sons to be made in this laboratory, it would not enable any to be made with results obtained elsewhere.

The cement committee of the society (of which the writer was made a member by invitation) advised that tests should be made under pressure of 10 lbs. per sq. inch. It was not defined at the time whether this applied to sand tests only or to neat tests also; but the necessity for pressure is not so great in neat tests, because anyone with ordinary skill and practice can make a good neat briquette, and a light pressure will not affect the result much, as will be shown further on.

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In November last the molds above illustrated for applying pressure, which were from a design of the writer, modified by Mr. Withycombe, were completed, and since then several hundred briquettes have been made with them. It would seem a simple matter to mix up mortar, put it under a plunger, and by putting on 10 lbs. per sq. inch, make briquettes; but theory and practice must be fellow-'aborers. Now, 12 p. c. of water is considered the correct thing in 3 to 1 mixtures, but with this amount the mortar would not pack at all in a closed mold under so light a dead pressure, and it is light dead pressure that is wanted; even 20 lbs. per sq. inch was of no greater effect; then 15 p.c. of water was tried, with very little better results.

It was finally concluded to try several series with

different percentages of water, and thereby determine the best per cent. for making a good briquette.

As a result of these tests, the author thinks that 20 per cent. of water is just sufficient to make a plastic mortar, so that a good briquette can be formed, while more water tends to drown the cement and make it weaker at both the I week and 4 week tests, although longer tests would probably show a recovery in this respect.

This 20 per cent. applies to 1 to 1 and 3 to 1 mixtures, and will probably be about right for 2 to 1 also,

if it is desired to make such tests. It is conclusive that if any standard test under light pressure is to be adopted for sand tests, 20 per cent. of water must be prescribed as a definite part of the test, and in this way perfect uniformity obtained. It is understood that the sand used is standard sand, dry and sharp; a finer or rounder sand would allow less water to be used. This amount of water, while greater than that

usually given by authorities whose method of making sand briquettes is by some severe hammering process (e.q. German), is still close to the amount used in practice.

What we want, it seems, is, first of all, a uniforminod capable of applicatics in any part of the Dominion; after that we want it to approach as nearly as possible to actual usage, and fortunately the two conditions are in harmony with each other. The pressure adopted was 20 lbs. per sq. inch.

(Concluded in next issue.)

SCREW STEAMER AND STEEL TOW-BARGE EFFI-CIENCY.

BY JOSEPH R. OLDHAM, N.A. AND M.E., CLEVELAND, O.

Speaking of the invention or application of the screw to the propulsion of ships, Mr. John F. Pankhurst says "that the great lakes can boast of floating the first screw steamer ever built for business purposes." This has reference to the "Vandalia," built at Oswego, on Lake Ontario, in 1841.

It would be agreeable writing to give an unqualified support to this statement, but, unhappily for me, I cannot endorse this, as my friend, the Sunderland poet, Mr. William Allan, marine engineer, claims the same honor for his native lakes, for hestates that the "Archimedes," built in 1840, was the first screw steamer, and, parenthetically, let me add that the application of twin screws was patented as early as 1832 by Bennett Woodcroft in conjunction with his patent for expanding pitch. But long before this date, viz., in 1804, Col. John Stevens, of Hoboken, built a boat and fitted her with four-blade screw propeller. Moreover, the same great inventor introduced twin screws in 1805. Several other engineers proposed, and some of them tried, screw propulsion, but it was not brought into general use until John Ericson, a Swedish engineer residing in England, and E. P. Smith, an English farmer, perfected and pushed its introduction in Great Britain, and in America in 1836-7. However, as we are dealing with men whose inventions, improvements and labors in the arena of marine engineering have tended to such rapid advancement of marine transportation and commercial intercourse, it would be futile to attempt to apportion the exact degree of origin validly due to their inventions; therefore, let me again quote and say of the construction of these early screw steamers: "A mighty