

Improved Ship's Rudder.

"Behold, we put bits in the horses' mouths, that they may obey us; and we turn about their whole body. Behold also the ships, which though they be so great, and are driven of fierce winds, yet are they turned about with a very small helm, whithersoever the governor listeth."

The vessels of which James wrote this were mere cockle boats compared with the huge fabrics of modern art, and yet the statement is as true when applied to the *Great Eastern* herself as to any smaller craft; as long as the rudder remains perfect the ship moves in obedience to her commander's will, as if she were a living thing; but if the rudder is broken the vessel at once becomes an unmanageable mass, drifting at the mercy of the winds and waves. There is not a more helpless situation in which a man can be placed than in the wide ocean upon a vessel which will not obey her helm. To overcome the appalling effects of this accident is the object of the invention here illustrated.

The simple plan adopted is to construct an expanding rudder which may be made so narrow that it will pass through the port of the rudder stock, and will then spread to sufficient width to guide the vessel. This rudder is formed of iron plate, the first piece, *a*, being bent into the form of a cylinder at the upper end, while the lower end is fashioned in two leaves which embrace a second plate, *b*. This plate has two inclined slots, *c c*, through which bolts pass loosely and are riveted to the embracing leaves. It will be seen that if the plate, *b*, is allowed to rest upon the bolts, it will slide outward, owing to the inclination of the slots, and will thus form a blade of sufficient width to guide the vessel. If, however, it is drawn up and suspended by the rod, *e*, (see section Fig. 2) the same inclination of the slots will draw it within the fold of the piece, *a*, in which position the rudder is sufficiently narrow to pass through the port of the rudder stock.

In order that the plate, *b*, may have this diagonal motion while the motion of the rod, *e*, is vertical, it is necessary to connect the two by a link, *f*, with joints at its ends. The bar, *g*, is provided for holding the rod, *e*, suspended while the rudder is being lowered, and cords, *h*, on both sides of the vessel guide the pintles into their places.

The patent for this invention was granted through the Scientific American Patent Agency, August 5, 1862, and further information in relation to it may be obtained by addressing the inventor, John C. Raymond, at Brooklyn (E. D.), N. Y.

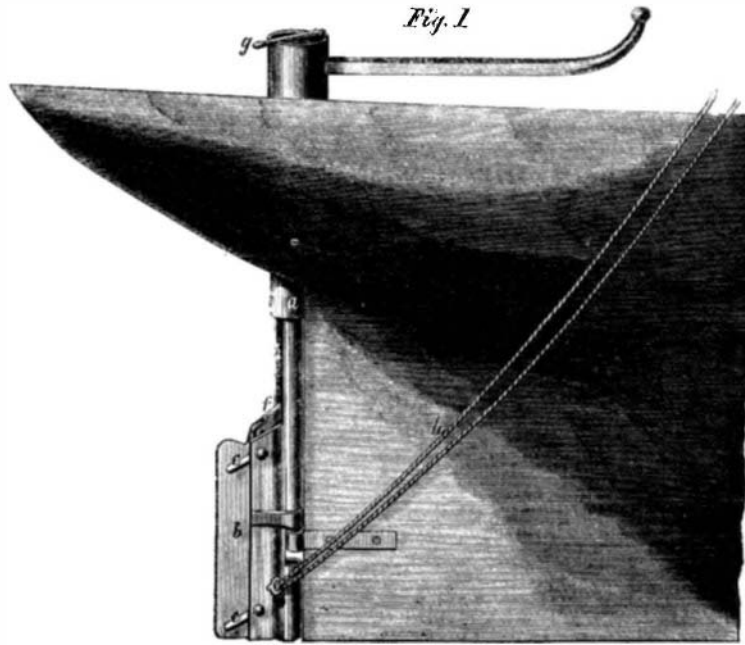
Experiments with Petroleum at Liverpool.

As great quantities of American petroleum are now imported into Liverpool, a number of the merchants in that city made complaints to the Town Council that it was explosive, very dangerous, and should not be permitted to be stored in the dock warehouses. In order to obtain positive information respecting its explosive and inflammable character, the Liverpool Town Council lately made several interesting experiments. A temporary brick vault was erected upon an empty lot of ground and a small cask of Canadian petroleum was first placed in it and ignited, and after burning for a short period it was extinguished by one of Phillip's Fire Annihilators. A second cask was then ignited and allowed to burn for five minutes, and extinguished in the same manner. A third cask containing thirty-four gallons was ignited and the fire allowed to acquire considerable headway and intensity, when two streams of water through hose were brought to bear upon it, after a short period the flames were extinguished. A barrel of petroleum was then placed upon the open ground and ignited

