# SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XXXVII.—No. 1. [NEW SERIES.] NEW YORK, JULY 7, 1877. [$3.20 per Annum. [POSTAGE PREPAID.]


## A MEW METHOD OF STEAMBOAT PROPULSION.

Mr. Eli Hunt, of Nyack, N. Y., a gentleman of long experience in steamboat management and construction, has invented a novel means of propulsion for such vessels, the nature of which will readily be understood from the annexed engraving. Mr. Hunt is of opinion that a boat, of the dimensions below given, can, with two of his wheels, be driven at the rate of thirty miles per hour; and he further considers that, by means of the general arrangement of the device, increased steadiness of the vessel will be obtained.

The boat taken as an example is to be 250 feet long, of 40 feet beam at a distance of 100 feet from stern, 32 feet wide at stern, of 10 feet depth of hold, and of 4 feet draught. Propulsion is obtained by two screw wheels 15 feet in diameter and of 22 feet pitch, with straight blades placed to dip within one foot of the bottom of the boat, and arranged as shown in the illustration. These screws travel in opposite directions; and as their vanes are long and elastic, it is believed that, despite their size, they will jar the vessel much less than the ordinary submerged screw. The inventor proposes to drive his propellers at 150 revolutions, which, he claims, with a pitch of 22 feet, would secure a speed of 37½ miles per hour; 7½ miles are deducted for slip, leaving 30 miles per hour as the effective speed of the boat.

Mr. Hunt sends us no records of practical tests of his invention; but he considers that, judging from his experience, it is entirely practicable, and possesses advantages both over the paddle wheel and ordinary propeller. It allows of stern screw propulsion in very shallow water; and if the speed mentioned is realized, it might be applied in lieu of the paddle wheel upon steamboats on our Western rivers.

## Manufacture of Iron and Steel.

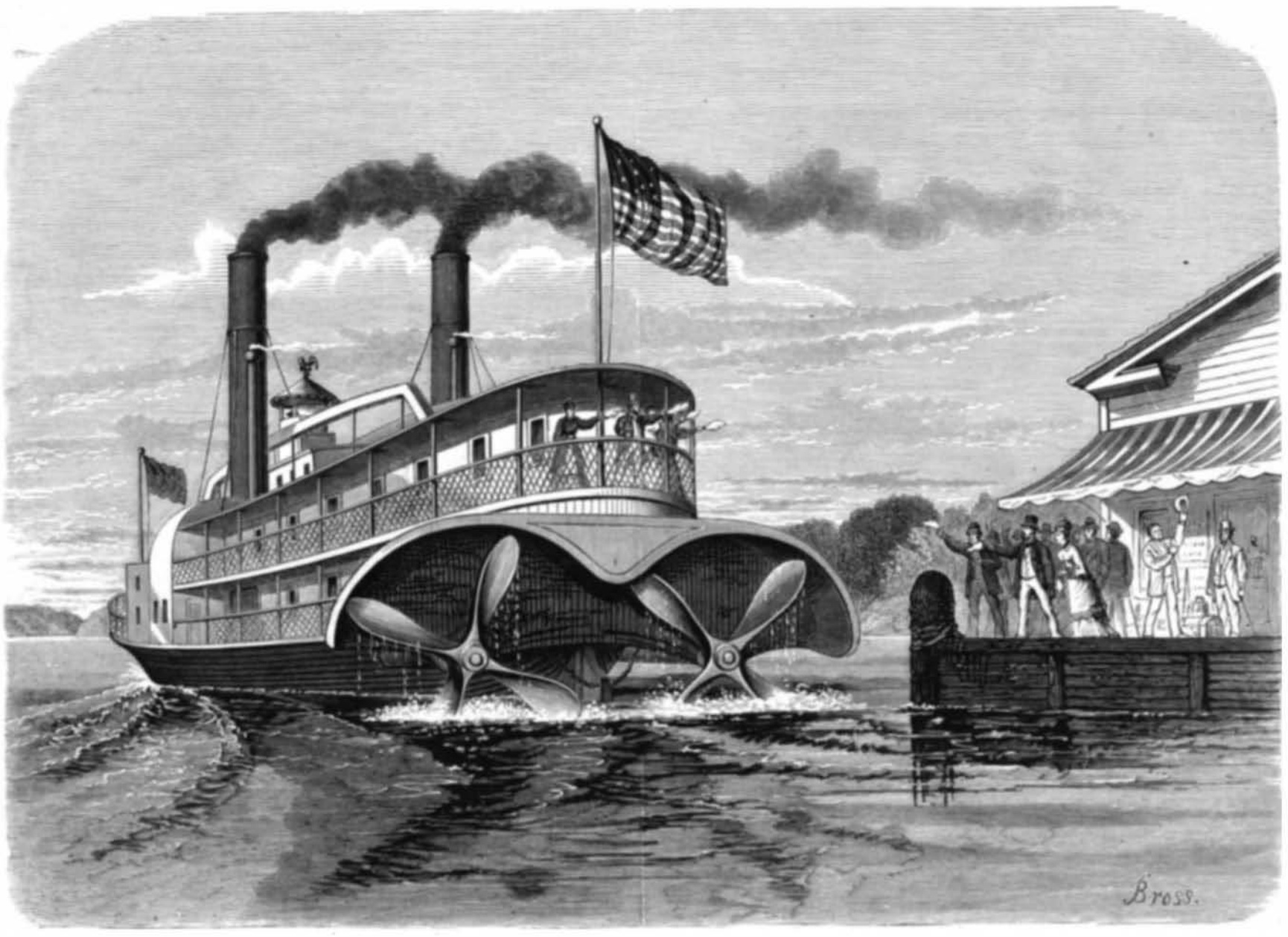
Cast iron containing carbon and other substances, such as manganese, silicon, or other alloy, is now added to fluid iron and steel, by which carbon is added to them. The amount of carbon in cast iron being limited, a large proportion of cast iron must be added, if much addition of carbon be required, whereby other substances contained in the cast iron are necessarily added. The improvement in this respect proposed by J. G. Willans, of Westbourne Park, London, England, is to carbonize cast iron or steel granules or particles by mixing them up with a hydrocarbonaceous substance (such as pitch, tar, oil, farinaceous or bituminous substance, and suchlike), and to heat the mixture to about a red heat in a retort, vessel, or chamber, without access of air. The metal granules will thus be coated with adhering carbon; he adds these carbonized granules to the fluid iron or steel (sometimes by means of blast or other gaseous current). The quantity of carbon absorbed into the fluid iron or steel will thus be greater than if the original cast iron alone was added. If it be desired to add or apply deoxidized iron ore, or other metals or substances to the fluid iron or steel, he applies the material or substance containing it coated with carbon as he does granulated iron.

