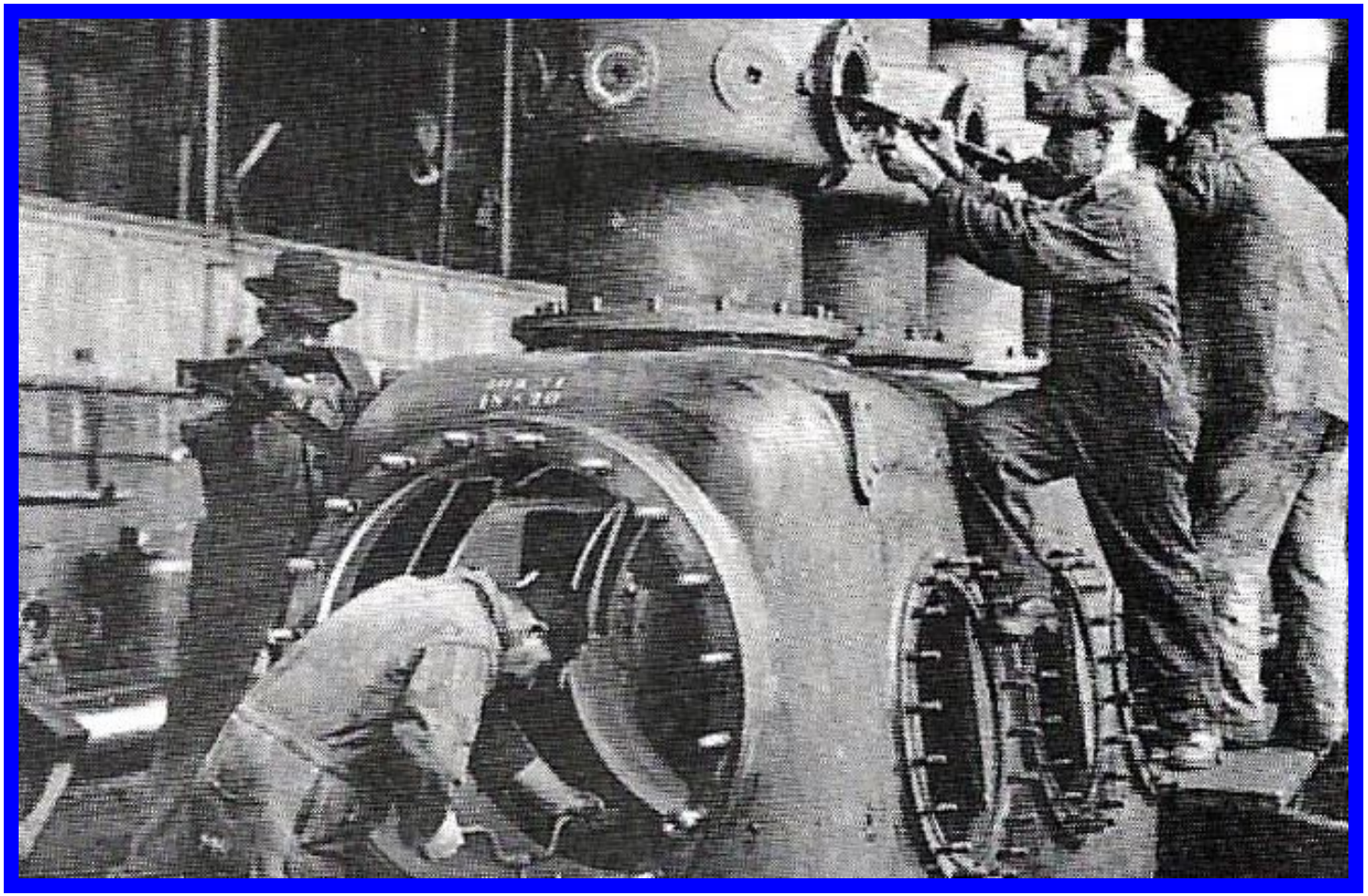
Refrigeration in American Breweries 1860-1920

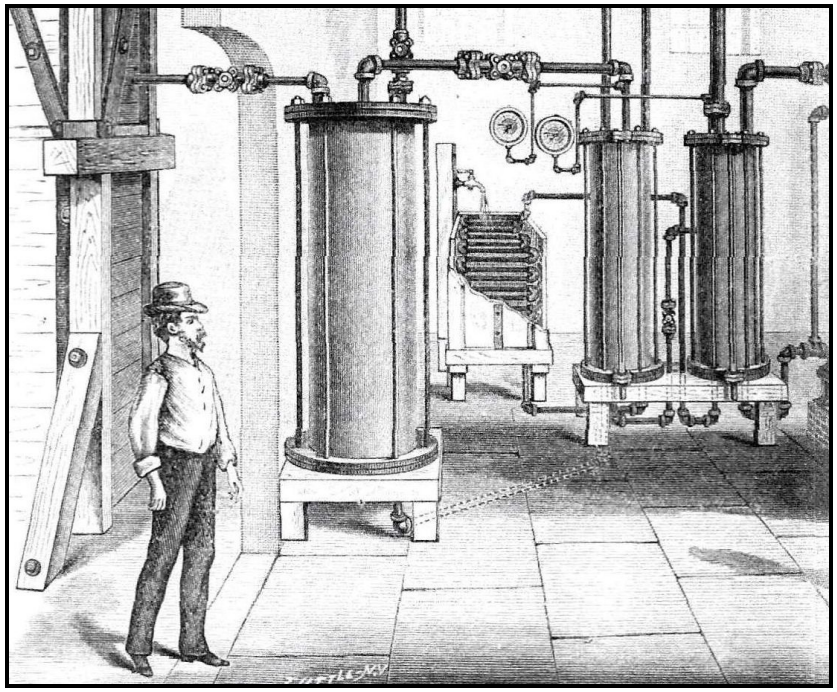
Refrigeration Machines



Illustrations from textbooks of 1882, 1900 & 1912

Refrigeration in American Breweries 1860-1920

Refrigeration in the Brewery



Selection of pages from *FABRICATION OF BEER* 1882

THE

THEORY AND PRACTICE

OF THE

PREPARATION OF MALT

AND THE

FABRICATION OF BEER,

WITH ESPECIAL REFERENCE TO THE

VIENNA PROCESS OF BREWING.

ELABORATED FROM PERSONAL EXPERIENCE BY

JULIUS E. THAUSING,

PROFESSOR OF THE SCHOOL FOR BREWERS AND OF THE AGRICULTURAL INSTITUTE "FRANSICO-JOSEPHUM," OF MODLING, NEAR VIENNA.

TRANSLATED FROM THE GERMAN BY

WILLIAM T. BRANNT,

GRADUATE OF THE ROYAL AGRICULTURAL COLLEGE OF ELDENA, PRUSSIA.

THOROUGHLY AND ELABORATELY EDITED, ACCORDING TO THE LATEST AND MOST SCIENTIFIC PRACTICE, INCLUDING ALL THE NEW IMPROVEMENTS IN THE BREWING OF LAGER BEER INTRODUCED INTO THE UNITED STATES, BY

A. SCHWARZ,

GRADUATE OF THE POLYTECHNIC SCHOOL OF PRAGUE, DIRECTOR OF THE FIRST SCIENTIFIC STATION FOR BREWING IN THE UNITED STATES, PUBLISHER OF "THE AMERICAN BREWER."

AND

DR. A. H. BAUER, M.A.C.S.,

ANALYTICAL CHEMIST AND SUPERINTENDENT OF THE FIRST SCIENTIFIC STATION FOR BREWING IN THE UNITED STATES, EDITOR OF "THE AMERICAN BREWER."

ILLUSTRATED BY ONE HUNDRED AND FORTY ENGRAVINGS,
Including the most Modern Approved Machinery.

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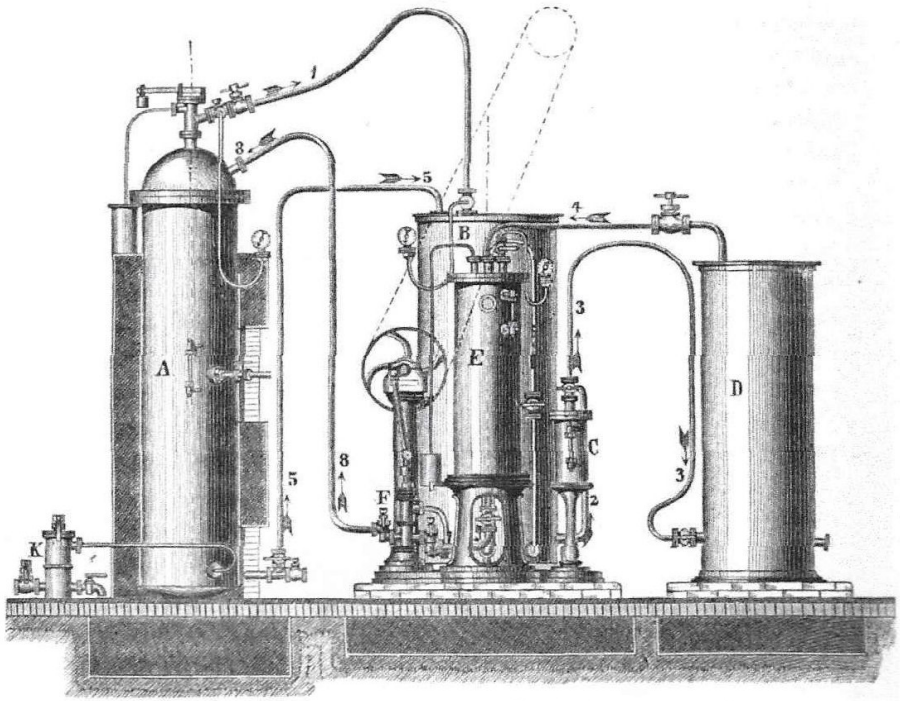
CROWN BUILDINGS, 188 FLEET STREET.
1882.

be cooled off passes into the cylinder from above, and after it has been cooled runs off from below to a cold water reservoir.

Fig. 109.



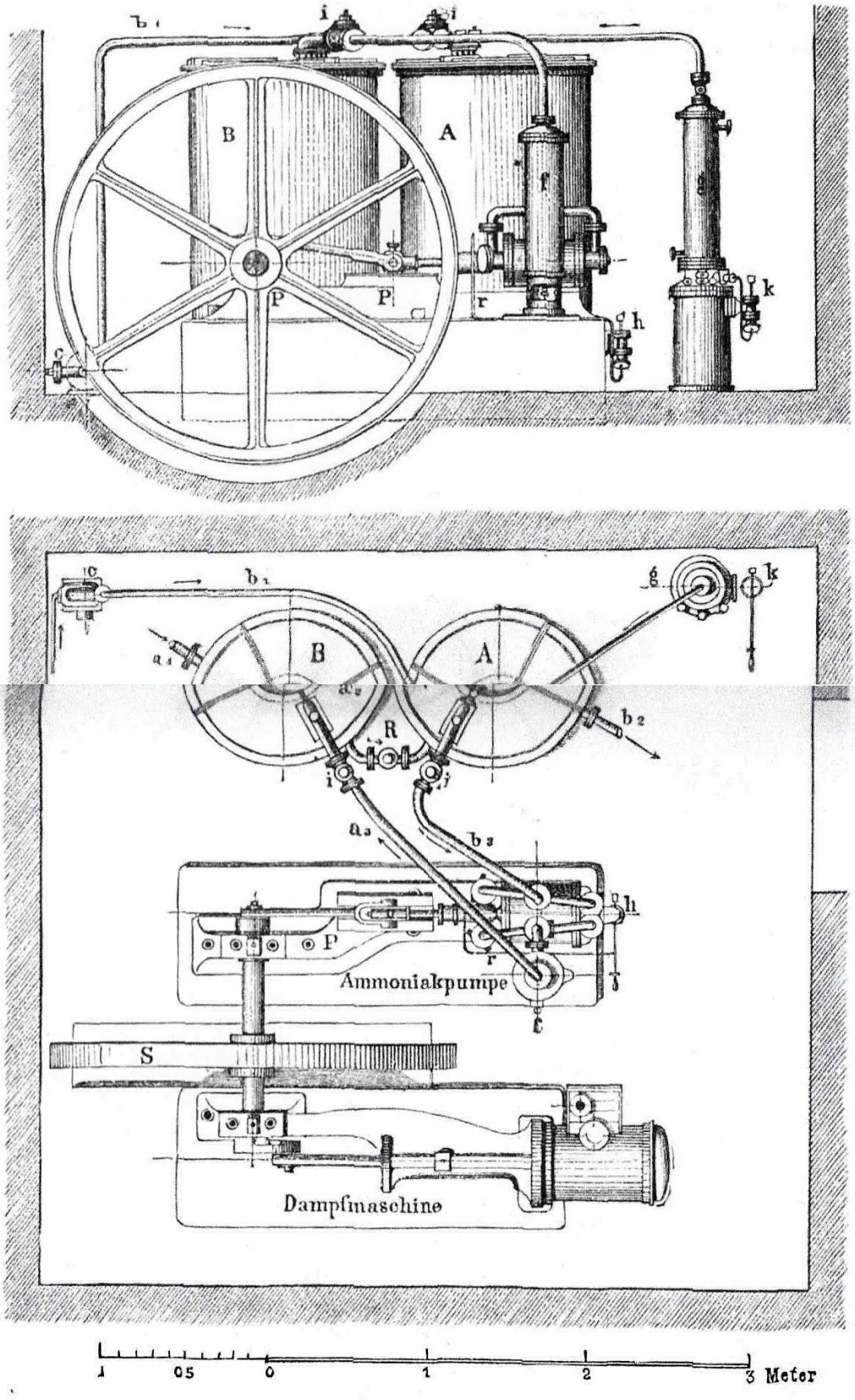
Vaass & Littmann's continuously working ice-machine for the production of ice-water.

