

(No Model.)

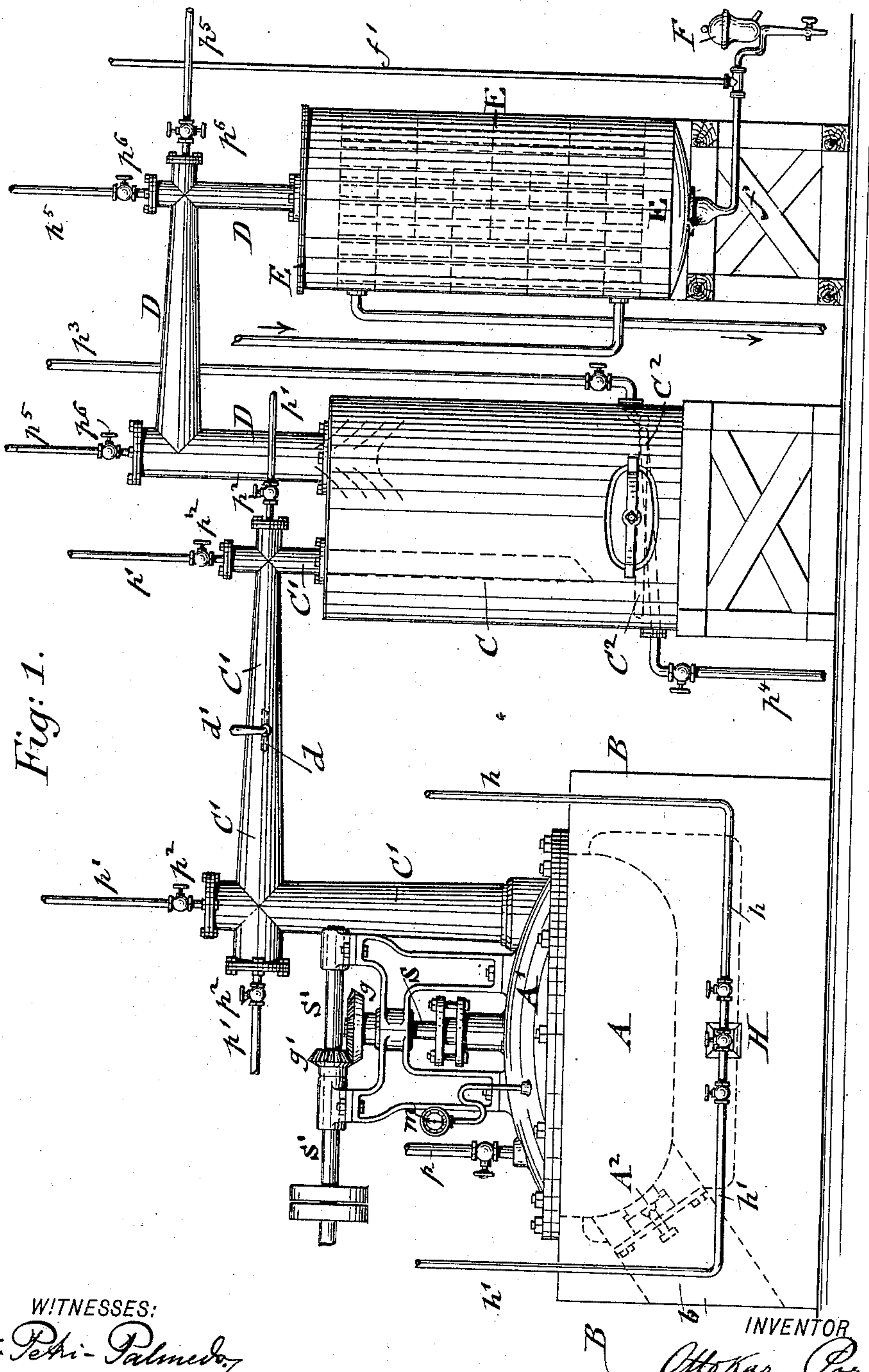
2 Sheets—Sheet 1.

O. PORSCH.

APPARATUS FOR MAKING ACETONE.