Cast irons containing much silicon or phosphorus are at present unsuitable for the production of superior wrought iron and castings. The same pig iron, if properly refined in the ordinary coke refinery or by other means, will lose the greater portion of its silicon; and if similar or other pig iron be converted into wrought iron by the usual process, the greater portion of its phosphorus as well as silicon will be removed. Mr. Willans proposes to melt down in a cupola furnace a mixture of refined cast iron and of wrought iron. The amount of silicon and phosphorus in the resulting metal may thus be proportioned to equal the average of these substances in cold blast all-mine pig irons; and owing to the contact of the wrought iron with the coke or other fuel, the metal will contain sufficient carbon to fit it for use in the foundry or puddling furnace.

Hitherto the reduction of iron ores or oxides to a metallic condition without melting them has been effected by mixing carbonaceous matter therewith, and heating them in close vessels, or by having the ore or oxide in a retort heated externally, and into which a reducing gas was admitted. It has also been suggested to heat the interior of the retort or chamber in which the ore is placed by the combustion of part of the gas, leaving the remainder in a highly heated condition, but adulterated with a watery vapor or carbonic acid to act upon the ore. Mr. Willans' improvement is to bring a reducing gas, such as carbonic oxide or hydrogen, or compounds of hydrogen and carbon, or their mixtures, up to the necessary temperature at which the iron ore or oxide becomes acted upon before it be admitted into contact with them without any such admixture of air as would support combustion, so that the vessel containing the ore or oxide be not necessarily heated, either externally by fuel, or internally by the partial combustion of the gas; or he has the ore or oxide sufficiently heated before it be put into the place where the reducing gas at less temperature in an unignited state be admitted. He prefers to pass the gas through a heater (such as is now used for heating the blast furnaces will answer), so that it be heated sufficiently to deprive any iron ore brought into contact of its oxygen.

In order to facilitate the more uniform action of reducing gas on iron ore or oxide, he employs a rotating (preferably inclined) cylinder or vessel, into which ore or oxide is placed; he has a gas pipe with sufficient opening for the exit of the gas inserted into the cylinder, and around which the cylinder and its contents (however heated) revolve. The position of the ore particles are thus continually changed, and the gas brought more equally amongst them. When the ore or oxide be sufficiently deprived of its oxygen, it may be transferred from the cylinder into vessels to cool without access of air, for after use as iron in a divisional state in the manufacture of iron and steel, or for other purposes; or it may be transferred whilst still hot into chambers or vessels to be welded or melted into malleable iron or steel; he sometimes adds carbon or finely granulated cast iron to the reduced ore or oxide before welding or melting it.

A VERY fine shaving soap solution may be made by taking ¼ lb. white Castile soap in shavings, 1 pint rectified spirit, ¼ pint water; perfume to taste. Put in a bottle, cork tightly, set in warm water for a short time, and agitate occasionally till solution is complete. Let stand, pour the liquid off the dregs, and bottle for use.




HUNT'S SYSTEM OF SCREW PROPELLERS.