EFFICIENCY OF CONDENSER AIR PUMPS.

In late years, jet air pumps and rotary (whirling) air pumps have been introduced for condenser service. The advantages of this type of pumps are well known, namely, their simplicity, the practical absence of attendance, and the ease with which repairs can be made by substituting a new outfit for the damaged one.

The introduction was facilitated by the shortcomings of the then existing types of reciprocating air pumps. These shortcomings consisted in complications such as mechanically operated valves, with the necessary valve gearing, large clearance and flash ports, the necessity for close adjustment on account of the small width of the flash ports, their sensitiveness for entrained water and the fact that at high vacuum the heat of compression warps the mechanically operated valve, and thereby makes further increase of vacuum impossible. Frequently these pumps were driven by steam cylinders with complicated Corliss valve gear.

Coupled with these features was the general lack of knowledge of the volumetric efficiency of such pumps. In contradistinction to the ease with which tests can be run on jet and whirling air pumps, tests on reciprocating pumps require more expensive installation and equipment.

The old law that improvement in one line produces improvement in a competing line, is true also in this case, and thus we find a new design of reciprocating air pump.

This air pump, which is illustrated by Fig. 1, has no mechanically operated valves on the air cylinder, but has instead automatic valves of the multi-ported plate type (Iverseen patent). There are no flash ports, and no large clearance spaces due to such flash ports. The valves need no attention and no oiling. They open and close at the right time independent of any adjustment.

These valves have been very successful on blowing engines and air compressors. In order to test this type of pump for reliability and economy, it was set up in the works of the Mesta Machine Company, at Pittsburg, and who are placing the pump on the market, and subjected to a thorough test by Prof. W. Trinks, of the Carnegie Institute of Technology. The test rigging is shown in Fig. 2. From left to right there will be noticed the bed plate of the air pump, then the steam cylinder and the air cylinder. The large vessel to the right is simply a tank for converting the pulsating suction of the air pump into a steady flow so that the actual quantity of air taken into the pump could be measured by a standard nozzle. This nozzle will be seen at the extreme right of the picture. Another nozzle was provided at the side of the tank away from the spectator and through this nozzle vapor could be admitted for the purpose of testing the pump under conditions existing in condenser practice. The usual precautions were taken to avoid leakage through the tank, and its joints, and to measure the very small amount of leakage which existed when the valves on the tank were closed. The steam passing through the steam cylinder was condensed at atmospheric pressure in a surface condenser located in the pit under the flywheel. The water resulting from condensing the steam was measured in barrels.

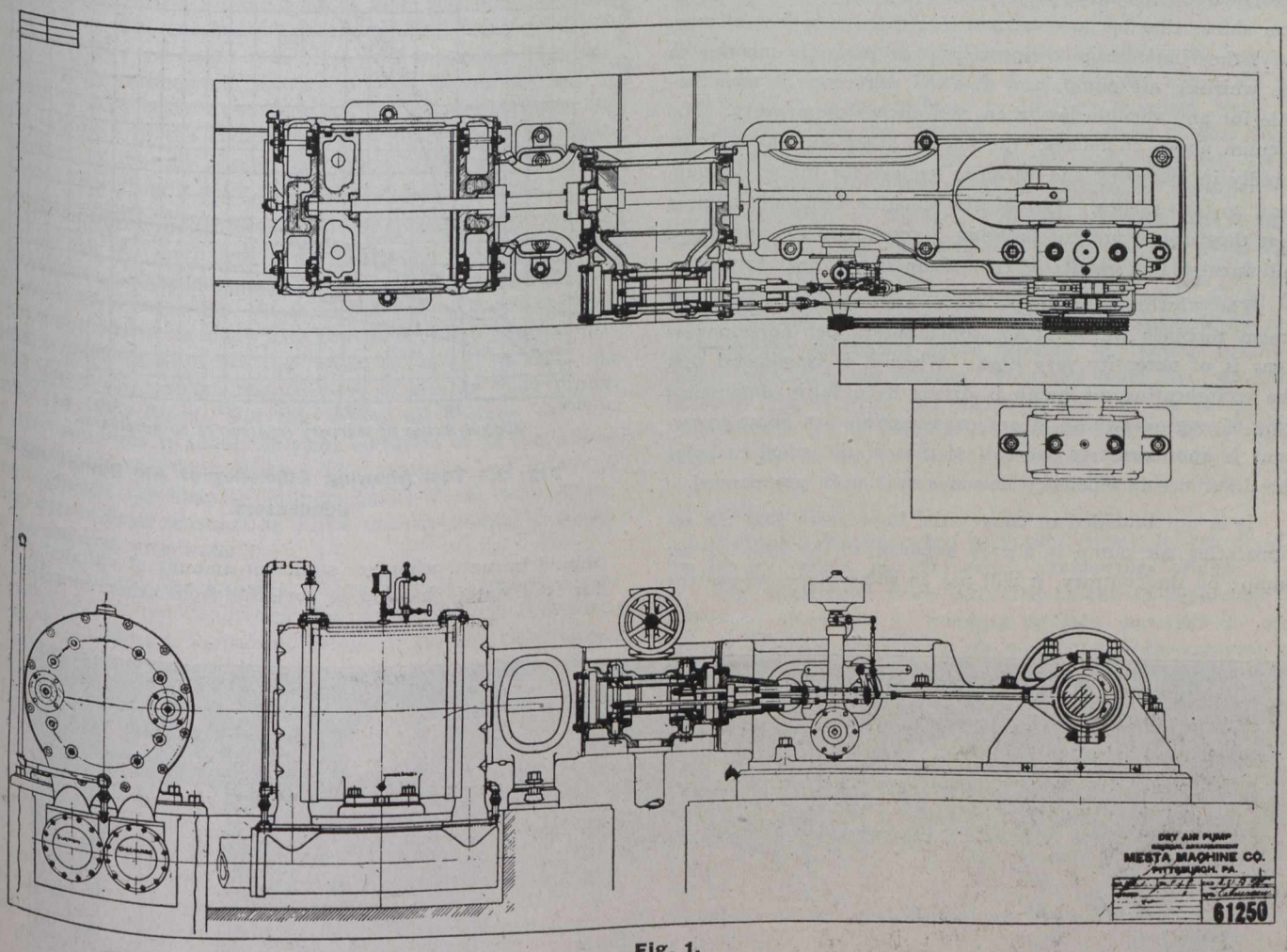

Fig. 1.