No. 535,553.

Patented Mar. 12, 1895.



WITNESSES:
D. Petri-Palmedo
Geo. S. Wheelock

INVENTOR
Otto Kar Porsch
BY
Joseph Paegemer
ATTORNEYS.

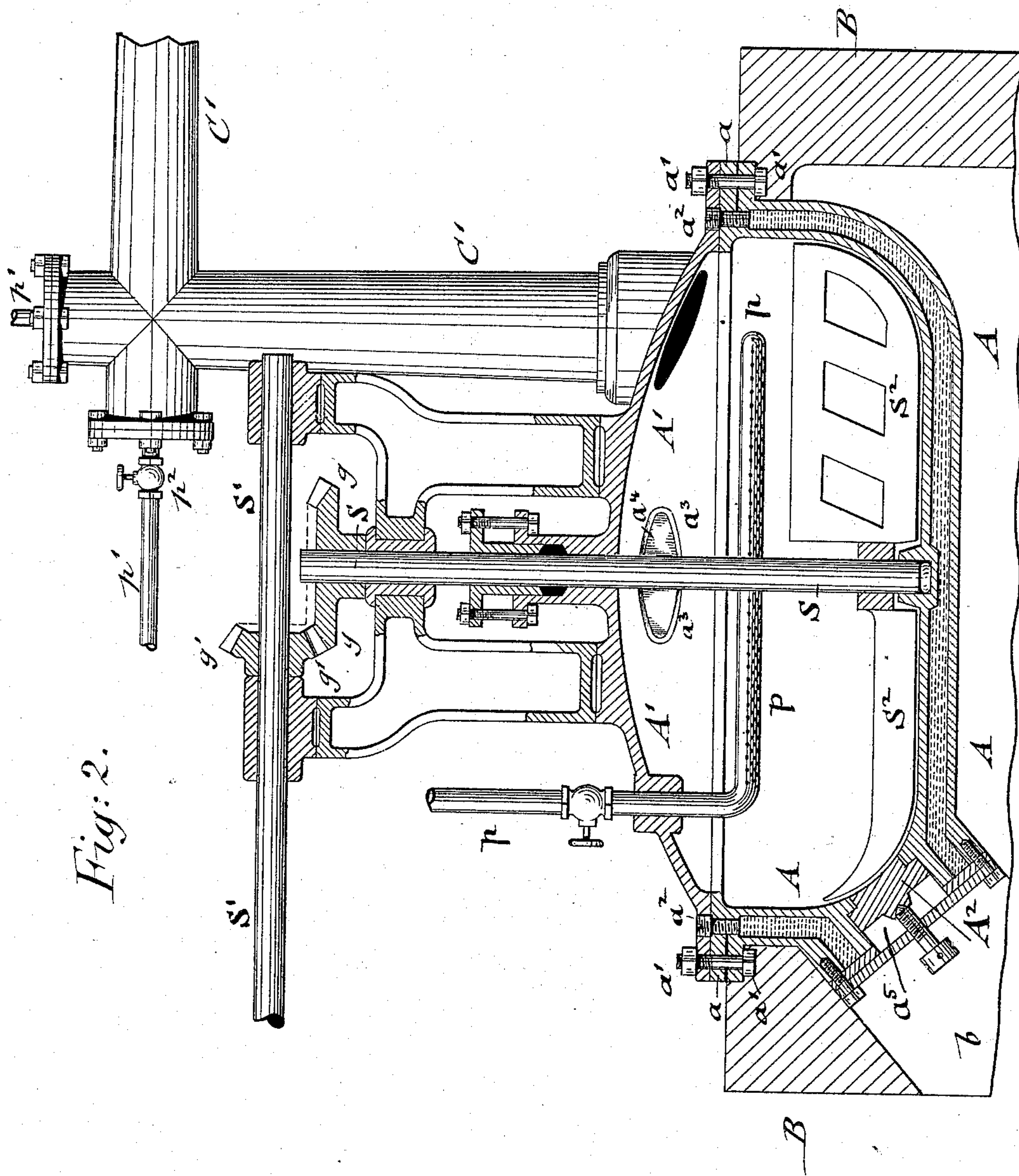
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BY *James Paeguer*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

OTTOKAR PORSCHE, OF ORANGEBURG, NEW YORK.

