

A PNEUMATIC COATING MACHINE.

Pneumatic painting has within recent years developed to such an importance that a description of the machine by which the work of coating a surface is performed may not be without interest to our readers.

The machine, as it is manufactured by its originator, Mr. F. E. Hook, of Hudson, Mich., comprises a self-contained air and liquid pump, fitted with a special expansive plunger, and an eight-inch boiler-tube receptacle in which the liquid and air are compressed. The apparatus thus comprised is mounted upon a substantial platform. Attached beneath the receptacle are two valves, located one above the other at one side of the pump in a special valve-chamber, and playing in removable brass seats and cages. The suction-opening at the under side of this valve-chamber is L-shaped. Into the L thus formed is screwed a piece of one-inch pipe to which the wire-wound suction hose is attached. The suction opening leading into the pumping-cylinder is placed about one and one-half inches above the bottom of the cylinder, and is connected with the lower valve chamber. It is the object of this construction to allow the plunger to close the suction-opening on each down stroke, thereby crowding every drop of liquid or air through the upper valve into the receptacle. From this construction, it follows that the liquid can never come in contact with the packing of the plunger. Indeed, the liquid does not enter the cylinder at all, because on the upper stroke of the cylinder the lower valve is opened and the liquid is drawn through into the lower valve-chamber. The down stroke, whereby the lower valve is closed and the upper valve opened, forces the liquid through the upper valve into the receptacle.

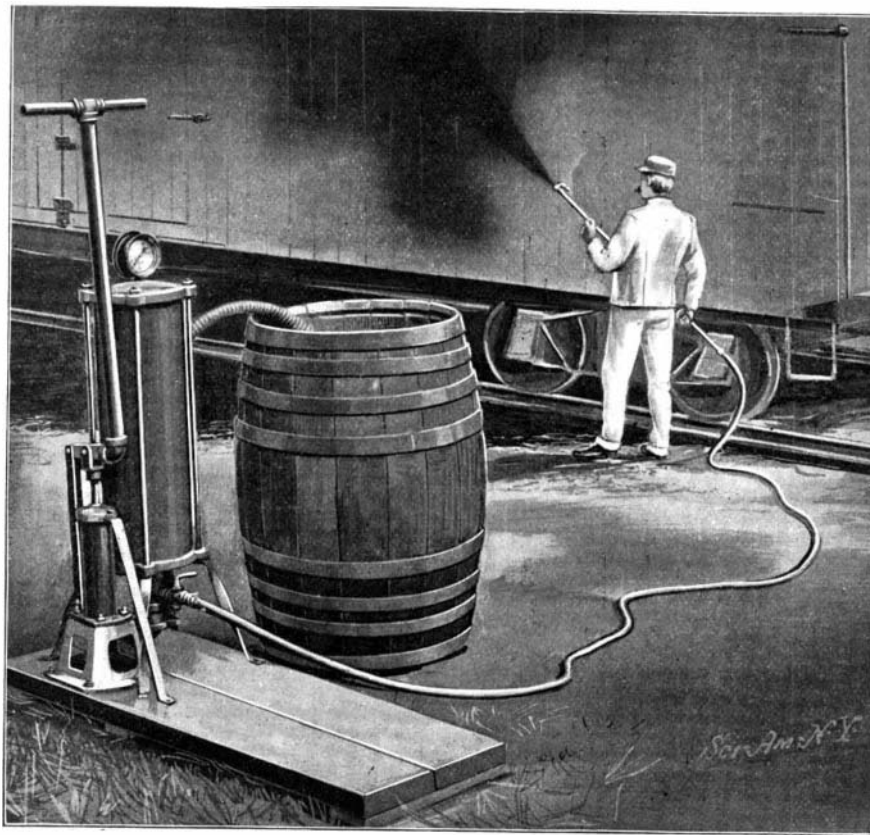
The plunger is so arranged that it can be withdrawn through the top of the cylinder by removing two bolts. Furthermore, it can be instantly expanded without necessitating its removal from the cylinder, simply by disconnecting it from the fulcrum, forcing it into the bottom of the cylinder, and tightening the plunger-rod. The discharge-opening, which is controlled by a special valve, is located at the extreme lower end of the receptacle, the bottom part of which is oval, so that every drop of the liquid is forced out of the receptacle.