The machines constructed according to this system are especially adapted for breweries, as they produce sufficient cooling water having a temperature of 1° C. (33.8° F.) to cool the wort coming from the cooler and the beer in the fermenting tun. The cost of producing cooling water, is considerably less than that of ice. The machines, represented by Figure 109, are manufactured in six different sizes and cool 500 to 1000 litres (132 to 264 gallons) of water from 15° to 1° C. (59° to 33.8° F.) per hour, or 280 to 11,600 cubic metres (364 to 15,080 cubic yards) of air from 25° to 1° C. (77° to 33.8° F.).

The advantages of these new machines, as compared with those of the old construction, are:—

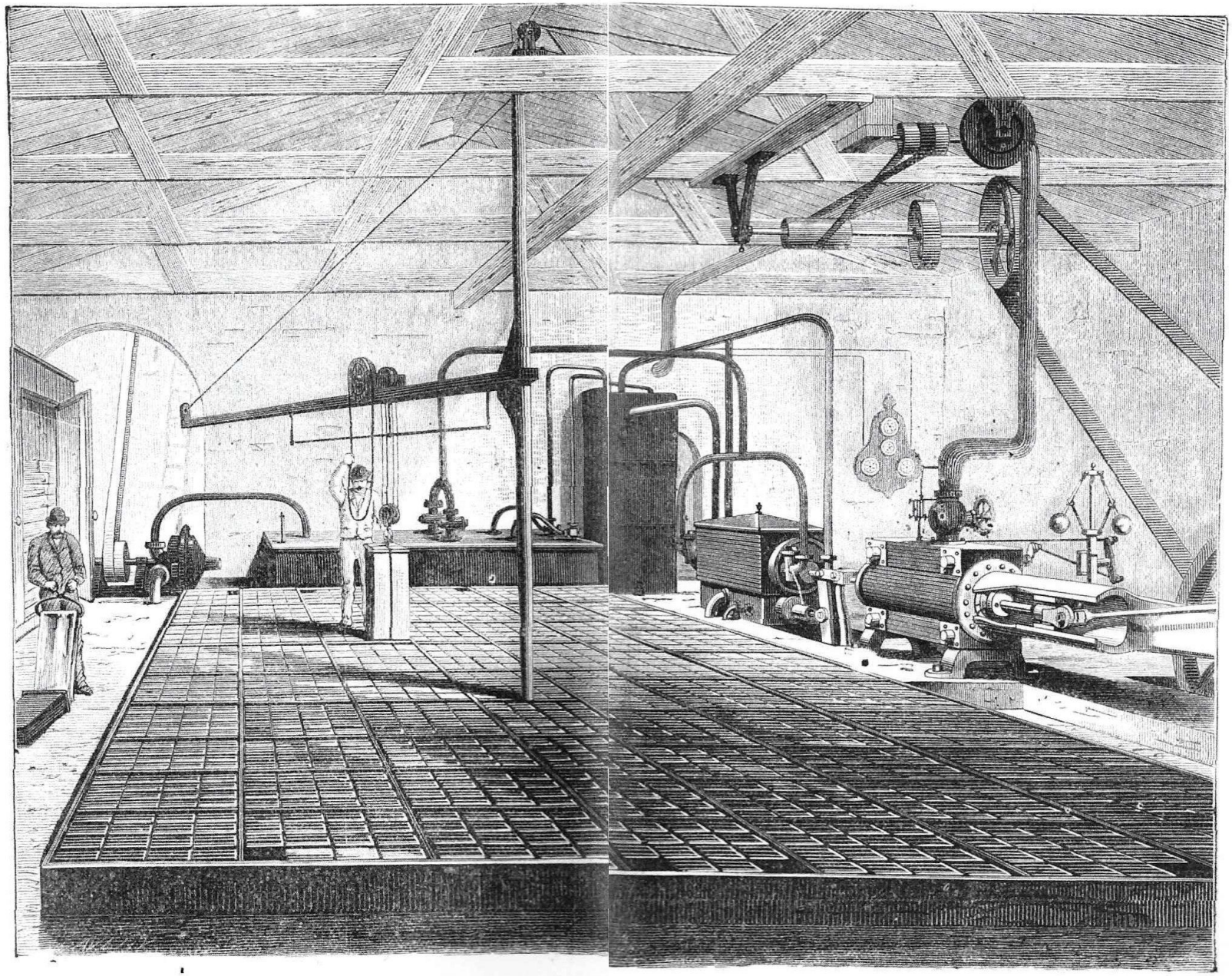
1. The condensing worm has been simplified (those con-

PLATE VII.



LIND'S ICE MACHINE. Page 633.

PLATE VIII.



PICTET'S ICE MACHINE. Page 641.

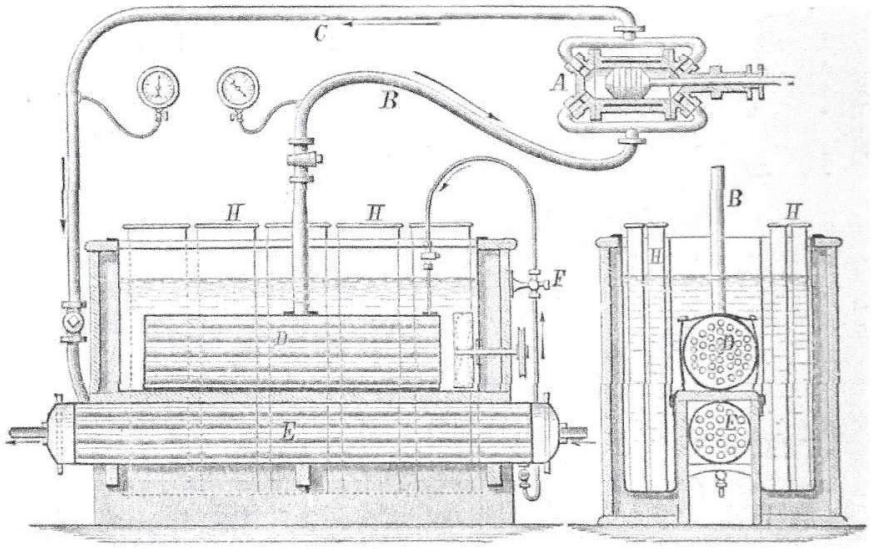
facture and put it in the market at a cheaper price. There is no danger of fire from the acid, nor is it explosive.

Fig. 111 shows a cross section of the machine represented by Plate VIII.

A is a condensing-pump, the valves of which are so arranged that by a stroke of the piston the sulphurous acid is raised up from the refrigerator, *D*, through the pipe, *B*, and passes into the condenser, *E*, through the pipe, *C*.

The refrigerator, *D*, is a copper tubular boiler, having a length of 6 feet $6\frac{3}{4}$ inches, and a diameter of $13\frac{4}{5}$ inches; it contains 150 tubes, $\frac{19}{32}$ inches wide, the ends of which are soldered to the boiler. It lays horizontally in a large tun of sheet-iron, in which are placed 100 square boxes (*H*) of galvanized sheet-iron, 3 feet high, each of which contains 5.28 gallons of water. The sulphurous acid volatilizes in the space reserved between the pipes

Fig. 111.

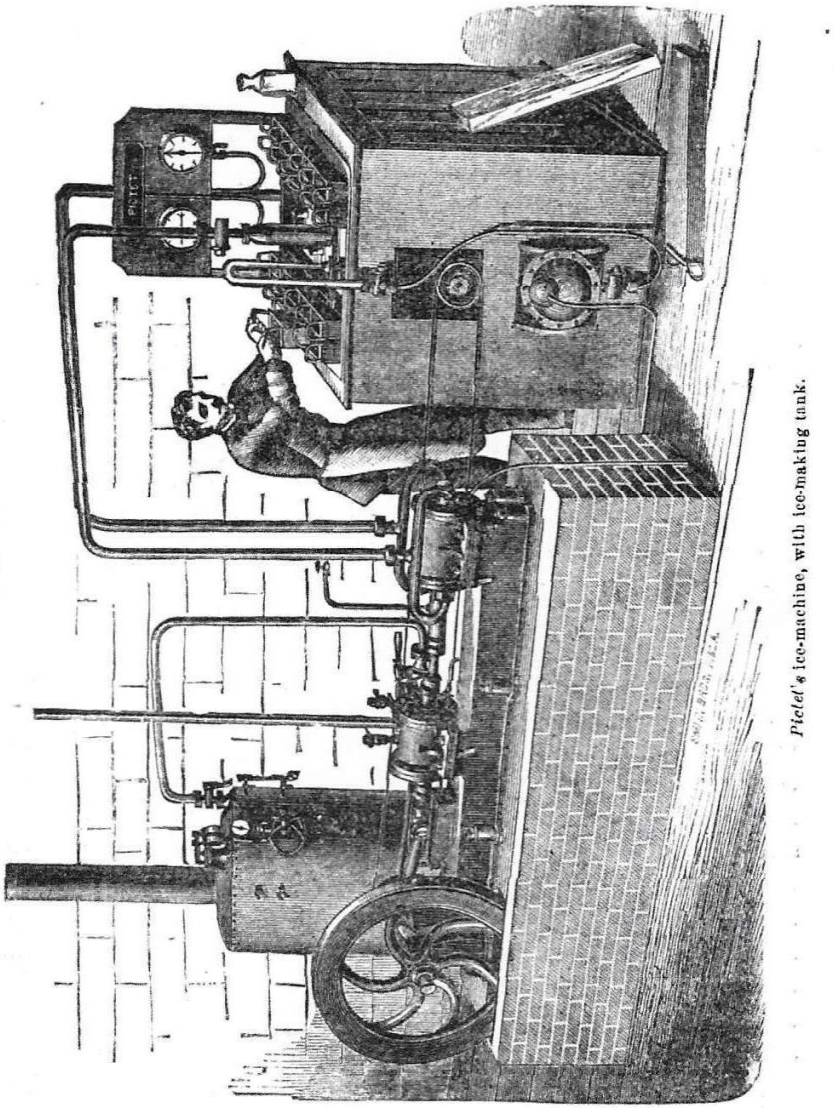


Pictet's ice-machine.

of the refrigerator, the vapors are taken up by the pipe, *B*, and conducted to the condenser through *C*. A fluid which will not freeze, such as salt-water, a mixture of glycerine, or chloride of calcium with water, is kept in constant motion and circulation

by a screw in the refrigerator, *D*, until it is cooled off to about —7° R. (—8.7° C., 16.2° F.). and in running back plays around the sides of the galvanized sheet-iron boxes containing the water to be frozen.

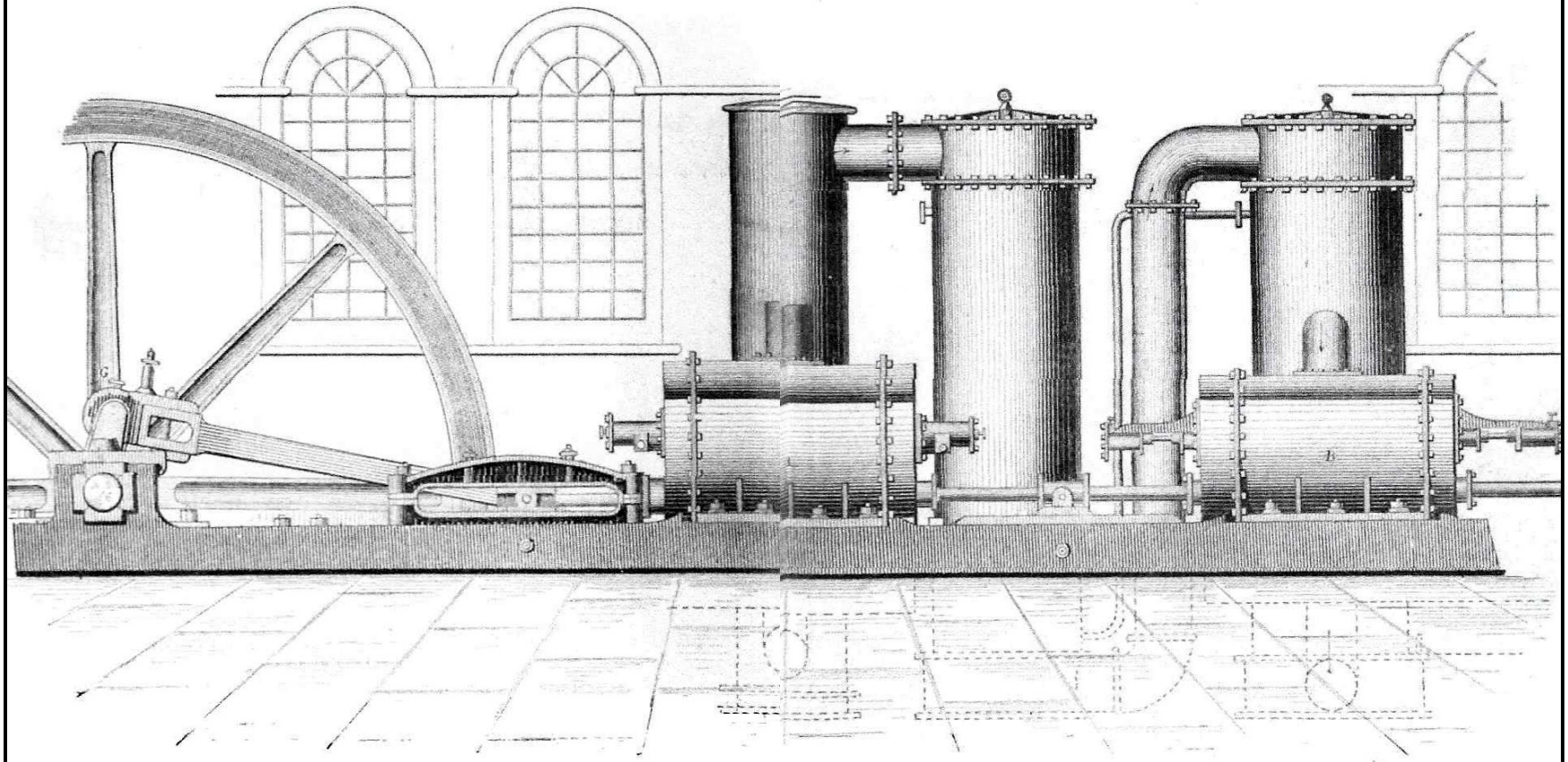
Fig. 112.