APPARATUS FOR MAKING ACETONE.

SPECIFICATION forming part of Letters Patent No. 535,553, dated March 12, 1895.

Application filed November 21, 1894. Serial No. 529,454. (No model.)

To all whom it may concern:

Be it known that I, OTTOKAR PORSCHE, a subject of the Emperor of Austria-Hungary, residing at Orangeburg, in the county of Rockland and State of New York, have invented certain new and useful Improvements in Apparatus for Making Acetone, of which the following is a specification.

This invention relates to an improved apparatus for making acetone, said apparatus being so constructed that the same can be quickly charged and discharged and cleaned in all its parts with great facility from the adhering dust, and by which a high yield of acetone, free from mechanical impurities, is obtained; and the invention consists of an apparatus for making acetone, which comprises a jacketed mixing-vessel or retort having closed supply and discharge-openings, rotary scrapers in said retort, a perforated steam supply-pipe, a collecting-vessel, provided with a heating-coil, a pipe connecting the mixing-vessel with the collecting-vessel, a condenser, a pipe connecting the collecting-vessel with the condenser, and steam-pipes arranged axially in line with the connecting-pipes so as to permit the quick removal of the dust settling in the same.

The invention consists further of certain details of construction which will be fully described and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a side-elevation of my improved apparatus for making acetone, and Fig. 2 is a vertical central section through the mixing-vessel or retort, drawn on a larger scale.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the closed mixing-vessel or retort; B, the furnace in which the same is set for being heated; C, the dust collecting-vessel, and E the condenser.

The mixing-vessel or retort A is connected with the collecting-vessel C by a pipe C', and the collecting-vessel with the condenser E by a pipe D. The bottom of the mixing-vessel A is formed of an interior and an exterior section, the space between which is entirely filled with molten lead. The circumferential flange of the top or cover A' and the circumferential flanges of the outer and inner sec-

tions of the mixing-vessel are firmly connected by screw-bolts a' . The lead is run in molten condition into the space formed by the double-walled body and is retained in molten condition in the same by the heat of a furnace B, which is built around the mixing-vessel A. Suitable openings are provided in the flange of the cover and intermediate ring a for supplying the lead, said openings being closed by means of plugs A^2 . The cover A' is provided at its center with a stuffing-box, which forms a bearing for a vertical shaft S, that extends in downward direction through the mixing-vessel, said shaft being supported at its lower end by an interior step-bearing b' at the bottom of the interior section of the mixing-vessel A and by an exterior neck-bearing.

A man-hole a^3 is arranged in the cover A' of the mixing-vessel and closed by a manhole cover a^4 in the usual manner, said man-hole being used for charging the mixing-vessel, while a discharge-opening a^5 is arranged in the lower part of the interior and exterior sections of the body, said discharge-opening being closed by a tightly-fitting cover A^2 . When the operation of distilling off the crude acetone from the charge is completed, the cover A^2 is removed so as to permit the ready discharge of the contents of the retort A. An inclined discharge-flue of the furnace B conveys the charge to the outside.

The lower end of the shaft S is provided near the bottom of the mixing-vessel A, with diametrical-inclined stirrer-arms or scrapers S^2 , which are arranged close to the bottom of the interior section and bent up at their ends, so as to exert a mixing and scraping action on the contents of the vessel and prevent them from settling on the bottom of the same. Rotary motion is imparted to the vertical shaft S by bevel-gears $g g'$, which receive their motion from a horizontal shaft S' which is supported in bearings supported on uprights on the cover of the mixing-vessel, the horizontal-shaft S' being provided with a fast and loose pulley in the usual manner. The scrapers S^2 are arranged at an angle of forty-five degrees to the bottom of the interior section and are rotated slowly so as to make about four rotations per minute.