and when the fire had become intense, two streams of water were applied, but were found very ineffectual. A fire annihilator was then placed in the fire and it also failed to extinguish the flame. More copious streams of water however accomplished the object at last. A barrel of Pennsylvania petroleum standing upon end, was then ignited on the open ground. Its flames rose higher than those of the Canadian petroleum, and they were ultimately extinguished by powerful streams of water. Those who witnessed these experiments were surprised that none of the barrels exploded, for they had expected such a result. Pe-

for preventing any rattle by this bolt or its connections. For this purpose a brass bushing, *E*, Fig. 3, is introduced into the hole in the rod, *C*, and is pressed backward against the bolt by a block, *F*, of india rubber, as shown in Fig. 2. The elasticity of the india rubber will press the brass bushing against the bolt, and will prevent any rattle; thus perfecting the last improvement necessary to the production of a noiseless carriage.

This design is the invention of Benjamin Rice, of Hastings on the Hudson, N. Y.; and one half the invention has been assigned to Wm. Lamb, who may be addressed for further information in relation to the matter, at Yonkers, N. Y.



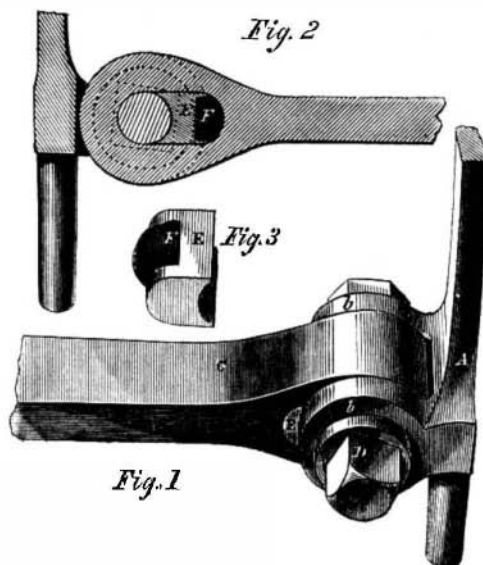
RAYMOND'S JURY RUDDER.



troleum is not explosive, but its vapor mixed with atmospheric air is. The very inflammable nature of the petroleum however led the Town Council of Liverpool to conclude that it should not be stored adjacent to warehouses, or on docks containing common merchandise.

RICE'S SHAFT COUPLING FOR CARRIAGES.

Our carriage makers have long been striving to construct pleasure carriages that would run without any rattle or jingle, and they have succeeded in the



effort to a surprising extent; but there are still a few parts which will rattle somewhat as soon as they become a little worn. One of these is the joint by which the shafts are secured to the front axle, and the annexed cut illustrates an invention deigned to overcome the difficulty at this point.

Fig. 1, is a perspective view of the coupling, and Fig. 2, a longitudinal section. The strap, *A*, is bent around the axle, and between its two ears, *b b*, the iron rod, *C*, is fitted; this rod being fastened to the end of the shaft. A steel bolt, *D*, holds the two parts together, and this invention consists in a plan

done. The majority of the members, however, were of a different opinion.

Krupp's Steel Castings.

The works of H. Krupp, at Essen, Prussia, have obtained a world-wide celebrity for the production of the most massive and perfect steel castings. Krupp's display in the London Exhibition has astonished and puzzled the English workers in steel. He exhibits a cast-steel cylinder which weighs twenty-one tons, and it has been broken across to show its grain. Not a single flaw has been detected in it under the scrutiny of a magnifying glass. Steel shafts, rolls, railway tyres and wheels are also exhibited; also a steel cannon of 8-inch caliber. The processes by which such perfect steel castings are obtained has been kept somewhat secret.

The superiority of Krupp's castings is perhaps chiefly due to the perfection of the mechanism used and the mode of conducting the operations. The smelting crucibles contain 70 lbs. of steel each, and when a large casting is required the organization has been carried to such a degree of perfection that at a given signal all the crucibles are ready to be lifted at the same time and poured into a large receiver, whence the steel flows to the mold. In bronze casting on a large scale homogeneity of the alloy is obtained in the same manner.

The London *Engineer* states that Krupp's apparatus for making steel is the most gigantic in the world. He has a steam hammer which weighs 50 tons, and an anvil that weighs 192 tons, resting on eight blocks of cast iron, each weighing 135 tons. The mold for a large steel casting is always made so as to avoid angles. It has been stated that puddled steel made with a mixture of German zinc cast-iron, similar to Franklinit, is employed for these purposes.

AMERICAN MANUFACTURES.—The London *Illustrated News*, of August 2d, says:—"The only exhibitors at the International Exhibition of cotton goods from the United States are Messrs. G. Brewer & Co., of Boston. The goods shown are a superior quality of fine shirtings, which were certainly not produced a few years ago in any part of the United States. These goods arrived very late, and have not been included in the awards of the jury, which they certainly ought to have been in time for examination."