Pictet's ice-machine, with ice-making tank.

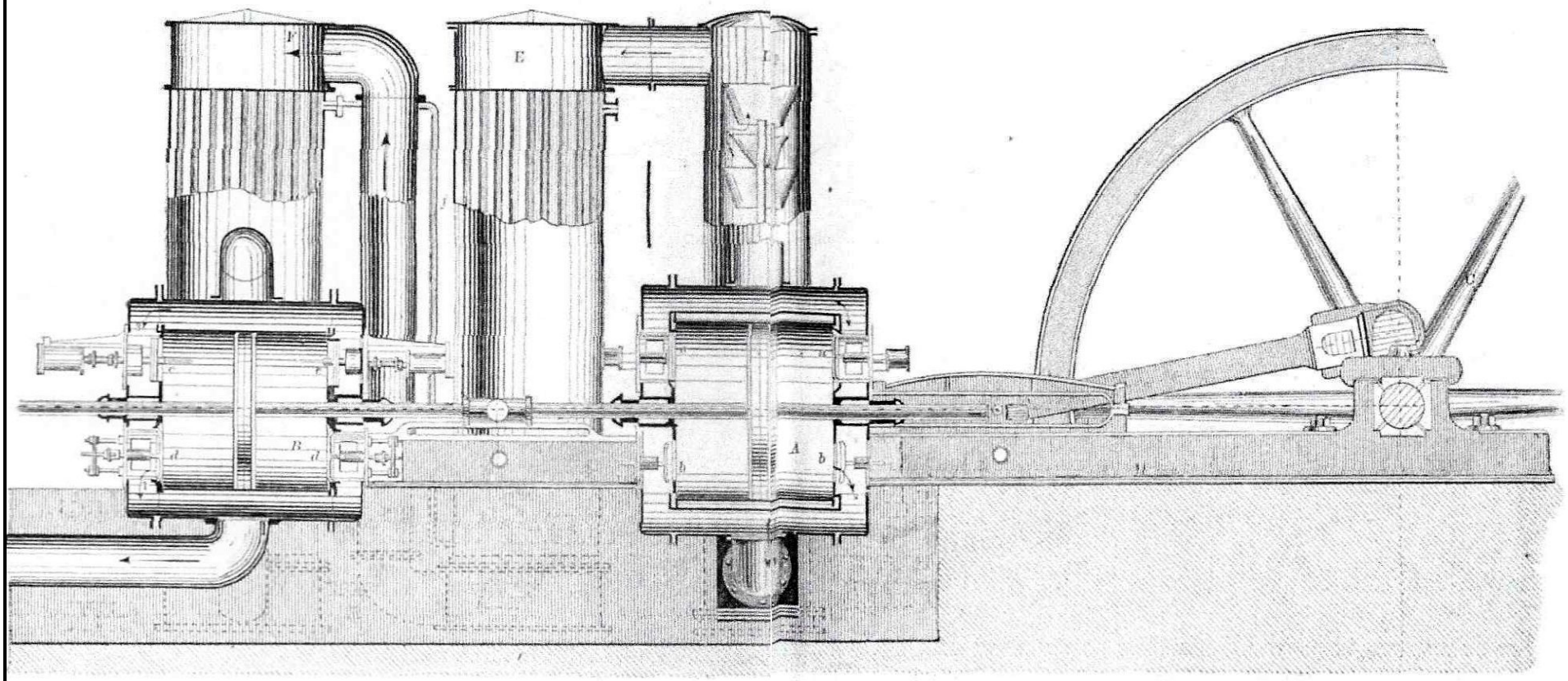
The condenser, *E*, is a tubular boiler similar to the refrigerator, *D*, but only ordinary water runs through the tubes for the

PLATE IX.



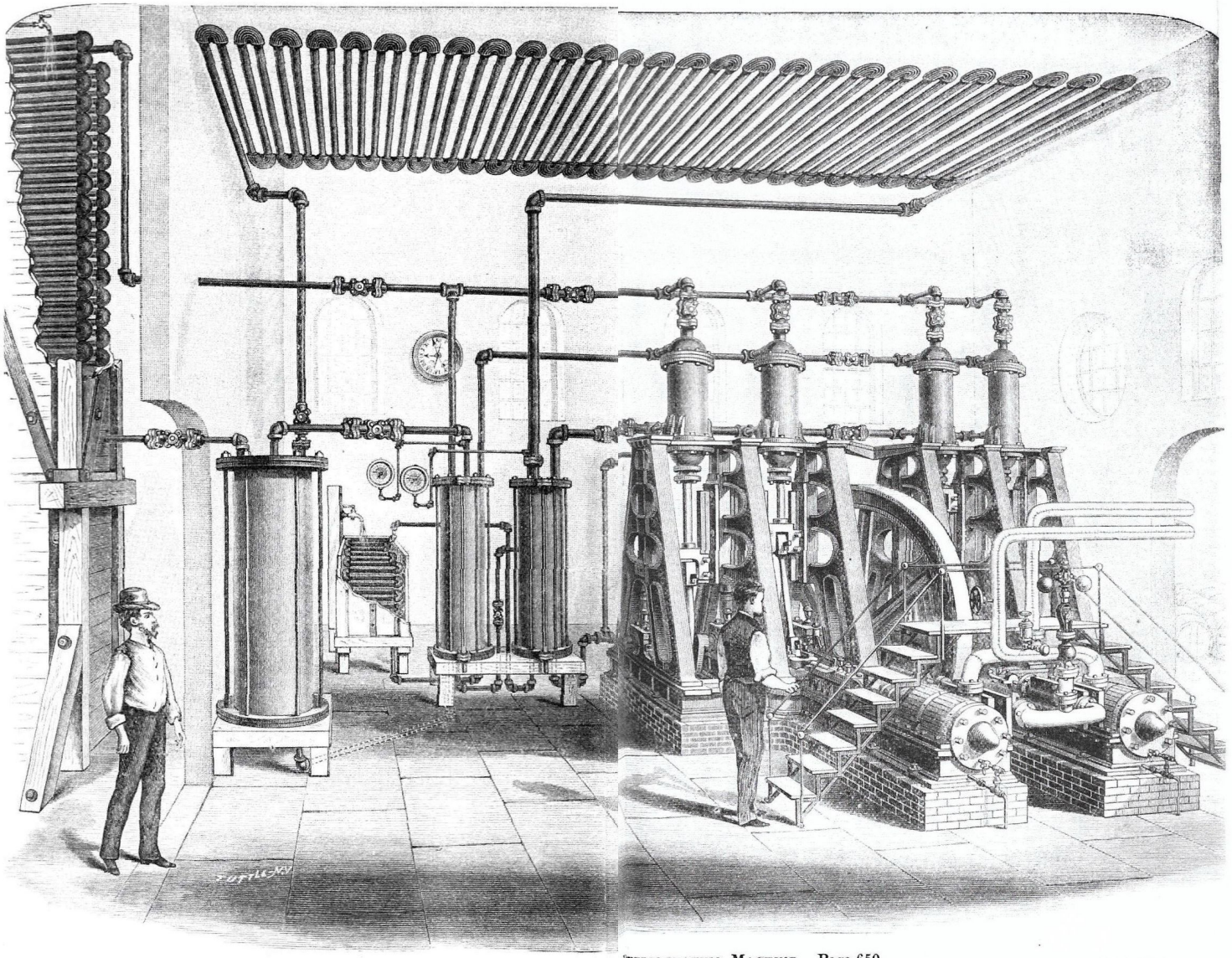
WINDHAUSEN'S REFRIGERATING OR COLD AIR MACHINE. Page 646.

PLATE X.



WINDHAUSEN'S REFRIGERATING MACHINE (LONGITUDINAL SECTION). Page 647.

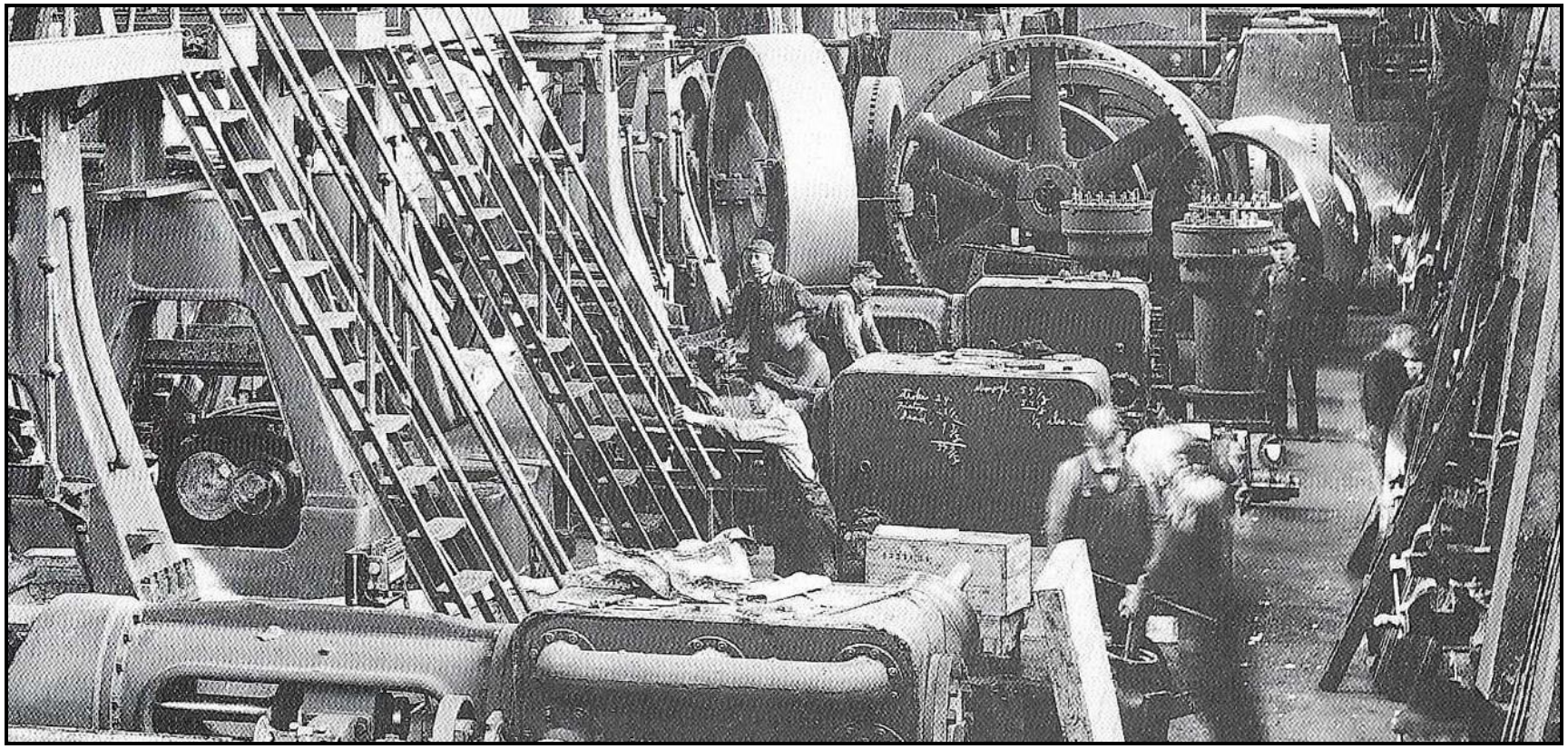
PLATE XI.



THE DE LA VERGNE AND MIXER [illegible] REFRIGERATING MACHINE. Page 650.

Refrigeration in American Breweries 1860-1920

Machinery and Refrigeration



Selection of pages from *MACHINERY AND REFRIGERATION* 1900

MACHINERY

FOR

REFRIGERATION

BEING

SUNDRY OBSERVATIONS WITH REGARD TO THE PRINCIPAL APPLIANCES EMPLOYED IN ICE MAKING AND REFRIGERATION, AND UPON THE LAWS RELATING TO THE EXPANSION AND COMPRESSION OF GASES. PRINCIPALLY FROM AN AUSTRALIAN STANDPOINT

BY

NORMAN SELFE

LATE CHAIRMAN OF THE BOARD OF TECHNICAL EDUCATION, NEW SOUTH WALES, AUSTRALIA.
PAST PRESIDENT ENGINEERING ASSOCIATION OF NEW SOUTH WALES, AUSTRALIA.
MEMBER OF THE INSTITUTE MECHANICAL ENGINEERS, ENGLAND.
MEMBER OF THE INSTITUTE CIVIL ENGINEERS, ENGLAND.
HON. MEMBER SOUTHERN ICE EXCHANGE, U. S. A.
ETC., ETC.