Any length of pneumatic air hose can be used; for when the discharge valve is open the hose becomes a part of the receptacle, increasing its capacity to the extent of the additional volume of the hose. By means of an eight-foot extension rod or tube the liquid can be spread fourteen to sixteen feet overhead without a scaffold or ladder. Within this extension rod is another valve, which gives the operator complete control of the discharge, even though he is working one hundred feet away from the machine. A specially designed nozzle at the end of the extension rod gives to the liquid a whirling motion, so that there is no possibility of clogging the outlet. This special nozzle, in connection with the compressed air, atomizes the liquid so that a fine, filmy mist is formed which penetrates everywhere.

The merits of the construction of the machine are obvious. The pump has simply to compress the liquid and air, and is not used as a means of discharging the liquid. The air, confined above the liquid, forces the liquid out through the discharge-hose and nozzle, so that if the machine is charged with liquid and air, it is not necessary to operate the pump handle in order to empty the receptacle. The chemicals in the liquid cannot reach or destroy the plunger-packing; for they do not pass through the plunger. Since the valves are located at one side of the plunger, they cannot become clogged with sediment. By providing concave seats and giving the valves a rolling motion, each stroke of the handle

cleans the valves. The air pumped in while the receptacle is full of liquid passes to the top of the receptacle, thereby stirring or agitating the liquid constantly. By spreading the liquid into a thin mist through the medium of a special nozzle it is possible to apply a coat more evenly than otherwise and without the streaky appearance given by the brush.

Contrary to the prevalent opinion, the pneumatic coating machine is clean. If the filmy mist falls to the



PAINTING A FREIGHT CAR WITH THE PNEUMATIC COATING MACHINE.

floor, it is hardly noticeable. In painting by brush, huge drops often fall to the floor. The application of the machine is wide, but has found its chief use in warehouses, factories, and for painting large surfaces of any kind, whether they be rough or smooth. In painting rough surfaces the saving in time and labor is particularly marked; for the fine spray permeates every crevice, and the work is far better done than it could be by hand and brush.

DREDGER FOR LEVEE BUILDING.

BY ENOS BROWN.

At the junction of the Sacramento and San Joaquin Rivers with San Francisco Bay are large tracts, millions of acres in extent, known as "tule" lands. With each succeeding flood these lands are submerged, but as the waters subside vegetation of the rankest character quickly appears and develops with a profusion and luxuriance surpassed nowhere else in the world. The soil is composed of alternate layers of vegetable mold and silt, deposited by the rivers, and when re-

these levees consists in scooping the soil from the channel of adjacent water courses and depositing it upon the boundaries of the land to be reclaimed. The levees vary in height with large base dimensions, and are calculated to resist a heavy pressure from the outside. The lands are kept dry by a system of intersecting trenches draining the water into a depression from which it is pumped by steam power.

A dredger, claimed to be in some respects the largest ever constructed, has just been completed by the Golden Gate and Miner Works of San Francisco. It is designed for building a levee on one of the most considerable of the islands in the Sacramento River delta. The boom is of extraordinary length and describes a circle having a diameter of 310 feet, allowing the employment of material at great distance from the shore line, and thus lessening the danger from sliding banks.

The dredger is of the common "clam shell" type with hull 140 feet long, 50 feet wide and 11 deep, built of 12 by 12 timbers. It has two longitudinal bulkheads extending from cross keels on to deck timbers, and two cross bulkheads constructed of 12-inch square timbers.

There are three stationary spuds and one fleeting spud, each 30 inches square and 70 feet long. The engine is of the double cylinder compound high-pressure type, with two 14-inch cylinders working into a low-pressure 41-inch cylinder. The horse power developed is about 500.

The boilers are 7 feet high and 13½ feet long, of the Scotch marine type. Oil is the fuel employed.

The boom is 155 feet in length, constructed of 24-inch timbers spliced in the center. The bucket is unusually large, with a spread of 14 feet; though denominated a six-footer, it has raised in one lift a load of 14 cubic yards, weighing 25 tons (see illustration), of soil composed of sand and clay such as the beds of California rivers in lowlands consist of. One round trip of the bucket is made in 60 seconds, and in a day's work of 22 hours the dredger can handle 10,560 cubic yards of material, though the average of day's work is about 8,000.

A New English Submarine Boat.

The submarine boat "A 1," built by Vickers Sons & Maxim and the Admiralty, was tested in deep-sea experiments in the Irish Sea recently.

