A. J. KUHN.

Drying Apparatus.

No. 227,020. Patented April 27, 1880.

Fig: 1.

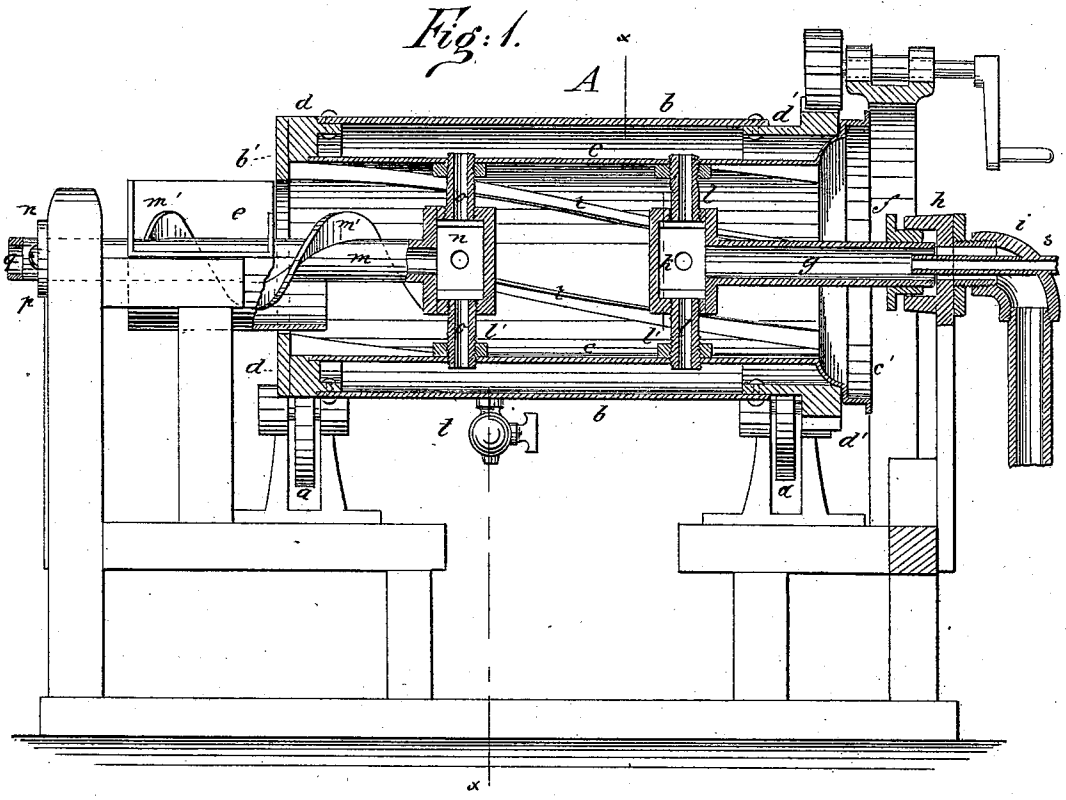
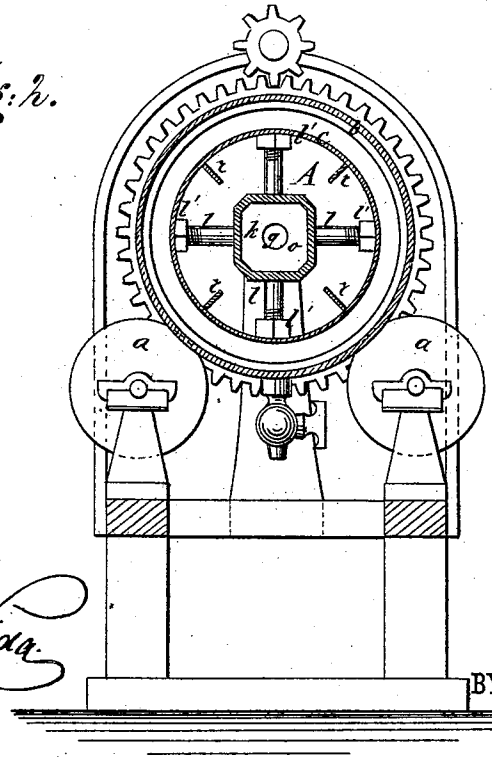


Fig: 2.



WITNESSES:

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AUGUSTUS J. KUHN, OF LEWISTOWN, PENNSYLVANIA.

DRYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 227,020, dated April 27, 1880.

Application filed January 20, 1880.

To all whom it may concern:

Be it known that I, AUGUSTUS J. KUHN, of Lewistown, in the county of Mifflin and State of Pennsylvania, have invented a new and useful Improvement in Drying Apparatus, of which the following is a specification.

My improvements relate to machines intended more particularly for drying sand, which, by its peculiar nature, is difficult to dry and inconvenient to handle; but my improved machine may be used to advantage in drying any material that will run through the machine.