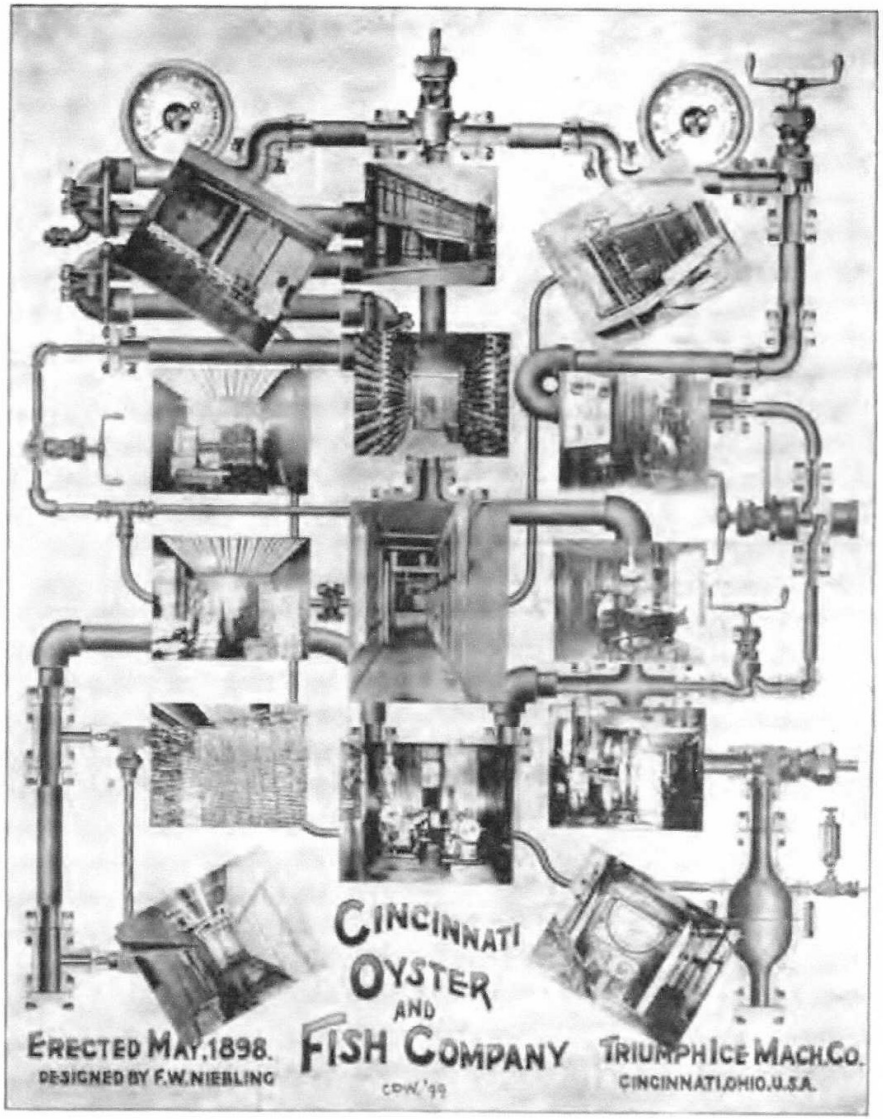
AUTHOR OF "COMPRESSED AIR AND ITS APPLICATIONS"
ETC., ETC.

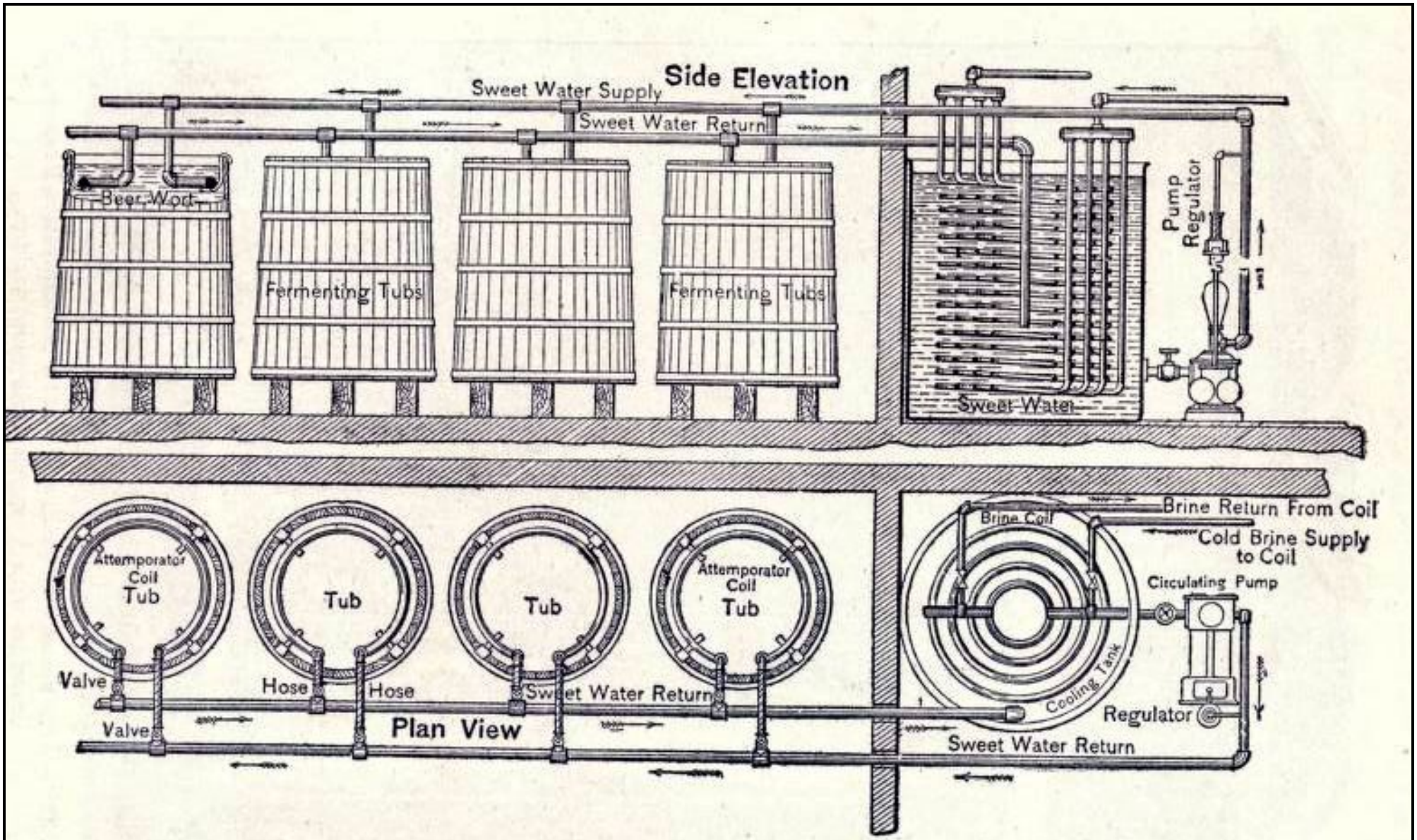
CHICAGO
H. S. RICH & CO.
1900

THE TRIUMPH ICE MACHINE CO.

CINCINNATI, OHIO, U. S. A.

INVESTIGATE. IT PAYS.





Figs. 329 and 330.—Automatic Attemperator System and Cooling Arrangement, Frick Company. Side Elevation and Plan.

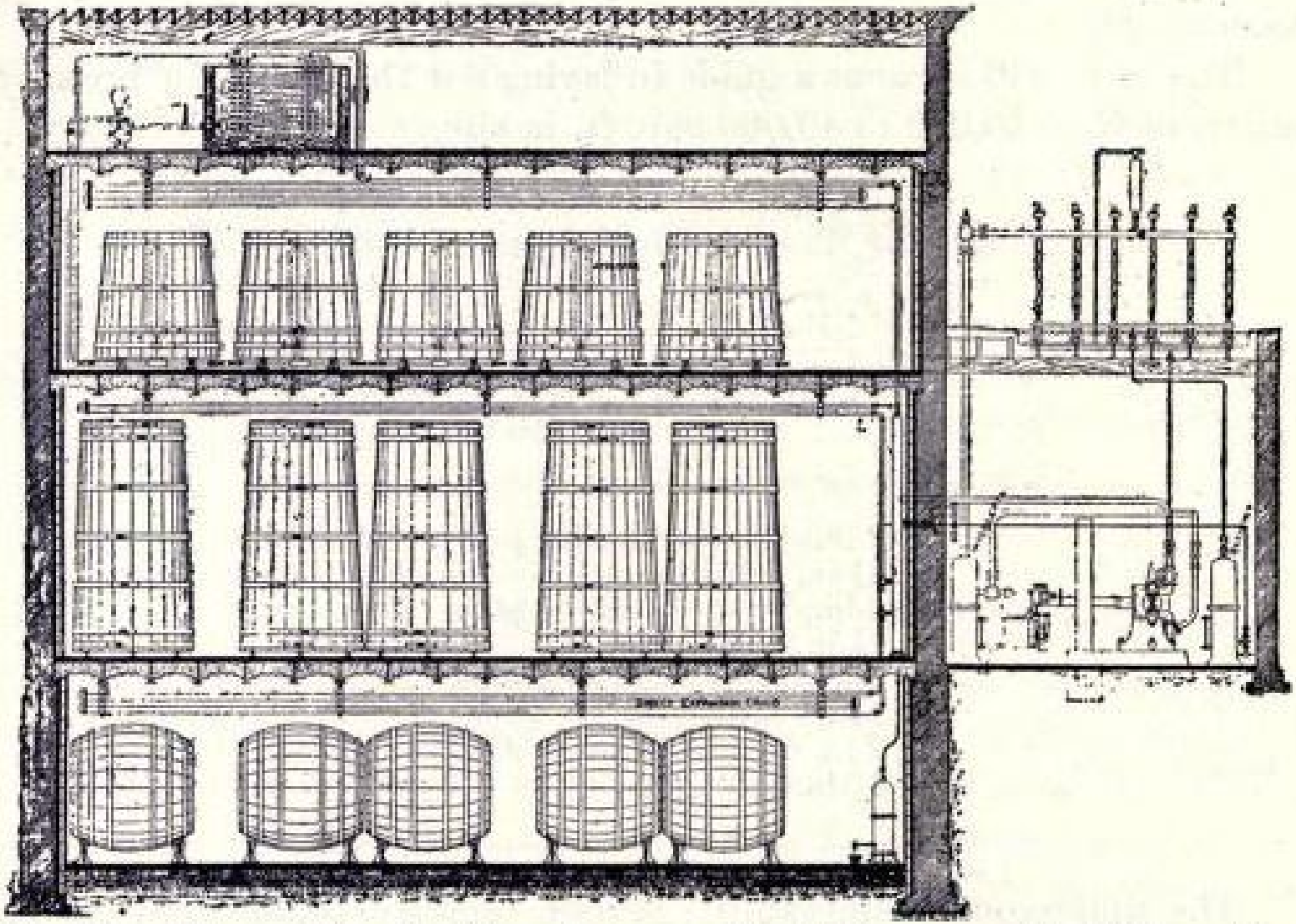


Fig. 332.—Triumph Ice Machine Company, Small Brewery with Refrigerating Machinery working on the Direct Expansion System. Sectional Elevation.

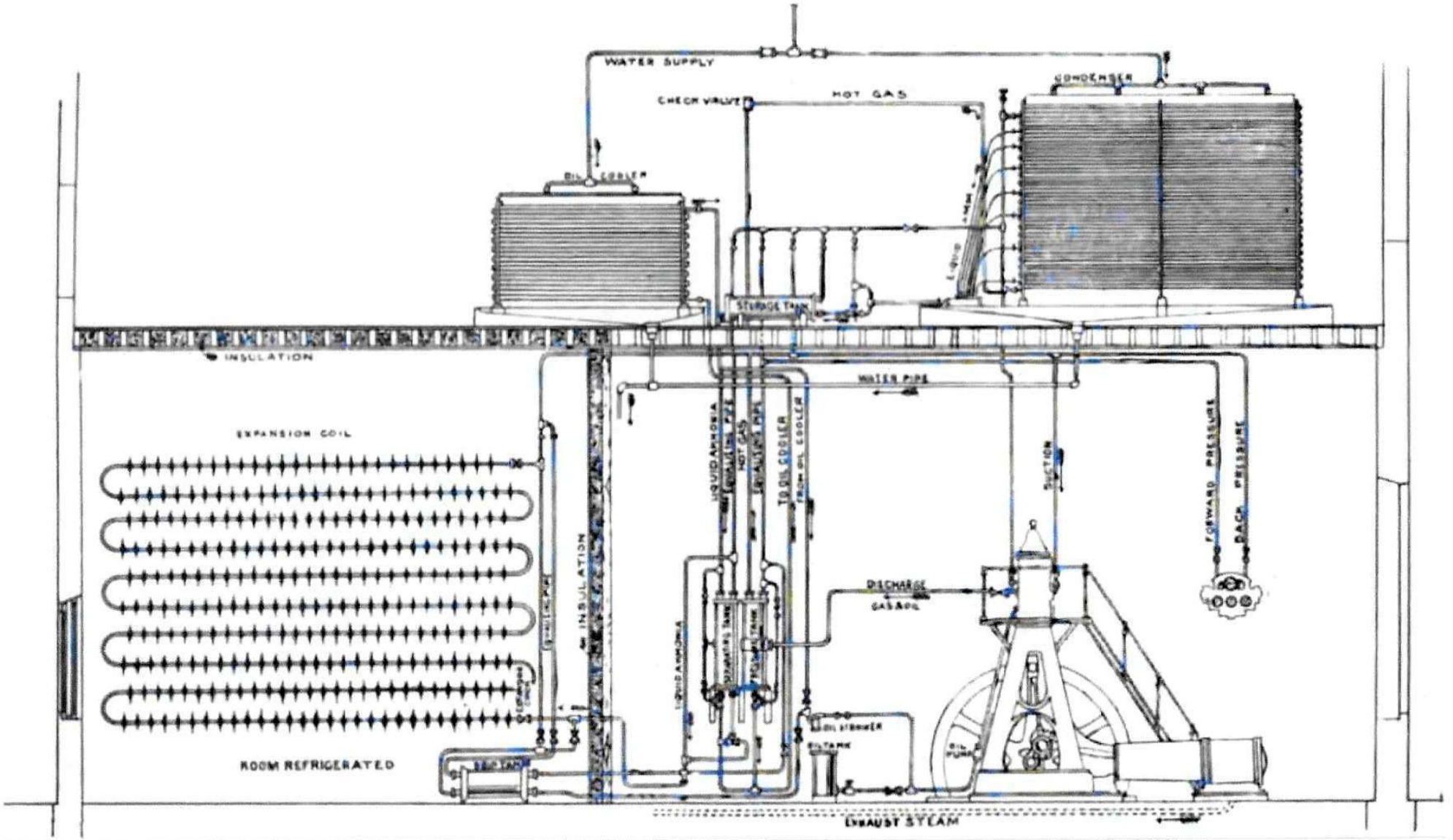


FIG. 20.—DIAGRAM ILLUSTRATING CYCLE OF OPERATIONS IN A DE LA VERGNE PLANT.

