

(No Model.)

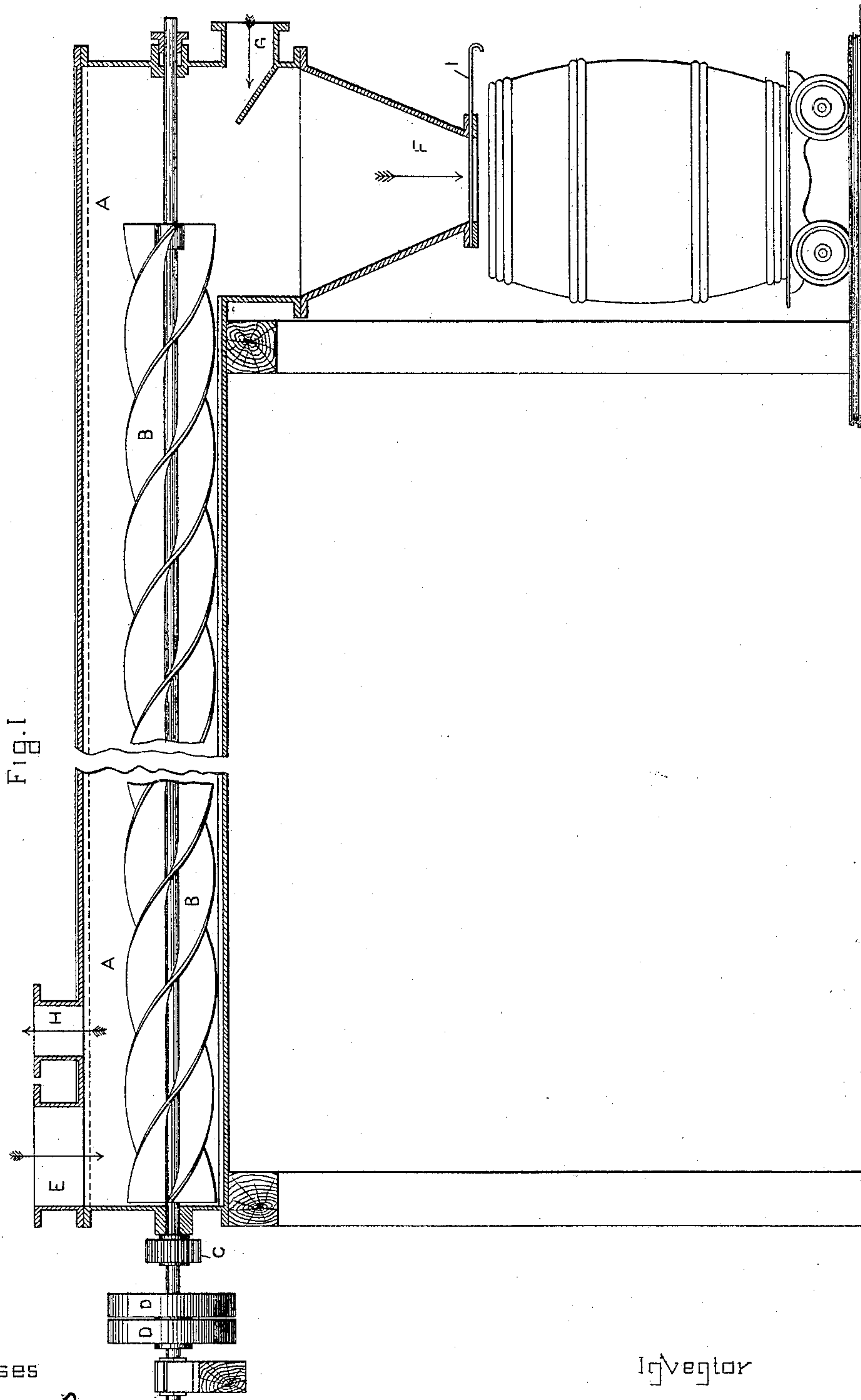
2 Sheets—Sheet 1.

C. LANGER.

APPARATUS FOR TREATING SOLIDS WITH GASES.

No. 409,409.

Patented Aug. 20, 1889.



