M. Nolden. Sheet 1, 2 Sheets.

Liquid Cooler.

No. 107,621. Patented, Sept. 20, 1870.

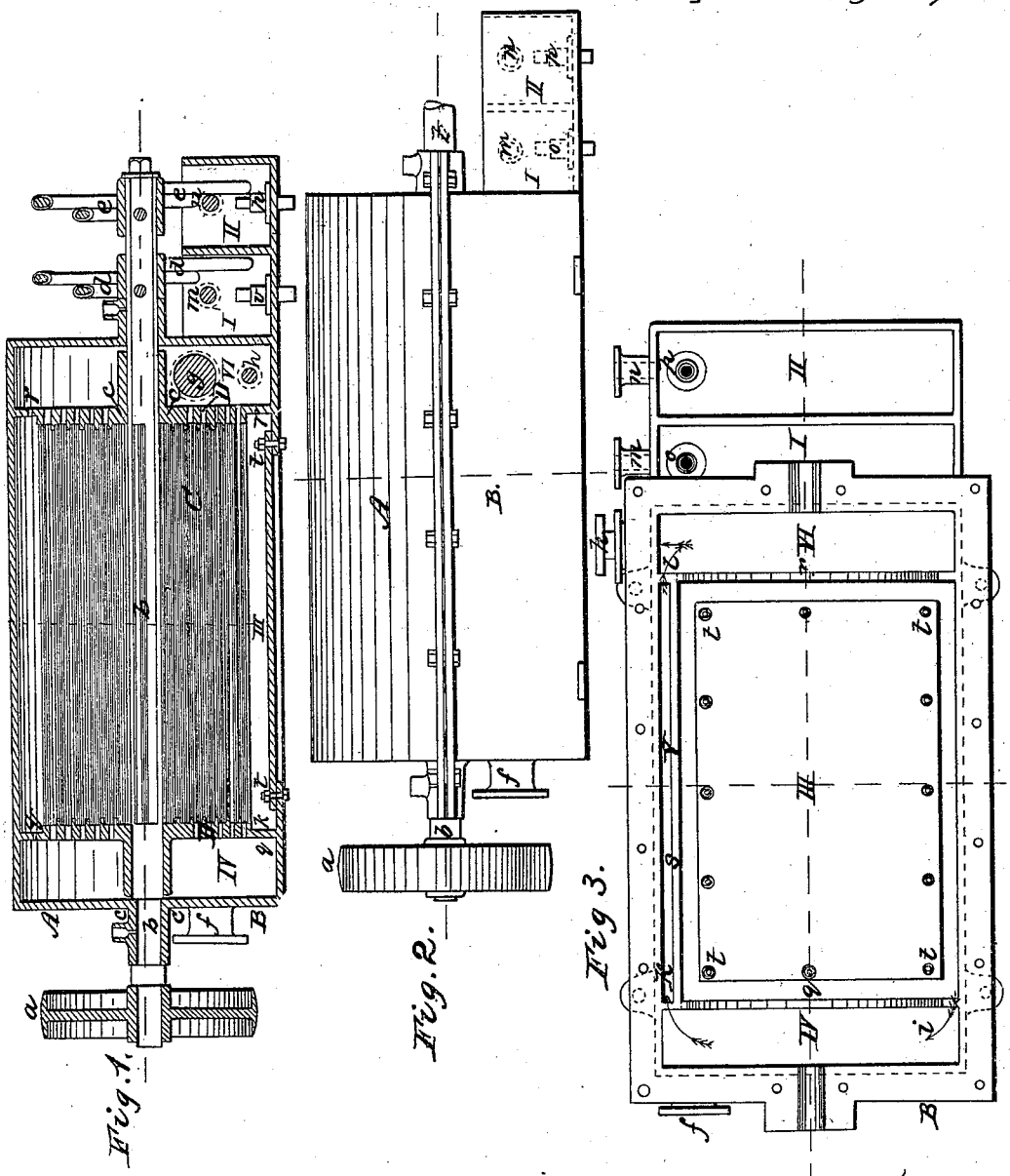

Fig. 1.

Fig. 2.

Fig. 3.

Witnesses.

John C. Parrot

Ulysses H. Ramsey

Inventor.