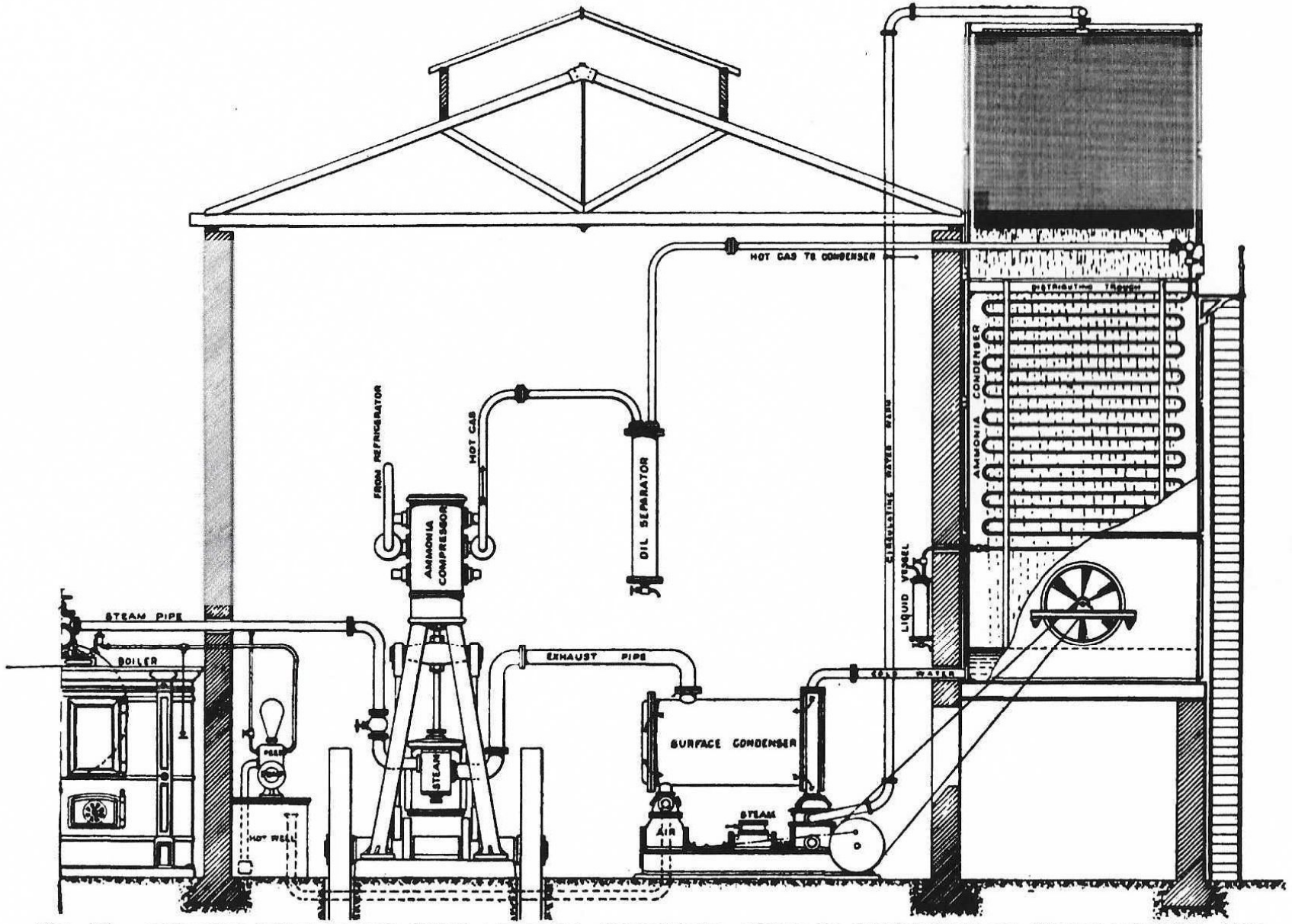


FIG. 24.—REFRIGERATING PLANT WITH AMMONIA CONDENSER, SURFACE CONDENSER TO STEAM ENGINE, AND COOLING TOWER PROVIDING FOR RE-USE OF CONDENSING WATER.

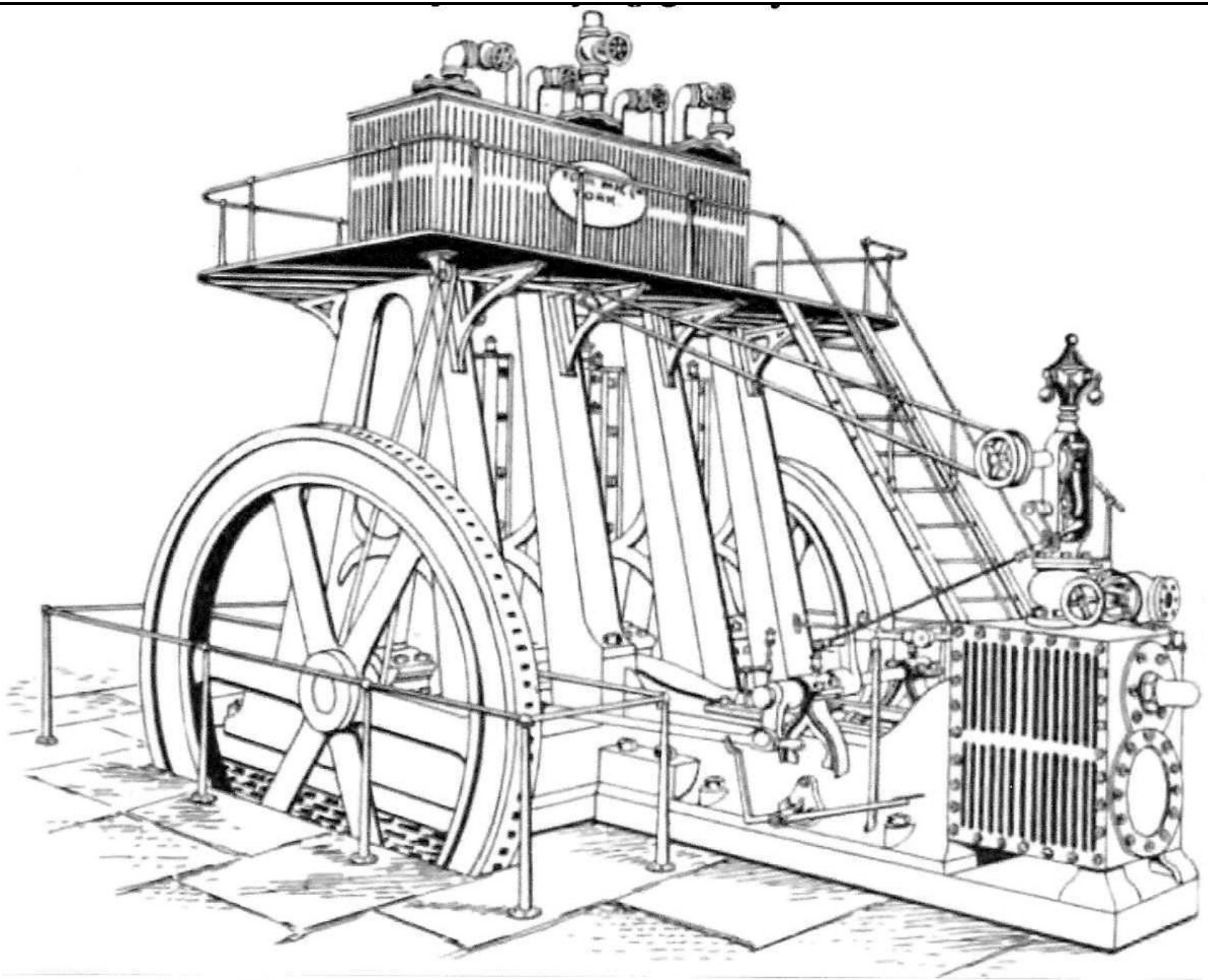


FIG. 70.—YORK CO.'S COMPOUND COMPRESSOR AND ENGINE.

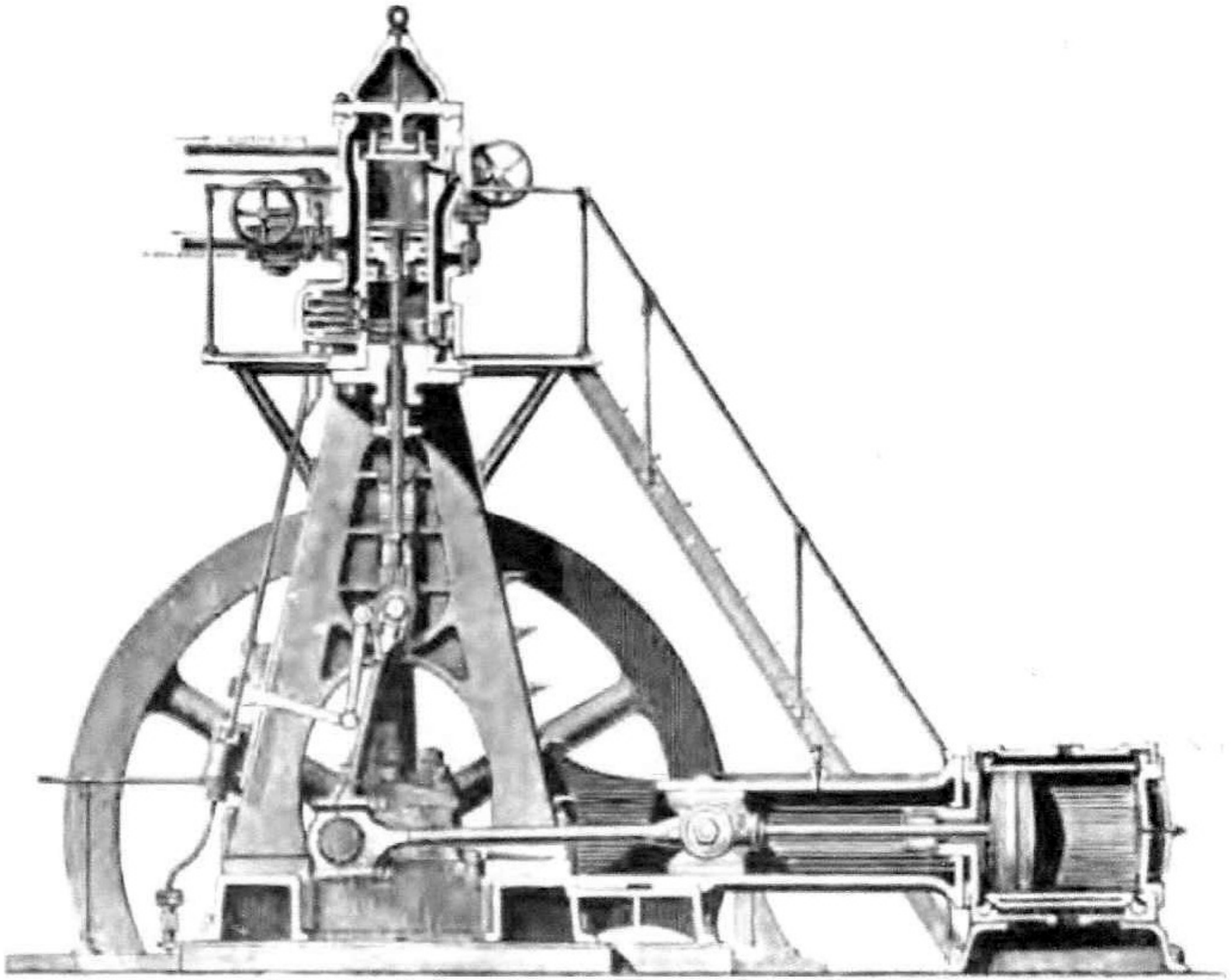


FIG. 79.—SECTION OF DE LA VERGNE ENGINE AND COMPRESSOR.

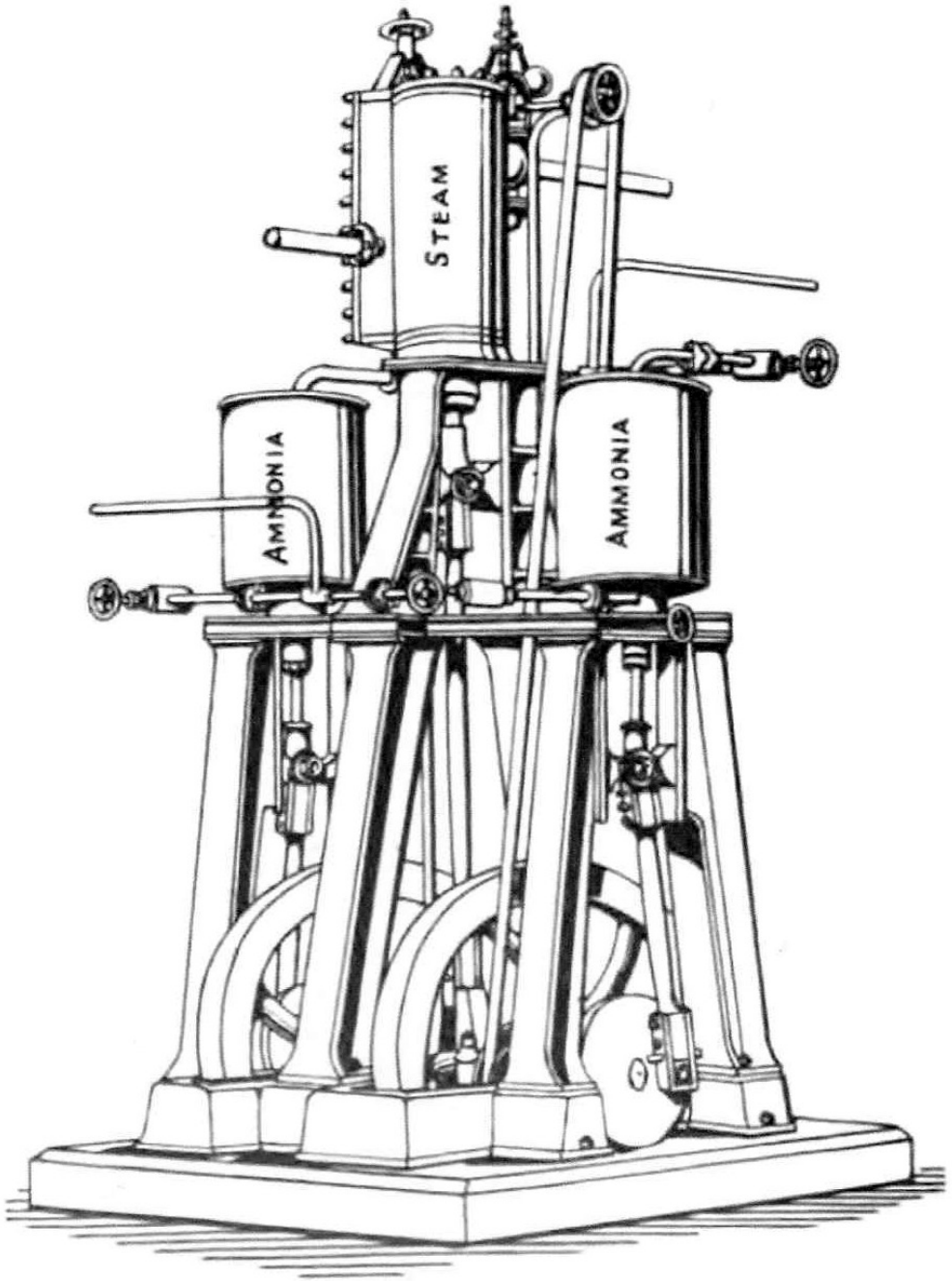


FIG. 87.—AMMONIA COMPRESSOR—ORIGINAL BOYLE PATTERN.