A supply-pipe p for super-heated steam ex-

tends through the cover A' to the interior of the mixing-vessel, terminates at the interior of the same, and is provided with a number of perforations at its lower part through which the steam is discharged. A pressure-gage *m* is connected with an opening in the cover of the mixing-vessel for indicating the pressure in the same.

The connecting-pipe C' is composed of three sections that are arranged at right angles to each other, the sections diminishing gradually in diameter. The rectangular pipe-sections are extended beyond their intersections, and are closed at their ends with detachable covers, through which steam-pipes *p'*, provided with stop-cocks *p²* pass to the interior of the pipe-sections, said steam-pipes being in line with the axes of said pipes so as to permit the convenient cleaning of the sections of the connecting-pipe C' from the dust deposited in the same. In the horizontal section of the connecting-pipe C' is arranged a damper *d*, provided with a handle *d'*, so that the pipe C' can be closed for facilitating the cleaning of the sections at either side of the damper. The connecting-pipe C' extends downward into the dust collecting-vessel C, and is obliquely cut off at its lower end, so as to deliver the acetone-vapors into the collecting-vessel. The dust collecting-vessel C is provided at its lower part with a heating-coil C² to which steam is supplied, and which is provided with valved steam inlet and outlet-pipes *p³* *p⁴*. It is further provided with a man-hole and man-hole cover at its lower part for removing the accumulated dust and permitting the cleaning of the dust-collecting-vessel.

The pipe D by which the dust-collector C is connected with the condenser E is provided with a dust-catcher D' formed of inclined conical tubes and a closed bottom, said dust-catcher being arranged below the outlet-opening in the top of the collector, so as to retain the dust as much as possible in the collecting-vessel, and prevent its passage with the vapors to the condenser.

All the parts heretofore described, namely, the mixing-vessel A, the dust collecting-vessel C, and the connecting-pipe C', are made of cast-iron, while the condenser E and the connecting-pipe D between the collecting-vessel and the condenser are preferably made of copper.

The condenser E is constructed on the counter-current principle, cold water being supplied to the bottom of the same, while the warm water is discharged at the upper part of the same. A number of cooling-tubes are arranged in the condenser, through which the vapors are conducted, while the water passes over a number of horizontal trays that extend alternately from one side of the condenser toward the other side. The crude liquid acetone is discharged through a bottom-pipe *f* into a collecting-vessel F, while the carbonic acid is conducted off through a vertical pipe

f' that communicates from the pipe *f* into the atmosphere.

The connecting-pipe D is, like the connecting-pipe C', formed of sections that are arranged at right angles to each other, each section being extended beyond its intersection with its adjacent section, and provided with a detachable cover, through which extends a steam-pipe *p⁵*, provided with a stop-cock *p⁶*, said steam-pipe serving to admit steam to the interior of the pipe for removing the dust settled in the same, the dust in the sections of the connecting-pipe D being forced into the dust collecting-vessel and through its man-hole to the outside, while the dust in the sections of the connecting-pipe C' is forced into the mixing-vessel and through the discharge-opening of the same to the outside. By this arrangement, the entire apparatus can be cleaned of the dust settled in the connecting-pipes in a very short time, so that the time heretofore taken up for cleaning the different parts of acetone distilling apparatus is saved, and the annoyance caused thereby to the attendants dispensed with.

In producing the acetone, a suitable acetate, preferably the commercial acetate of lime, is mixed with calcium hydrate and charged into the mixing-vessel or retort A. Each charge consists of about six hundred pounds, from which the acetone is distilled off in about four hours, including the time required for charging and discharging the mixing-vessel. The charging of the apparatus is accomplished in about five minutes and the discharging takes up about the same time. The charge has to be subjected to uniform heat in the mixing-vessel, which is accomplished by means of the lead-bath, in which the lead is retained in liquid condition by the heat of the furnace B.

