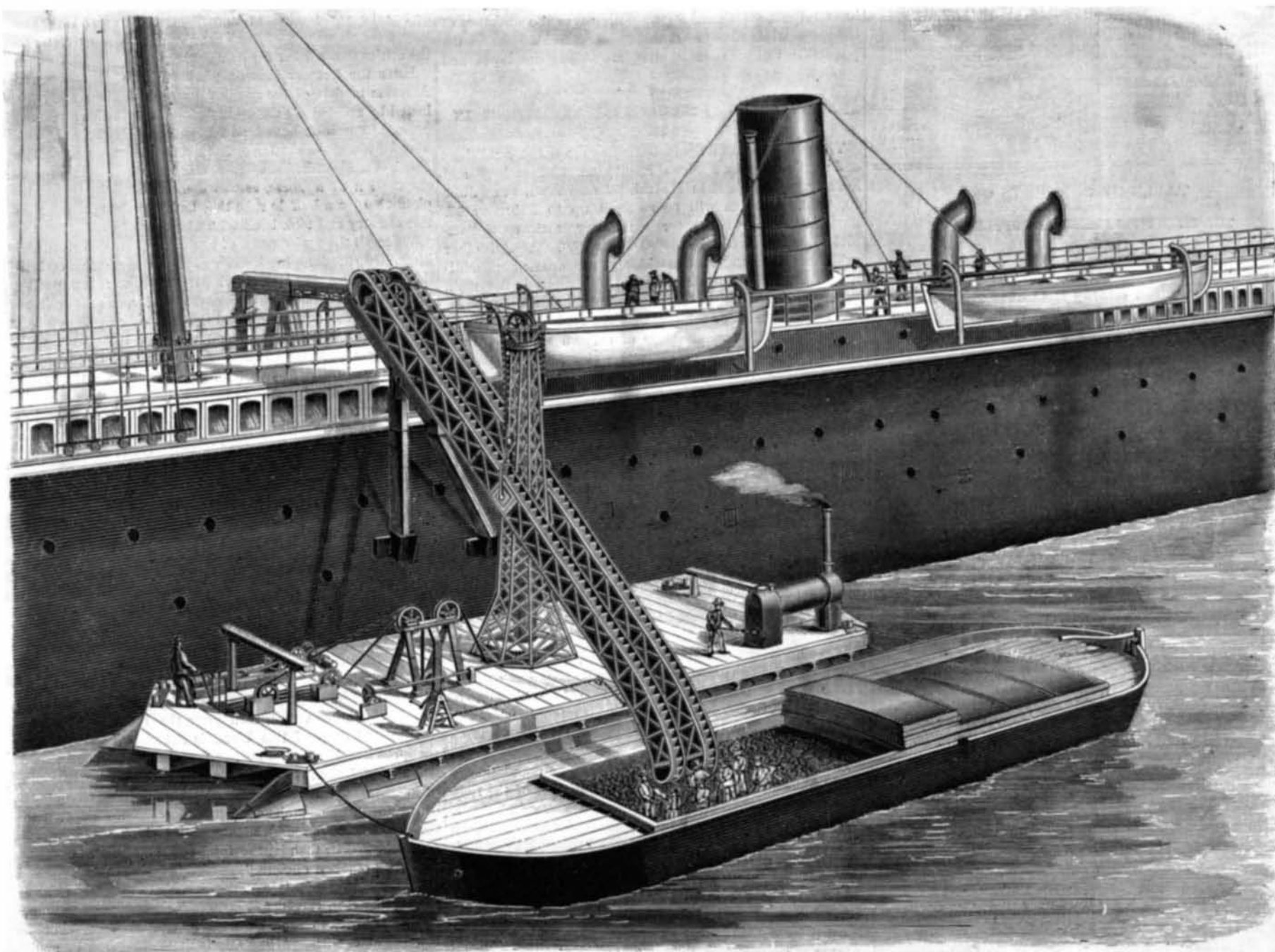
The perspective view represents the elevator as used in the coaling of steamers, but it is equally applicable to the loading under similar circumstances of salt, grain, and other matter. The necessity for some improvement on the present most general method of coaling steamers by hand has long been acknowledged, the system, if it may be so termed, being to place gangs of men in the barges, and others above them upon suspended platforms against the ship's side in sufficient numbers to enable them, by passing the baskets containing the coal from one gang to the next, ultimately to reach the ship's bunker. The expense and inconvenience attending such operations are considerable, and, moreover, are not under such ready control as steam or other power.

It is essential that any apparatus intended for this purpose should be so arranged as to be easily removable from place to place, and to meet this requirement the elevator now under notice is capable of being stowed away fore and aft of the pontoons upon which it is carried, as shown in Figs. 2, 3, and 4, page 354, thus avoiding any risk due to instability. The perspective view illustrates it in operation athwart and coaling a large ocean mail steamer through side bunkers, and the various movements effecting this change are so arranged as to be performed by steam power.

The six pontoons are 6 ft. in diameter by 20 ft. long, independently of their conical ends, and on the saddles riveted upon these are placed rolled wrought-iron beams, carrying the deck. A semi-portable boiler, F, provides steam for the pair of winding engines, which are used for three purposes, viz.: First, for driving the endless steel wire rope which actuates the two chains of elevator buckets or scoops; secondly, for raising and lowering the elevator arms; and, thirdly, for revolving them, that they may be stowed away fore and aft as shown in Figs. 2, 3, and 4. The hollow lattice tower, A, carries at its head a circular roller path, upon which a casting, B, is capable of revolving through the quadrant traversed between the two positions, and below this casting is attached a cast-iron column in three parts, within which pass the driving and return lengths of an endless steel rope; this rope being driven by the V-pulley on the first motion shaft, passes over and under the six grooved pulleys, Figs. 2 and 3, and a balance weight passes through the deck between guides, always maintaining the rope taut.

On the first motion shaft at the head of the elevator is a clip pulley driven by this rope, and a pinion upon this shaft is geared into a spur-wheel upon the drum shaft, thus giving motion to the double continuous chains of scoops (Fig. 9); and these scoops, which are of steel, are connected through malleable iron links to round steel spindles (Fig. 8), upon either end of which are small flanged pulleys traveling in double-angle steel guides forming part of the main suspended frames. The lower ends of these frames being concave, they will dip through the hatchways as deeply as the holds of the lighters or barges. Inasmuch as buckets cannot be so constructed as to pick up the coal, this is done by manual labor, and the buckets are formed as trays or scoops (Fig. 9), their capacity being about double that which can be

(Continued on page 354.)



IMPROVED FLOATING ELEVATOR FOR LOADING COAL, GRAIN, ETC.