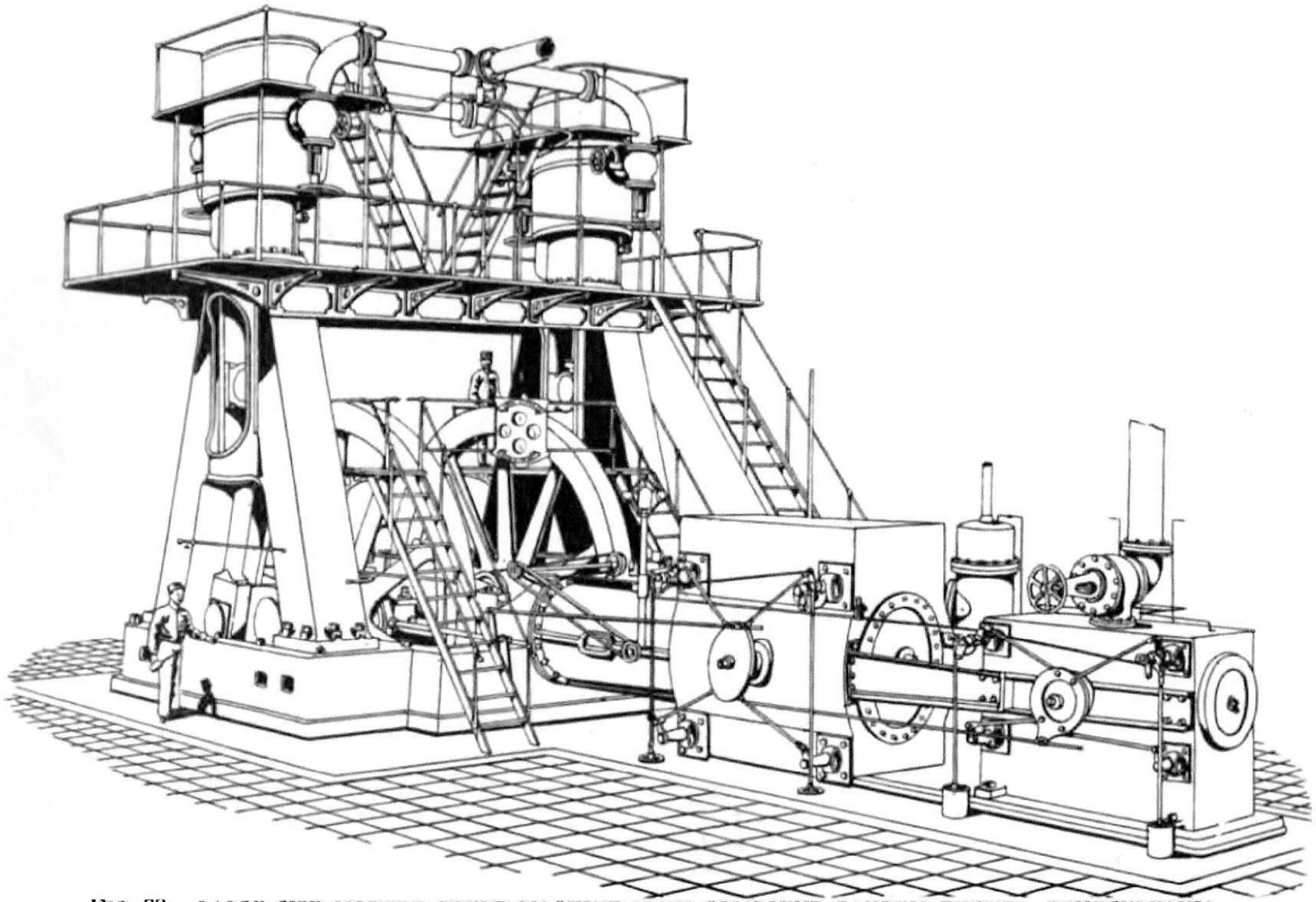
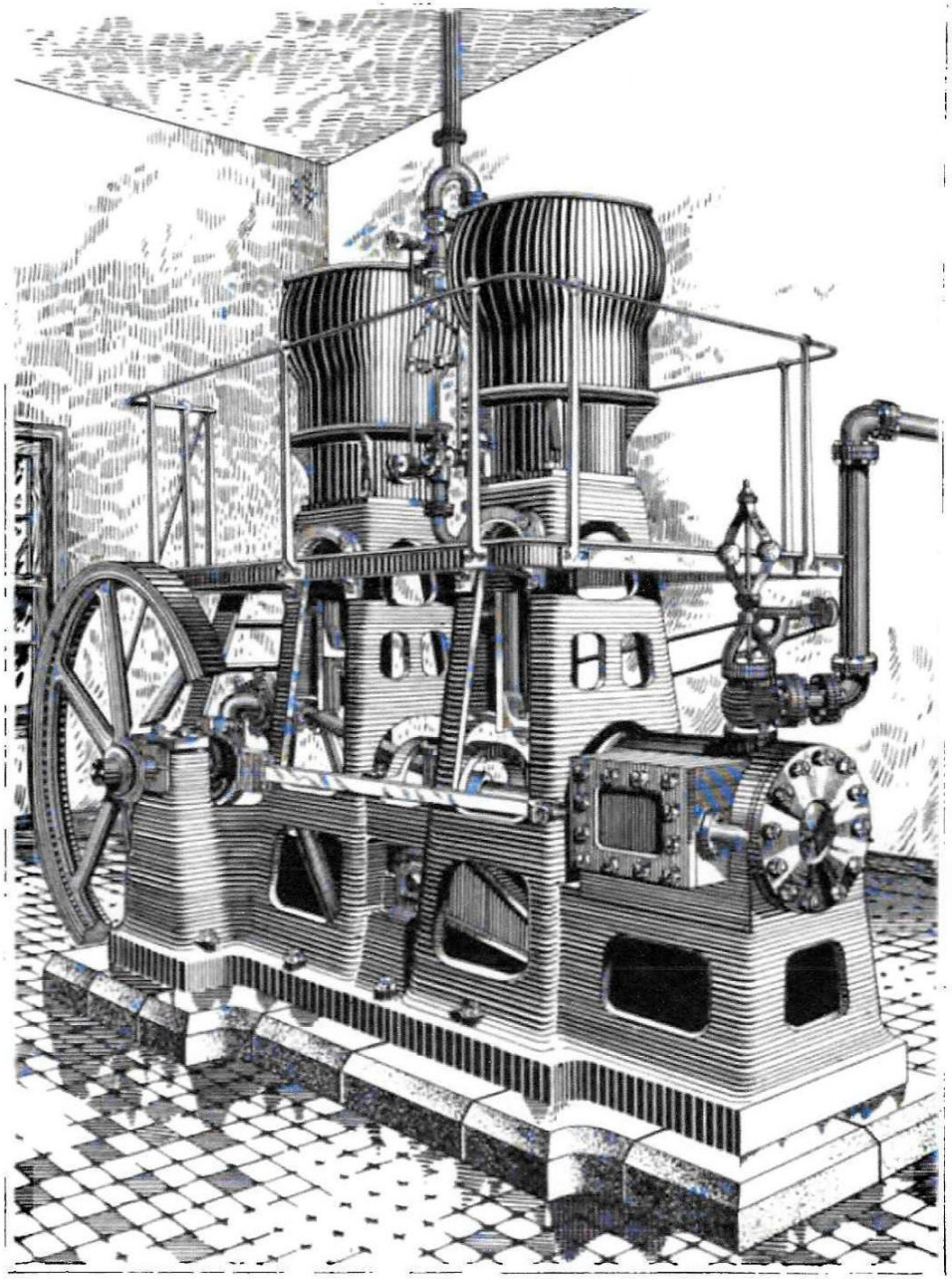


FIG. 88.—LARGE SIZE MODERN BOYLE MACHINE WITH COMPOUND TANDEM ENGINE—PENNSYLVANIA IRON WORKS CO., PHILADELPHIA, PA., U. S. A.



PERSPECTIVE VIEW—ANTARCTIC REFRIGERATING MACHINE—BEAM PATTERN—TEN TON.

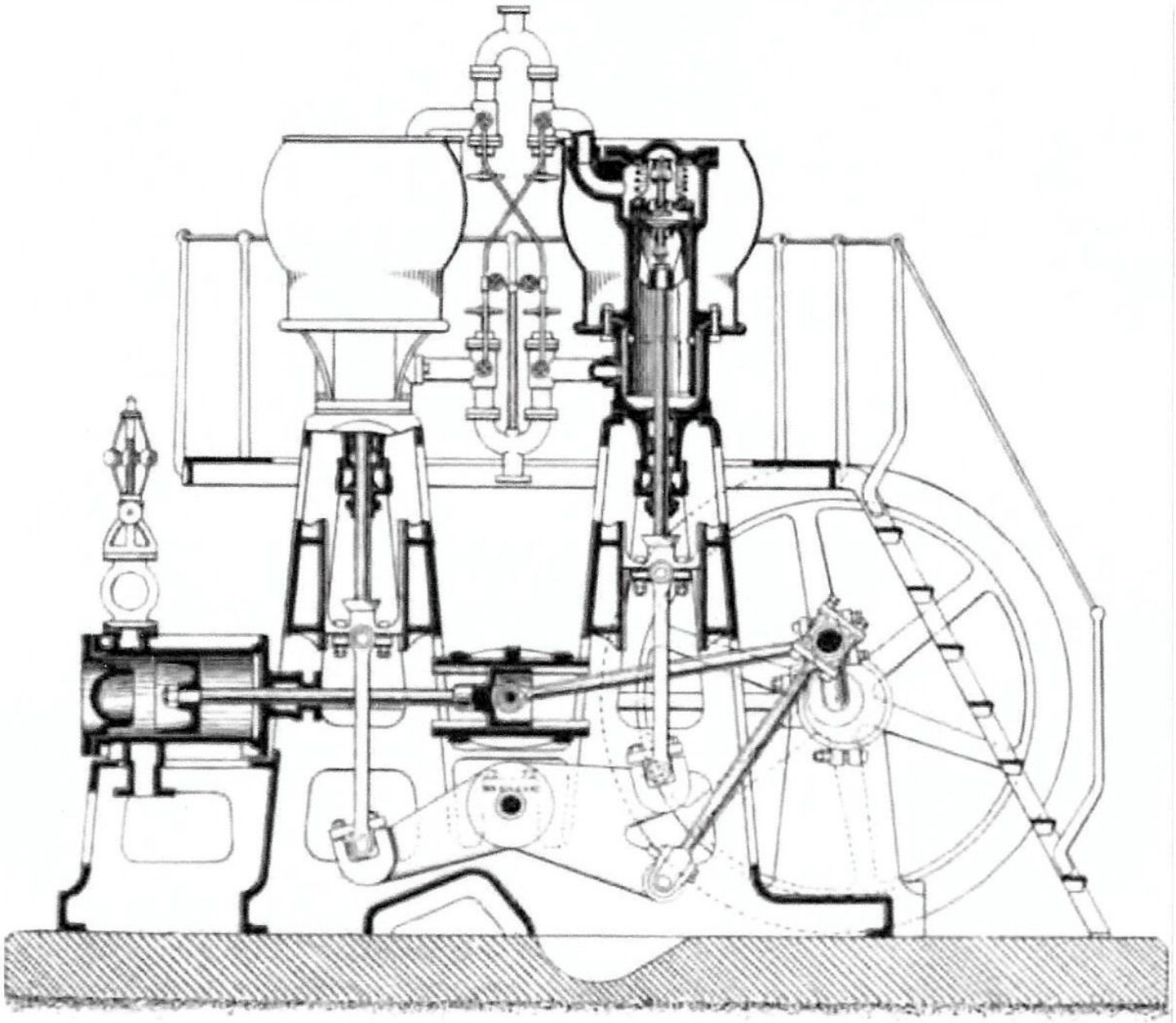


FIG. 95.—SECTION OF BEAM PATTERN ANTARCTIC COMPRESSOR.