Witnesses

H. H. Lamb.
Stephen Janner

Inventor

Carl Langer

By his Attorney

Frankland Janner

(No Model.)

2 Sheets—Sheet 2.

C. LANGER.

APPARATUS FOR TREATING SOLIDS WITH GASES.

No. 409,409.

Patented Aug. 20, 1889.

Fig. 3.

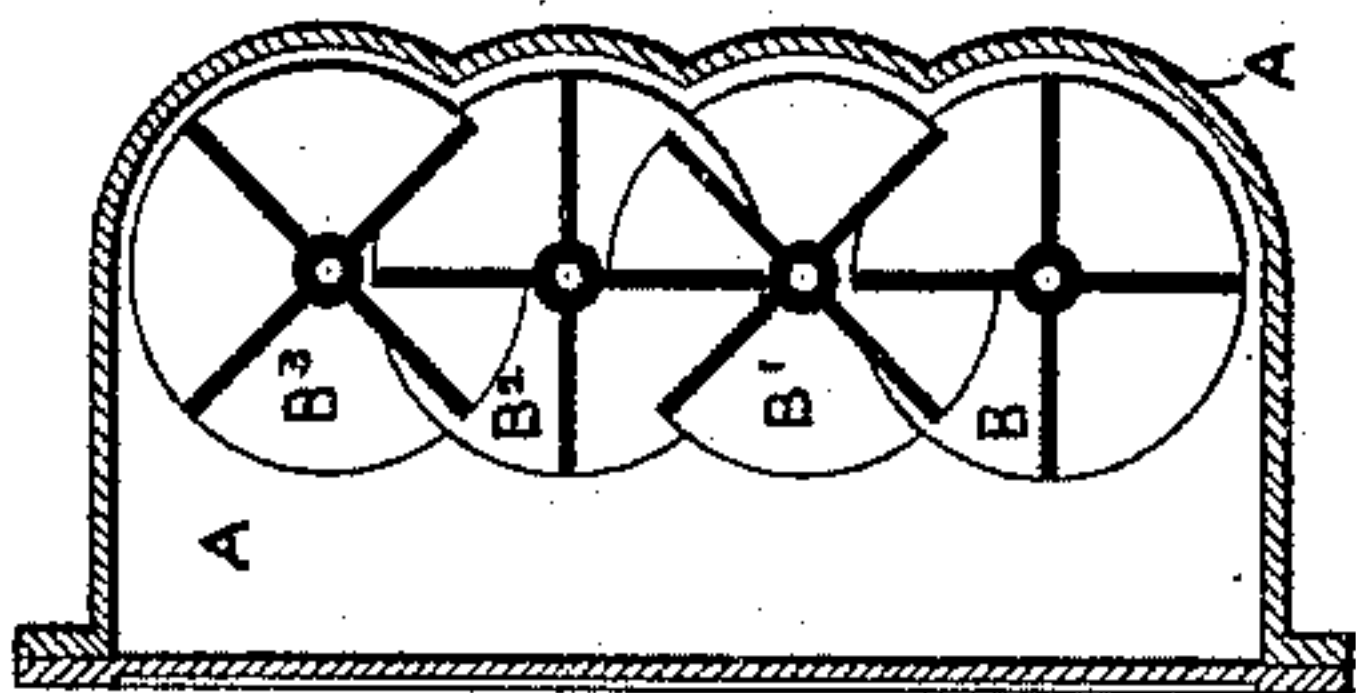
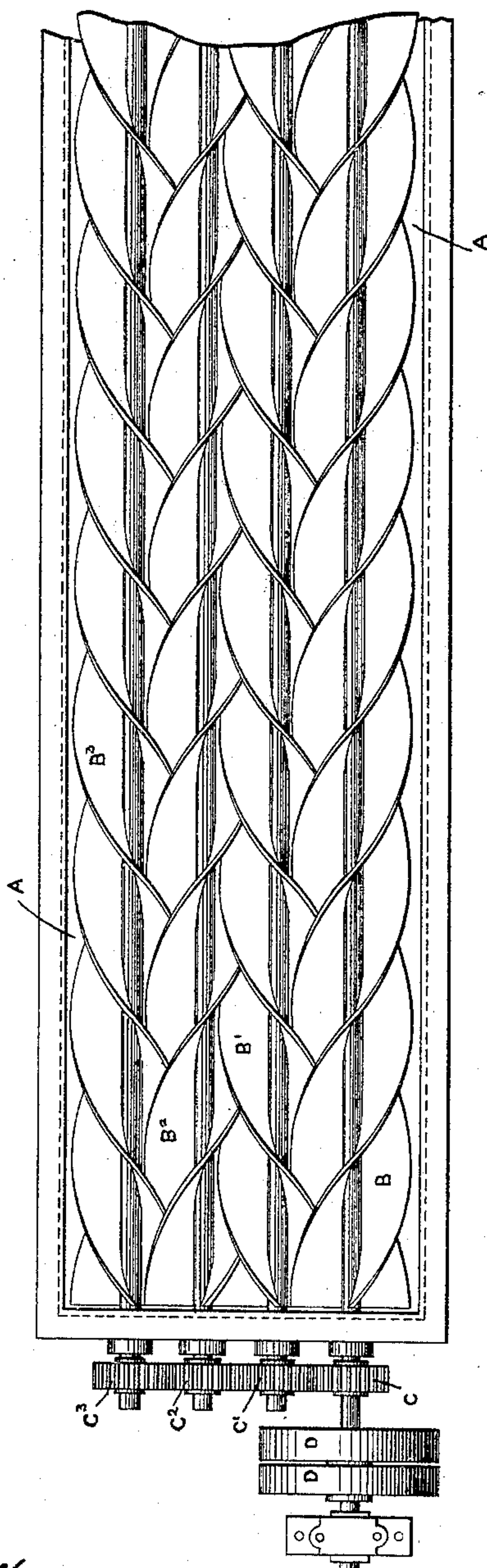