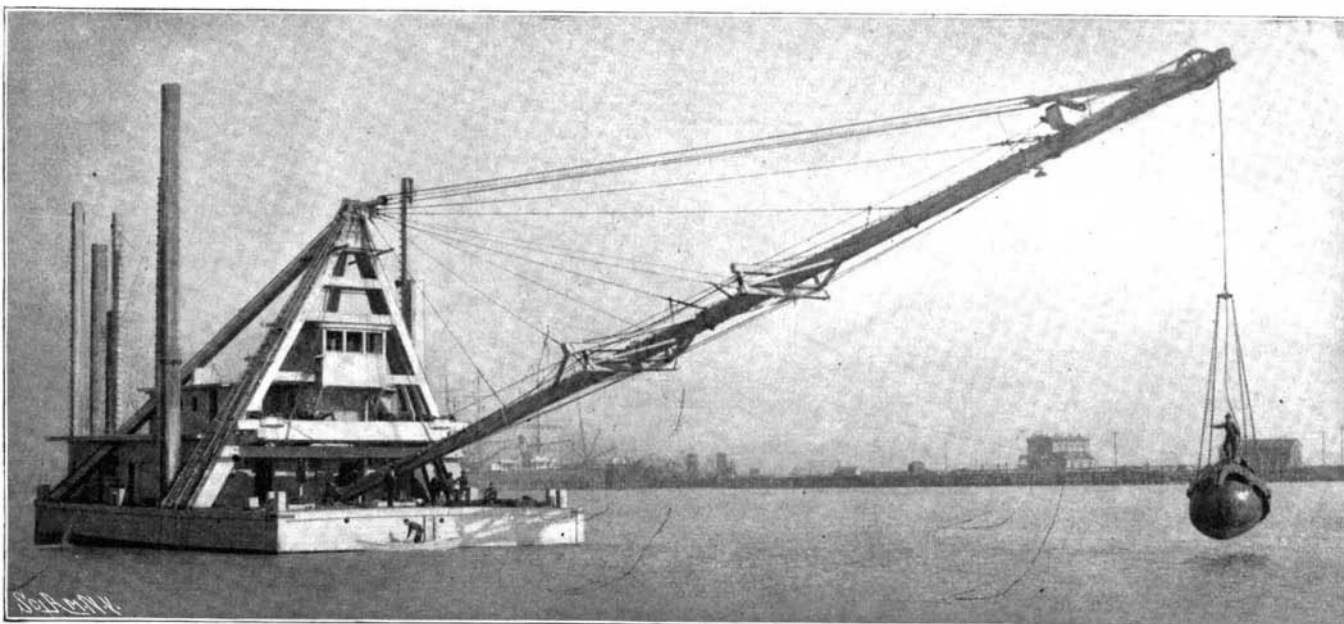
After several days' speed trials at the Barrow Docks the vessel was towed out before daylight to about five miles from Walney Island. Large casks with flags were laid down for a long course, and soundings were taken for several miles in the vicinity. A heavy sea was running, and there was a thick mist.

The boat was quickly submerged and traveled several miles, not returning to the surface for some hours. A depth of from ten to fifteen feet was obtained. Maneuvers in and out the flag marks showed that the vessel answered her rudder with great rapidity in whichever

direction it was desired to go. She was brought promptly to the surface on several occasions and was submerged with equal rapidity. The surface trials were then run and the speed showed considerable improvement over boats of the Holland type. The naval authorities maintain the utmost reticence, making it impossible to obtain accurate details. It is believed that the "A 2," "A 3" and "A 4," which are now being built, will be more formidable than any with which

trials have been made by foreign powers. The "A 1" returned to Barrow after dark. It is believed she will be fitted with a new petrol engine for the purpose of charging her electric batteries and propelling her on the surface with greater speed than has hitherto been obtained.

It is claimed by the builders that this new vessel is far more powerful and efficient than the American boats of the Holland type.



A GIANT DREDGER. THE BUCKET HOLDS 25 TONS; AND THE BOOM IS 155 FEET LONG.

claimed has proved of extraordinary fertility, producing crops of grain, potatoes and other vegetables that surpass belief. To reclaim all the tule lands is a task involving so great an outlay of capital as to be beyond the financial capacity of the present generation. But much has been accomplished in this direction, and at the present time some hundreds of thousands of acres have been leased and placed beyond danger from the yearly floods. The method employed in building