Melchior Nolden

M. Nolden. Sheet 2, 2 Sheets.

Liquid Cooler

No. 107,621. Patented Sept. 20, 1870.

Fig. 5.

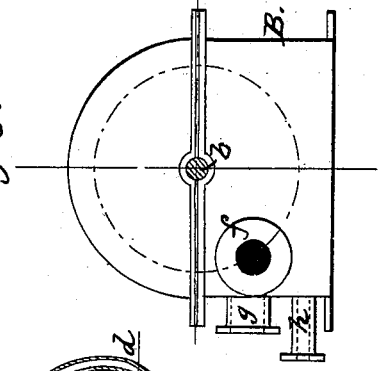

Fig. 6.

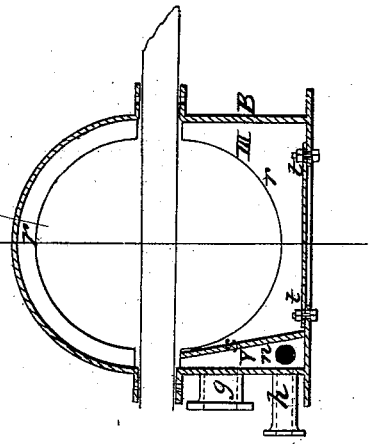

Fig. 7.

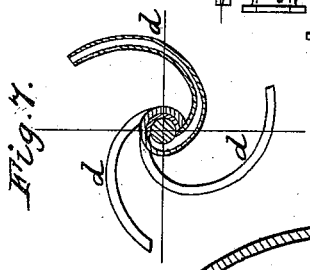

Fig. 4.

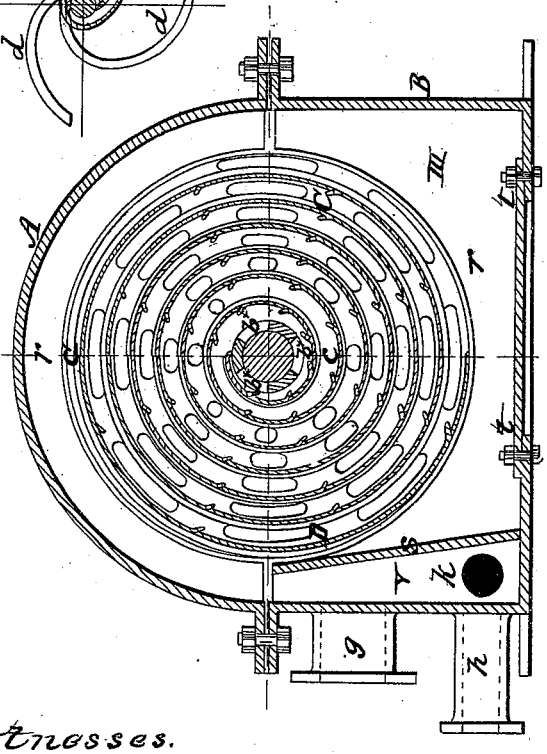

Fig. 8.

Witnesses.

John C. Parrott

Hirsch H. Straus

Inventor.

Melchior Nolden.

United States Patent Office.

MELCHIOR NOLDEN, OF FRANKFORT-ON-THE-MAIN, PRUSSIA.

Letters Patent No. 107,621, *dated September* 20, 1870.

IMPROVEMENT IN APPARATUS FOR MIXING, HEATING, AND COOLING SUBSTANCES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, MELCHIOR NOLDEN, of Frankfort-on-the-Main, in the Kingdom of Prussia, have invented a new and improved Apparatus for Heating, Cooling, and Mixing Solid or Liquid Materials; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification, in which drawing—

Figure 1 represents a longitudinal vertical section of this invention.

Figure 2 is a side view of the same.

Figure 3 is a plan or top view of the trough, which forms the bearings of the working parts of my apparatus.

Figure 4 is a transverse vertical section of the apparatus, in a larger scale than the previous figures.

Figure 5 is an end view of the same in a smaller scale than the previous figures.

Figure 6 is a transverse section of the trough and cover.

Figure 7 is a detached section of the tubular scoops.

Figure 8 is a detached section of the hollow shaft, as used for treating solid materials.

Similar letters indicate corresponding parts.