The principal objects of my invention are, first, to permit the use of exhaust-steam for producing the drying-heat; second, to save handling of the material from the time it is placed in a wet condition in the machine to its delivery in a dry condition; and, third, to permit the regulation of the feed and delivery according to the heat and condition of the material and to prevent clogging of the feed.

Figure 1 is a vertical longitudinal section of my machine. Fig. 2 is a vertical transverse section on line *x x* of Fig. 1.

Similar letters of reference indicate corresponding parts.

A is the revolving double-walled cylinder, which is to be of suitable length and diameter, according to the character of the material to be operated upon, and is supported at each end on rollers *a a*, that are mounted in suitable bearings in a substantial frame-work, as shown. The cylinder A may be set with its axis either horizontal or more or less inclined, to retard or hasten the passage of the material through it, as desired.

The outer shell, *b*, and inner shell, *c*, of the cylinder are formed of sheet-metal plates riveted together and to end rings, *d d'*, whereby an annular space is formed around the cylinder, which space is closed at the ends.

At the delivery end the ring *d'* is formed with external gear-teeth, with which meshes a pinion driven by suitable power, and to prevent sand from getting into the gearing the inner shell, *c*, is extended beyond the ring *d*, and flares outward in the form of an annular flange, *c'*.

At the feeding end of the cylinder A is fixed the feed-hopper *e*, the bottom of which is of semicircular form, and extends a short distance within the cylinder through an apertured plate or ring, *b'*, which is attached on the end of the cylinder, and serves to prevent the material from escaping backward after entering the cylinder. One side of the hopper *e* is partially removed to give opportunity for dumping in the sand or other material.

The steam-pipe is made in two sections. The inlet-pipe *g* is at the delivery end of the cylinder supported at its outer end in a fixed boxing, *h*, that is fitted with a packing-gland, *f*, around the pipe, and to which boxing is connected the curved coupling *i*, that receives an exhaust-steam pipe. The pipe *g* extends a short distance within the cylinder A, and terminates in a hollow box, *k*, that is fitted with radial tubes *l*, preferably four in number, entering the space between the shells *b c*. The tubes *l* are threaded at their outer ends to receive the nuts *l'*, that are screwed against the inner surface of the shell *c*, so that box *k* and tube *g* are firmly held in place and may be accurately centered.

The outlet steam-pipe *m* at the feed end of the cylinder is similar in construction and arrangement. Its inner end is connected with a steam-box, *n*, from which radial tubes *o* pass to the annular space around cylinder A, and its outer end enters the boxing *p* and is packed by a gland. A pipe, *q*, from the boxing *p* carries off the steam. The outlet-pipe *m* extends through the center of hopper *e*, and is fitted with a spiral flange, *m'*, by which the material is carried from the hopper *e* into the drying-cylinder. The material therefore is subjected to heat as soon as it is placed in the hopper, and the flange or blade *m'*, being hot, dries the sand in contact with it, so that clogging by the wet material is prevented.

The inner surface of the cylinder A is fitted with four (more or less) projecting flanges, *r*, arranged spirally to agitate the material and carry it to the delivery end of the cylinder. The flanges *r* will be arranged at the pitch required for carrying the material forward at the required speed, which may be accelerated or retarded by raising or lowering the feeding end of the cylinder or by varying the speed of rotation.

I provide for using live steam directly from a boiler in case the exhaust-steam is not suffi-

cient, or when the other machinery is not in use, by fitting a small steam-pipe, *s*, to the curved coupling *i*, said pipe passing a short distance beyond the outer end of inlet-pipe *g*, so that the live steam will enter beyond the joint in the box, and will act to draw in the exhaust-steam.

In operation, the steam passes from pipe *g* to the jacketed space around the cylinder and out by the pipe *m*, thereby keeping the cylinder in a heated condition. The wet sand from the washing-machines is dumped into the feed-hopper *e*, and from thence is carried by the blade *m'* into the cylinder, and runs out in a dry condition from the delivery end into any suitable receptacle.

A cock, *t*, in the outer shell of the cylinder permits escape of water of condensation from the jacketed space of the cylinder.

This machine will perform the drying more rapidly and conveniently and at a less expense than the drying-floors usually employed. The machine using exhaust-steam, the expense for fuel will be little or nothing, as other machinery requiring power is generally used with the drier.

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

1. In a drying apparatus, the hollow box *k*, with its means of discharge, and the pipe *g*, with its stuffing-box, in combination with the live-steam and exhaust pipes, as and for the purpose specified.

2. The combination, with the annular chamber between shells *b c*, of the box *n*, having radial tubes *o*, extending into the sand-chamber, and the spirally-flanged pipe *m*, passing through the hopper to the inlet, as and for the purpose specified.

3. In drying-machines, the combination, with the revolving cylinder and inlet-pipe for exhaust-steam, of the pipe *s* for live steam, connected with the coupling and passing through the boxing of the revolving steam-pipe, substantially as shown and described.

AUGUSTUS JULIOUS KUHN.

Witnesses:
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J. B. L. MARKS.