Fig. 2.



Witnesses

H. A. Lauer

Stephen Janner

Inventor

Carl Langer

By his Attorney

Frankland Janner

UNITED STATES PATENT OFFICE.

CARL LANGER, OF LONDON, ENGLAND.

APPARATUS FOR TREATING SOLIDS WITH GASES.

SPECIFICATION forming part of Letters Patent No. 409,409, dated August 20, 1889.

Application filed June 20, 1887. Serial No. 241,924. (No model.) Patented in England June 21, 1886, No. 8,201; in Germany July 31, 1886, No. 39,661; in France December 7, 1886, No. 167,701; in Belgium December 30, 1886, No. 56,081, and in Austria-Hungary December 2, 1887, No. 26,840 and No. 49,234.

To all whom it may concern:

Be it known that I, CARL LANGER, Ph. D., subject of the Emperor of Austria-Hungary, residing at London, in the Kingdom of England, have invented certain new and useful Improvements in Processes and Apparatus for Conveying, Mixing, and Treating Substances with Gases, (for which I have received Letters Patent in England, dated June 21, 1886, No. 8,201; in France, dated December 27, 1886, No. 167,701; in Belgium, dated December 30, 1886, No. 56,081; in Germany, dated July 31, 1886, No. 39,661, and in Austria-Hungary, dated December 2, 1887, Nos. 26,840 and 49,234,) of which the following is a specification.

This invention relates to improved apparatus for mixing solid or pasty substances, or for turning over, stirring, and at the same time removing or conveying the same, and also for exposing these substances to the action of gases and vapors while they are being so stirred, turned over, and removed for the purpose of drying the substances or of producing chemical change in them.

The invention is best described by aid of the accompanying drawings, in which—

Figure 1 shows a vertical section of apparatus; Fig. 2, a plan of conveyer, and Fig. 3 a transverse section of same.