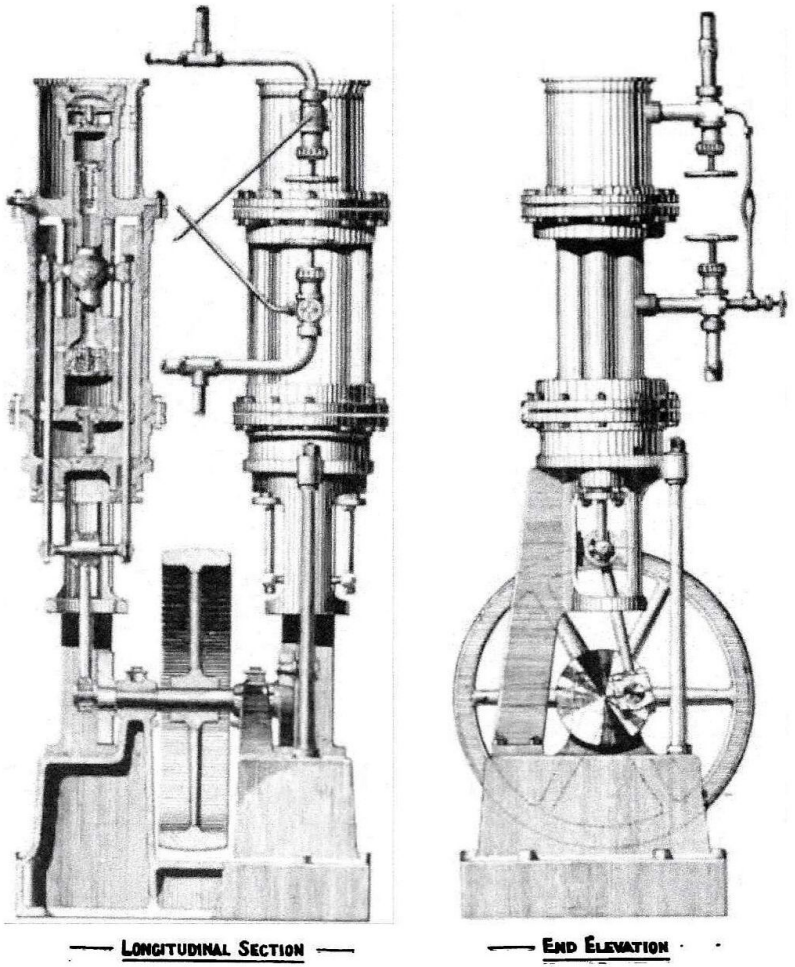
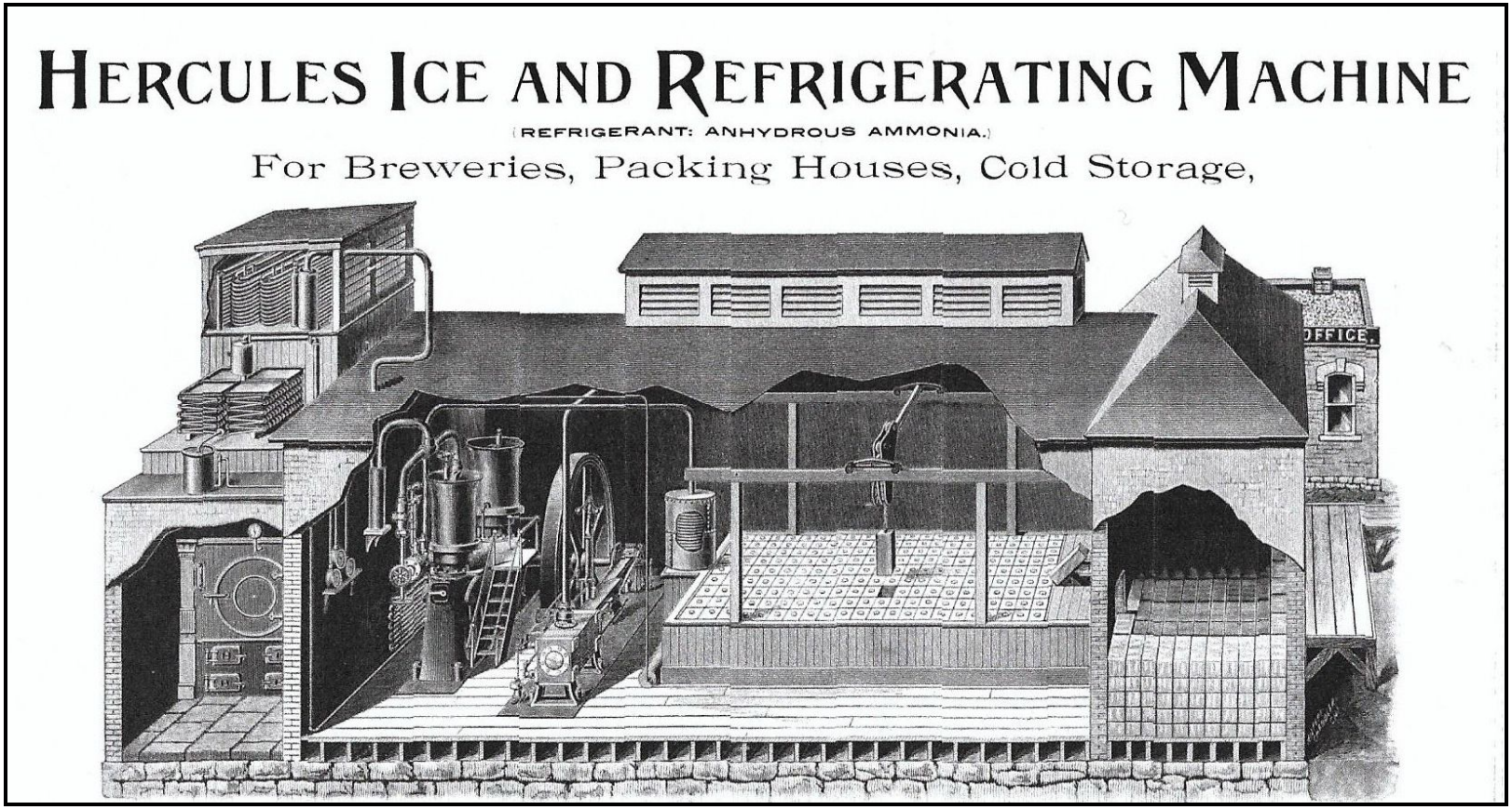


FIG. 101.- COMPOUND COMPRESSOR, TWO-TON ICE MAKING PLANT.

Refrigeration Cold Storage, etc



Pages from *REFRIGERATION COLD STORAGE & IE-MAKING* 1912

REFRIGERATION
COLD STORAGE AND
ICE-MAKING

A PRACTICAL TREATISE
ON THE ART AND SCIENCE OF REFRIGERATION

WITH WHICH IS INCORPORATED
"REFRIGERATING AND ICE-MAKING MACHINERY"
(THIRD EDITION)

BY

A. J. WALLIS-TAYLER, C.E.
ASSOC. M. INST. C.E.
AUTHOR OF "REFRIGERATING AND ICE-MAKING MACHINERY," "THE POCKET-BOOK OF REFRIGERATION AND ICE-MAKING," "SUGAR MACHINERY," "TEA MACHINERY," "BEARINGS AND LUBRICATION," "AERIAL OR WIRE ROPE TRAMWAYS," "MOTOR VEHICLES FOR BUSINESS PURPOSES," ETC., ETC.

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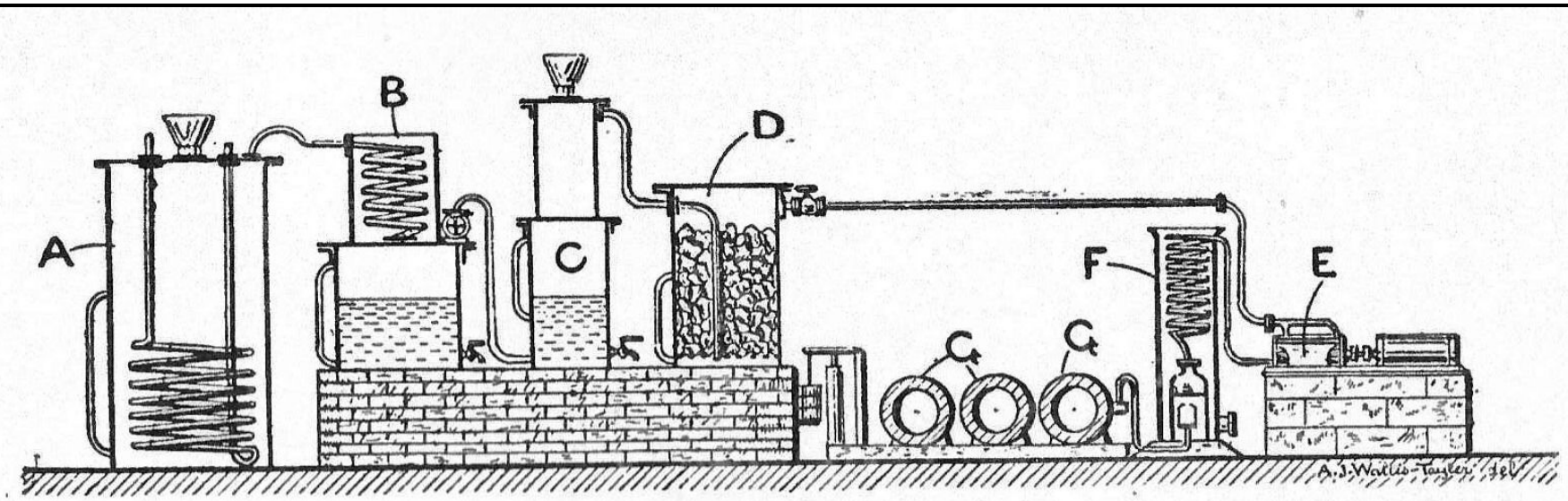

Fig. 10.—Tellier's Apparatus for the Distillation of Methylic Ether.

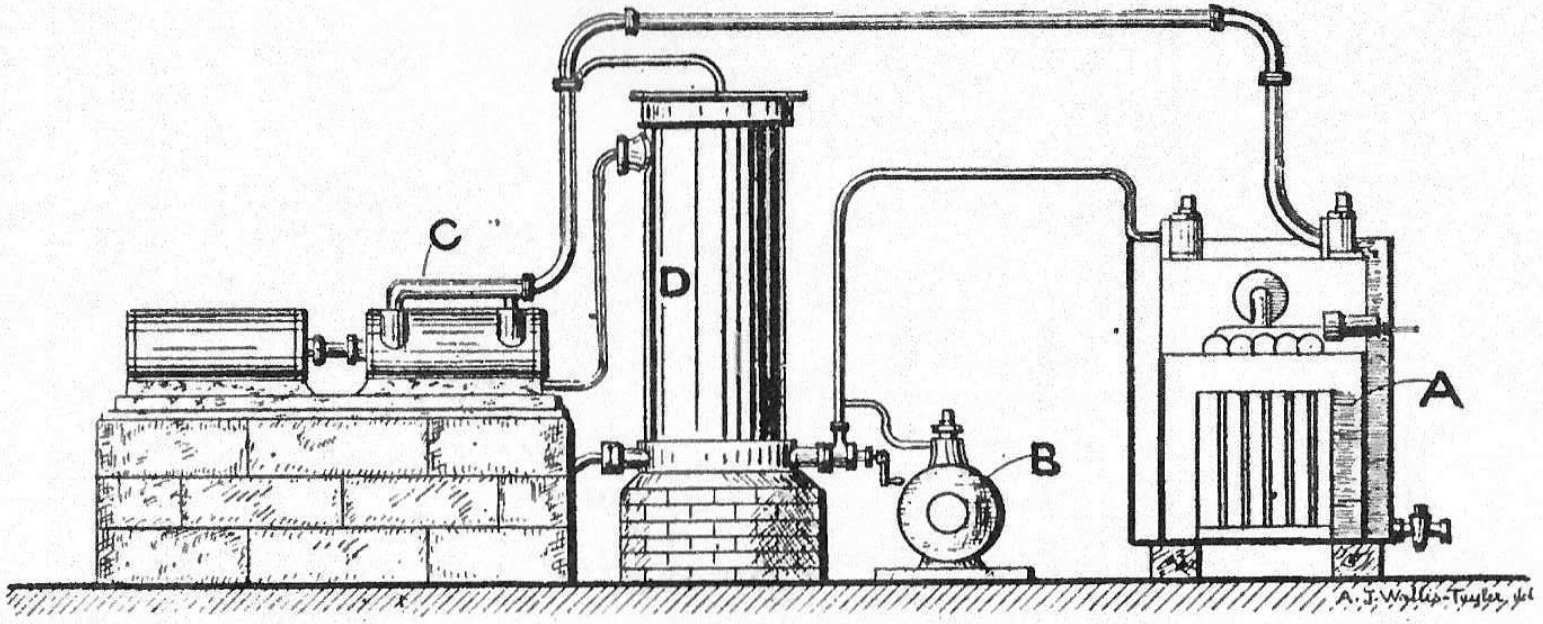

Fig. 11.—Tellier's Methylic Ether Compression Machine.