This invention relates to an apparatus, which consists of tubular scoops, capable of taking up the materials to be treated, and of transmitting the same into a hollow shaft, from which they escape into a flat spiral, mounted on said shaft, and revolving with the same, and provided with perforated heads, in such a manner that the material, while passing through the spiral, can be exposed to a current of cold or hot air, or steam, and it can thus be rapidly cooled, heated, or dried.

By arranging two or more sets of tubular scoops on the hollow shaft, the apparatus can be used for mixing two or more powdered or granulated substances, or two or more liquids or gases.

In the drawing—

The letter B designates a trough, which is provided with a semi-cylindrical cover, A, and which is divided by transverse partitions *q r*, and a longitudinal partitition, *s*, (see fig. 3,) in four compartments, III, IV, V, and VI.

The ends of the trough B form the bearings for a hollow shaft, *b*, on which is mounted a flat spiral, C, the heads D of which are perforated and provided with spiral ribs on their inner surfaces, which form the supports for the flat spiral C. In practice, the flat spiral C is produced of a series of sheet-metal plates secured to the spiral ribs.

The transverse partitions *q* and *r* are cut out to receive the heads.

To one end of the trough B is attached a reservoir, which may be divided by one or more vertical partitions, in two (or more) compartments, I II, which are intended to receive the materials to be treated.

These compartments are situated under the end of the shaft *b*, on which are mounted the tubular scoops *d e*, one set for each compartment.

These scoops communicate with the interior of the shaft *b*, and as this shaft revolves, the material or materials contained in the compartments I II are taken up and transmitted into the hollow shaft *b*, which communicates, through one or more long narrow apertures, *b**, with the inner end of the flat spiral C.

As this spiral revolves with the shaft *b*, the material or materials transmitted to it pass gradually out through said spiral, and are deposited in the compartment III of the trough B.

The bottom of this compartment is provided with an aperture, which can be opened or closed by means of a plate, *t*.

The compartment III communicates, through an opening, *i*, (see fig. 3,) with the compartment IV, and an opening, *k*, leads from this latter compartment into the compartment V, which communicates, through an opening, *l*, with the compartment VI.

The compartments IV and VI are furnished with nipples *f* and *g*, the nipple *f* to communicate with an air-forcing apparatus, and the nipple *g* to communicate with a discharge-pipe.

The compartments I and II are provided with supply-openings *m* and *n*, and with adjustable overflow-pipes *o* and *p*, which serve to keep a uniform supply of liquids in said compartments, if the apparatus is to be used for mixing liquids.

When the apparatus is to be used for curing or drying powdered or granulated materials, said materials are let into the compartments I, whence they are transferred by the scoops *d* into the hollow shaft *b*, and through it to the flat spiral C. While passing through the spiral, the materials are exposed to a current of superheated steam or hot air, admitted through the pipe *f*, and passing from this pipe through the perforated heads, and through the spiral C, and then out through the pipe *g*. In this case the bottom plate *t* is removed, to allow the cured or dried materials to discharge.

For the purpose of heating or cooling liquids, the liquids are made to pass through the spiral C, as above, while hot or cold air is circulated through the trough B. The bottom plate *t* is fastened down, and the liquid discharging from the spiral passes through the trough B, as indicated by the arrows in fig. 3, and discharges through a pipe, *h*.

For the purpose of mixing fluid or solid materials, the materials to be mixed are introduced into the compartments I II, and thence made to pass through the apparatus, as above stated.

In condensing gaseous substances these substances are passed into the apparatus through the pipe *f*, while the water required to absorb them is passed through the spiral C.

To prevent powdered or granulated materials passing through the apparatus from clogging in the interior of the shaft *b*, the passage in said shaft may be made tapering, as shown in fig. 8.

What I claim as new, and desire to secure by Letters Patent, is—

1. The tubular scoops *d*, in combination with the hollow shaft *b* and drum C, substantially as described.

2. The spiral C, with perforated heads D, in combination with the hollow shaft *b* and trough B, substantially as set forth.

3. The compartments III, IV, V, VI, in the trough B, in combination with the spiral C, hollow shaft *b*, and scoop *d*, substantially as described.

4. The combination of two or more sets of tubular scoops, *d e*, with the hollow shaft *b* and spiral C, substantially as set forth.

MELCHIOR NOLDEN.

Witnesses:

JOHN CHRISTOPHER PARROT,

HIRSCH H. THAULS.