In the drawings, A is a trough, which may be open or covered, as the circumstances of the case require. In this trough are placed two or more Archimedean screws B B' B² B³, one right-hand screw alternating with a left-hand screw, and so on. These screws are set side by side in such a way that the winding of each stands at an angle of ninety degrees to the winding of the next one, so that the blades of one screw run as near as possible in the grooves of the other and keep it clean. In the drawings the worms are shown with four complete threads each. Instead of complete threads, however, they can, if desirable, be broken threads, a series of vanes or paddles taking the place of the complete threads, so that in the case of plastic materials liable to form lumps or "ropes" a cutting action can take place. As a rule, however, the complete worms are to be preferred. Each screw

is moved in an opposite direction to the adjoining one (in the apparatus shown by pinions C C' C² C³, and driving fast and loose pulleys D). The bottom of the trough A, in which they run, is shaped to fit the screws, as shown, so that the latter keep the trough clear. When the substances to be treated in this apparatus are to be subjected to the action of gases other than cold air, the trough is covered in, so as to provide a channel for the gases to pass over the substances in the trough, and is provided with inlets E and outlets F for the material to be passed through, and with inlets G and outlets H for the gas to be brought in contact with the material. Both inlet and outlet can be regulated by hopper and feed-rolls or other feeding mechanism, so that only a given amount of material shall enter or be discharged in a given time.

In the drawings the feed mechanism is not shown, but the exit of the materials is controlled by slide I, so that it can be drawn off or stopped, as required, into barrels or other receptacles, as required, the discharge being temporarily stopped while a full receptacle is being changed for an empty one. The trough and the screws can be made of any suitable material, according to the purposes for which the apparatus is to be employed. When it is desired to expose solid substances to corrosive gases—as, for instance, in the manufacture of bleaching-powder—the whole apparatus can be made of lead, or of iron covered with lead; or the trough may be lined with fire-brick blocks of convenient shape, or with asphalt, and the screws may be made of hard wood or of ebonite or other material not acted on by the substances which have to pass through the apparatus. In making the screws of ebonite it will be advisable to make them in several pieces fixed upon an iron shaft.

Among the various purposes for which this apparatus will be found useful I will mention the mixing of dry or pasty substances which it is desired to have of great uniformity—such as colors and dyes and similar materials; the drying of substances, generally, more particularly those that have to be dried at low temperatures in a current of warm air—

such as bicarbonate of soda, starch, and innumerable similar substances; for all purposes where it is desired to bring a solid or pasty substance into intimate contact with
5 a gas or vapor, notably the manufacture of bleaching-powder, burning of dust, pyrites, and the like. One great advantage of this apparatus is that it produces very little dust when treating very light substances. Where
10 great heat is required, external heat can be applied to the underneath surface of the trough; but I prefer, as a rule, to supply any heat required by means of the air or gases passed through.

15 I claim as my invention—

1. The combination of two or more approximately-parallel Archimedean screws having intersecting circles of rotation, and geared so as to rotate synchronously, and a trough A,
20 substantially as and for the purposes described.

2. The combination of the trough A, having inlet E for materials to be mixed, and outlet F for the mixed materials, with two or
25 more rotating conveying and mixing Archimedean screws B B' B², having intersecting circles of rotation and geared to rotate synchronously, substantially as described.

3. In apparatus for chemically treating
30 solid materials with gases, the combination of a long closed chamber A, containing the gases and the materials to be treated therewith, with two or more parallel series of Archimedean screws having intersecting arcs
35 of rotation, whereby the material is stirred

up and acted upon by the gases contained in or passing through the upper part of the chamber.

4. In an apparatus for exposing materials to the action of fluids, the combination of two
40 or more lines of mixing, stirring, and conveying screws rotating synchronously among the material to be exposed to the fluid and having intersecting circles of rotation, a closed chamber having its bottom formed to closely
45 follow and contain the cylinders of rotation of the revolving series of screws and contain the gases to which the material stirred is to be subjected, whereby so long as the stirrers in their revolution appear above the material
50 every part of the material must be violently stirred and thrown up into the gases.

5. An apparatus for treating materials with gases, comprising a closed chamber or trough, a plurality of intersecting spirals or Archi-
55 medean screws arranged in parallel positions within said chamber and having intersecting circles of rotation, the edges of the blades of one spiral extending into close proximity to the sides of the blades of the other, prevent-
60 ing adherence thereto of material being treated, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CARL LANGER.

Witnesses:

WM. P. THOMPSON,
GEO. C. DYMOND.