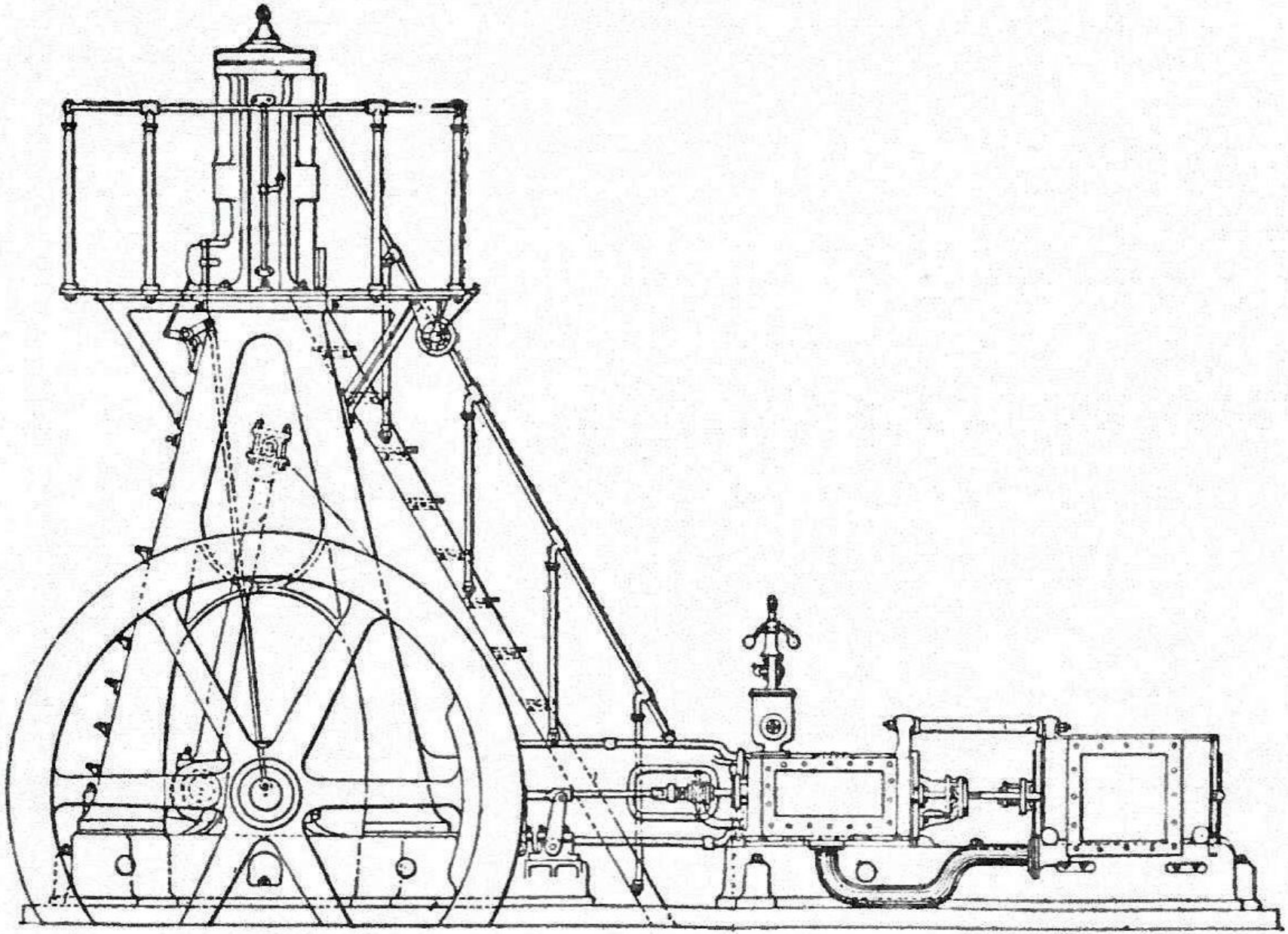

Fig. 18.—Double-Acting Vertical Type De La Vergne Ammonia Compressor and Horizontal Tandem Condensing Engine. Side Elevation of Complete Machine.

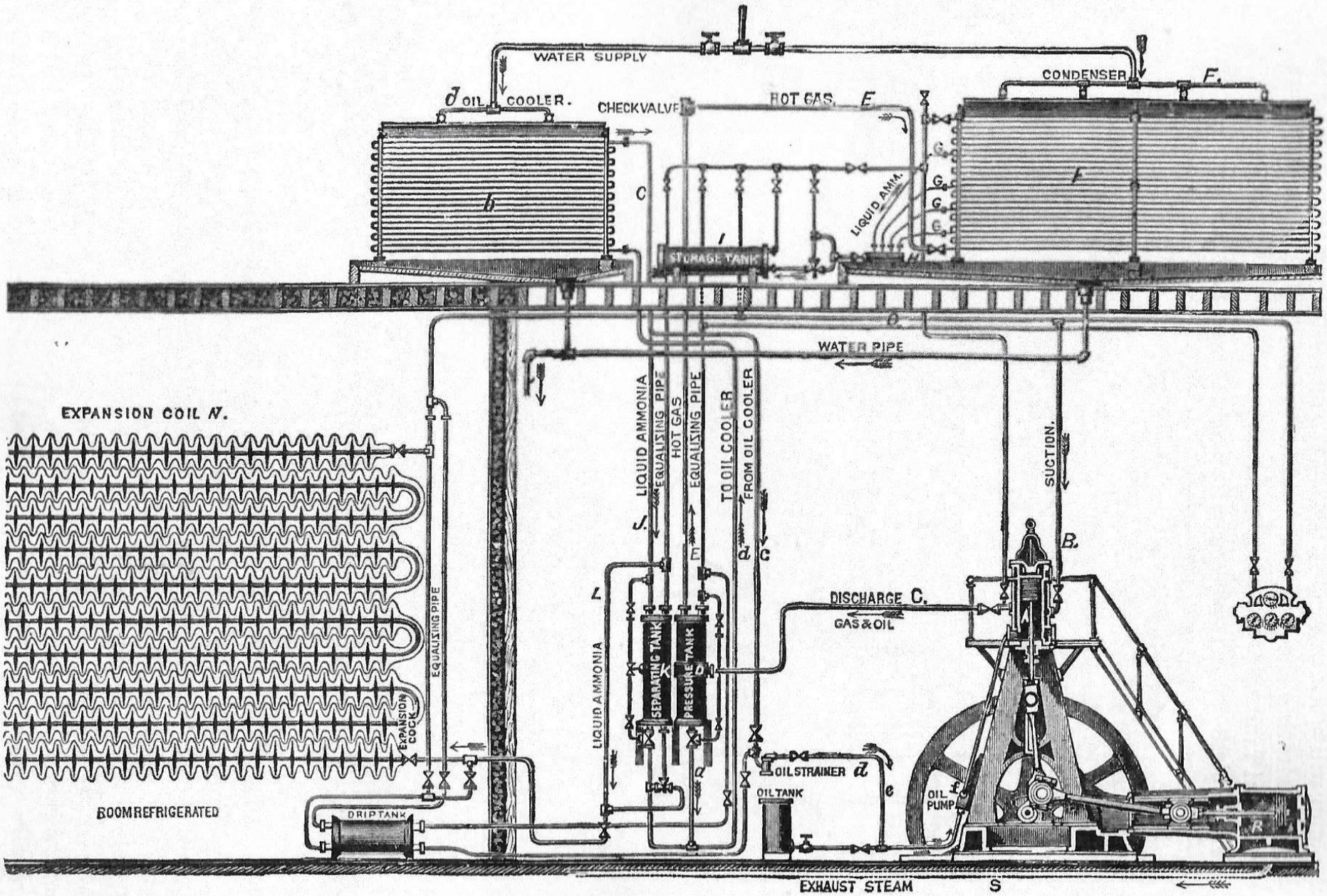

Fig. 19.—Diagrammatical View showing complete Installation of a Refrigerating Plant on the De La Vergne Ammonia Compression System.

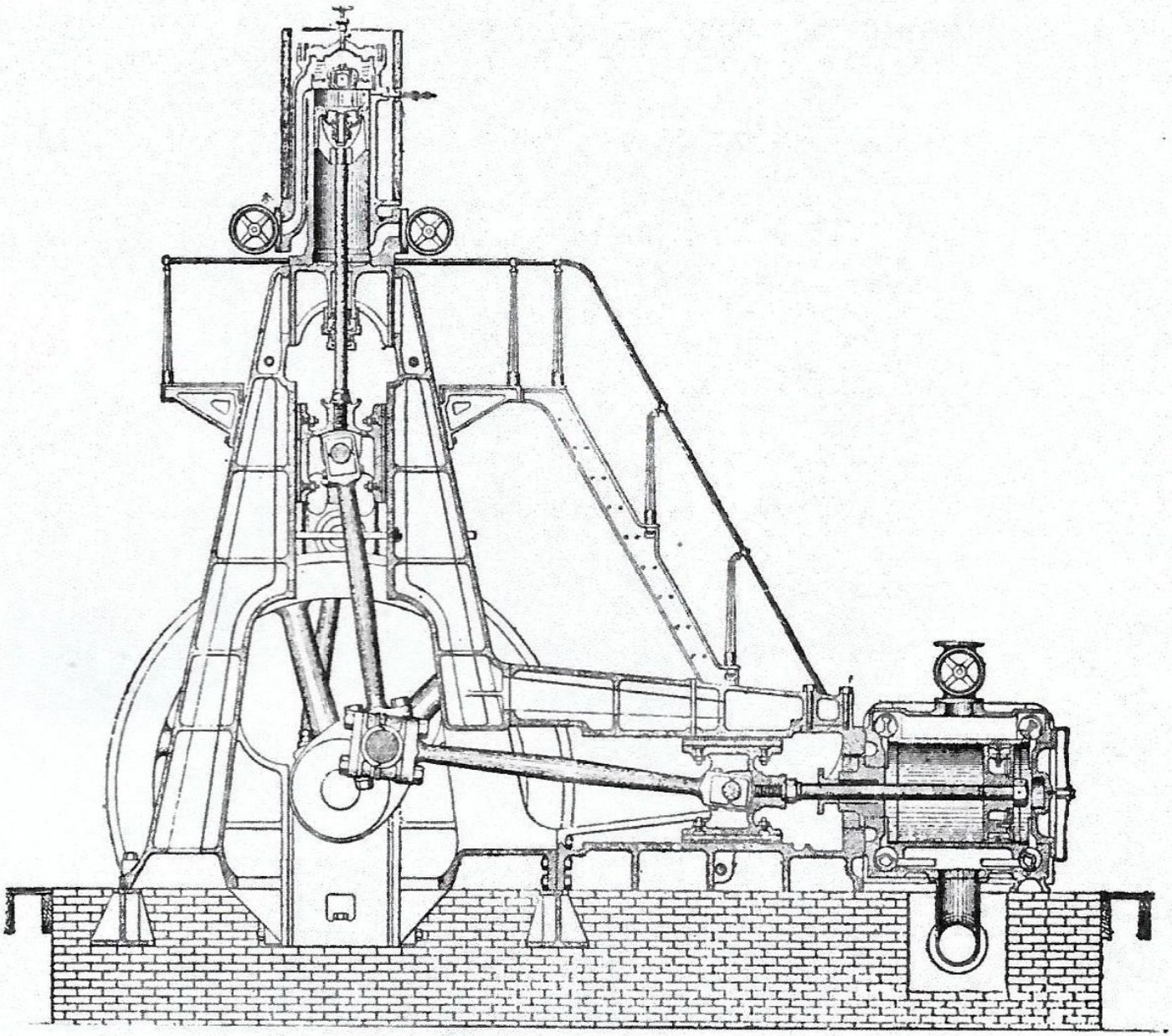

Fig. 26.—Large Single-Acting Vertical Type Frick Ammonia Compressor and Horizontal Steam Engine. Sectional Elevation of Complete Machine.

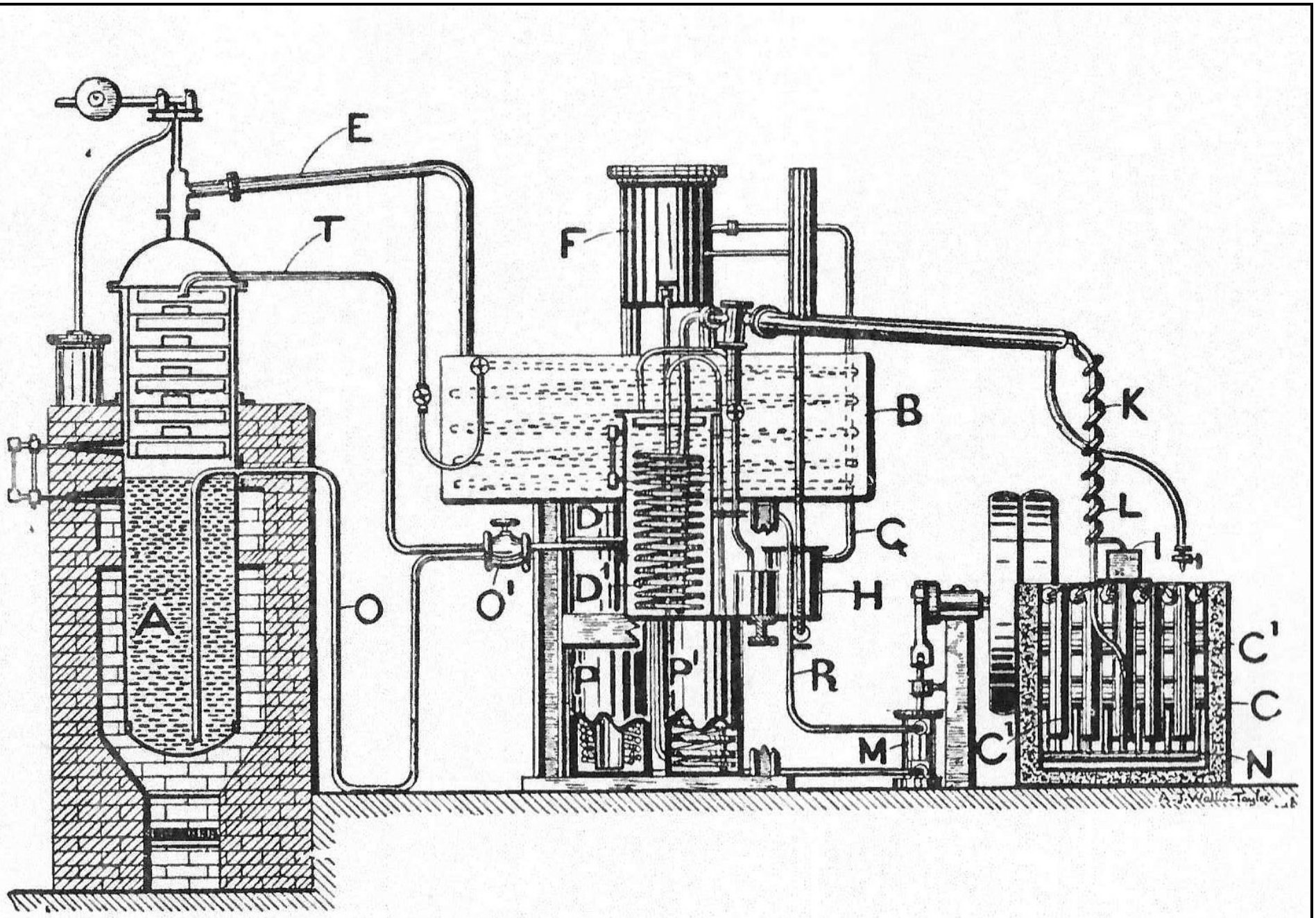

Fig. 106.—Carré's Continuous-Acting Ammonia Absorption Machine.