It is preferable to employ petroleum for heating the mixing-vessel, the heating-device being of any approved construction, preferably in the nature of a suitable hydro-carbon vaporizer H, to which the hydro-carbon is supplied by a pipe *h*, while air under pressure is conducted through a pipe *h'*, both pipes *h* *h'* being provided with suitable stop-cocks so as to produce the proper supply of oil and air respectively. By heating the apparatus with petroleum, a quicker heating up of the apparatus and a more uniform heating of the same can be obtained than with ordinary fuel. The lead-bath serves for the purpose of keeping the temperature of the mixing-vessel perfectly constant during the generation of the acetone vapors, so that any chance of decomposing the acetone is obviated.

Before introducing the molten lead in the space between the interior and exterior sections of the mixing-vessel, the exterior section is first heated to a light red heat, so that the lead remains in liquid condition and that the interior of the mixing-vessel assumes a temperature equal to the melting point of the

lead, and is thereby ready for the introduction of the acetate. The heated charge of acetate of lime and calcium hydrate is introduced through the man-hole in the cover, which
 5 is then closed quickly, as the generation of acetone commences instantly upon the charging of the mixing-vessel. The scrapers are then set in motion, so that the acetate of lime is subjected under continuous stirring to heat
 10 in the mixing-vessel. The acetone vapors pass through the connecting-tube C' into the collecting-vessel C and thence to the condenser E. When about twelve to fifteen per cent. of the acetone contained in the charge
 15 has passed over, the charge becomes perfectly dry and assumes a dust-like shape, so that it is necessary to supply super-heated steam into the mixing-vessel A. The supply of steam is kept up until the end of the operation. The
 20 acetone vapors are condensed in the condenser, the crude liquid acetone being conducted to a suitable receiver. As soon as water commences to be discharged through the discharge-pipe, the operation is completed and
 25 the contents of the mixing-vessel can be discharged, which is accomplished by opening the cover A² of the discharge-opening a⁵. The scrapers then move gradually the entire body of carbonate of lime toward the discharge-
 30 opening and through the same to the outside, so that the mixing-vessel is in condition to be immediately charged again with a dry mixture of acetate of lime and calcium-hydrate.

My improved apparatus has the advantages
 35 that it can be quickly charged and discharged; that by the arrangement of the steam-pipes in the connecting-pipes between the mixing-vessel and the dust collector, and between the latter and the condenser, the dust can be
 40 quickly removed from said pipes; that by the use of the lead-bath around the mixing-vessel a constant temperature is retained in the mixing-vessel and the walls of the same protected against destruction by burning.

45 When the heating of the furnace is accomplished with hydro-carbon, oil-residues and tars can be burned with great advantage at a considerable saving of fuel and with greater cleanliness than when the furnace is heated
 50 with solid fuel.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. An apparatus for making acetone, consisting of a mixing-vessel or retort provided
 55 with interior rotary scrapers, a furnace for heating said mixing-vessel, a dust collecting-vessel provided with a heating-coil, a connecting pipe between the mixing-vessel and the dust-collector, a condenser, a connecting-pipe
 60 between the dust-collector and condenser, and a discharge-pipe and receiver for the crude acetone below the condenser, substantially as set forth.

2. In an apparatus for making acetone, a
 65 mixing-vessel or retort, composed of a double-walled body filled with molten-lead, a cover attached hermetically to the double-walled body and provided with a charging man-hole, a discharge-opening at the bottom of the body, ro-
 70 tary scrapers at the interior of the vessel, and a steam supply-pipe provided with openings at the inside of the mixing-vessel, substantially as set forth.

3. In an apparatus for making acetone, the
 75 combination of a mixing-vessel, a dust collecting vessel and a condenser, with connecting-pipes between said vessels, said pipes being made of sections arranged at right angles to
 80 each other and extended beyond their points of intersection and closed by detachable covers, and valved steam-pipes entering through said covers in line with the axis of the sections, so as to permit the convenient cleaning
 85 of all of the sections of the connecting pipes from the dust collected in the same, substantially as set forth.

4. In an apparatus for making acetone, a dust collecting-vessel, provided with a heating-coil at its lower part, a vapor supply-pipe,
 90 and a discharge-pipe having a dust-catcher below the outgoing end of the discharge-pipe, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

OTTO KAR PORSCH.

Witnesses:

PAUL GOEPEL,
 GEORGE W. JAEKEL.