(No Model.) 2 Sheets—Sheet 1.

P. VAN GELDER.

GRAIN WASHING AND DRYING MACHINE.

No. 379,498. Patented Mar. 13, 1888.

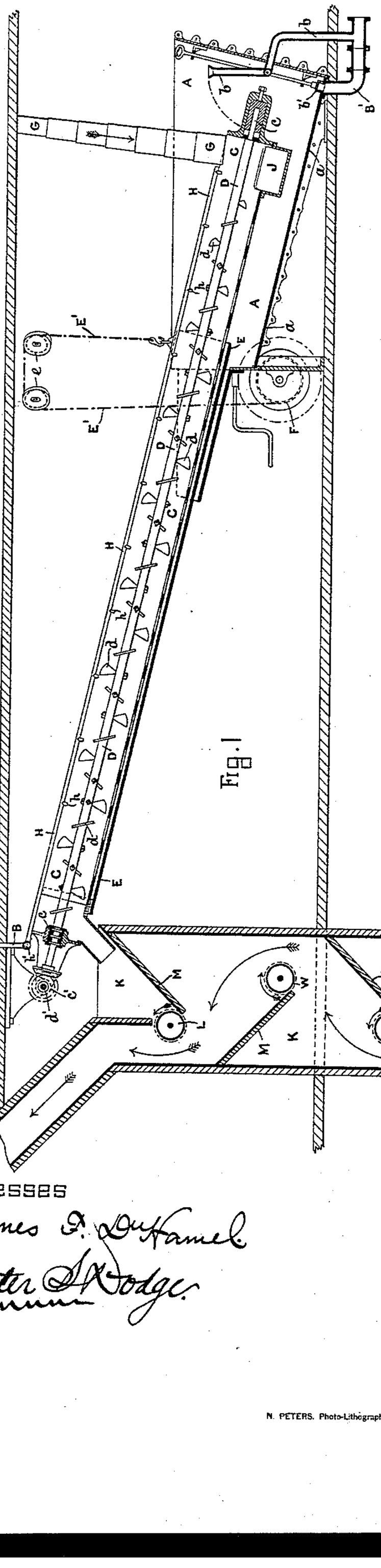

Fig. 1.

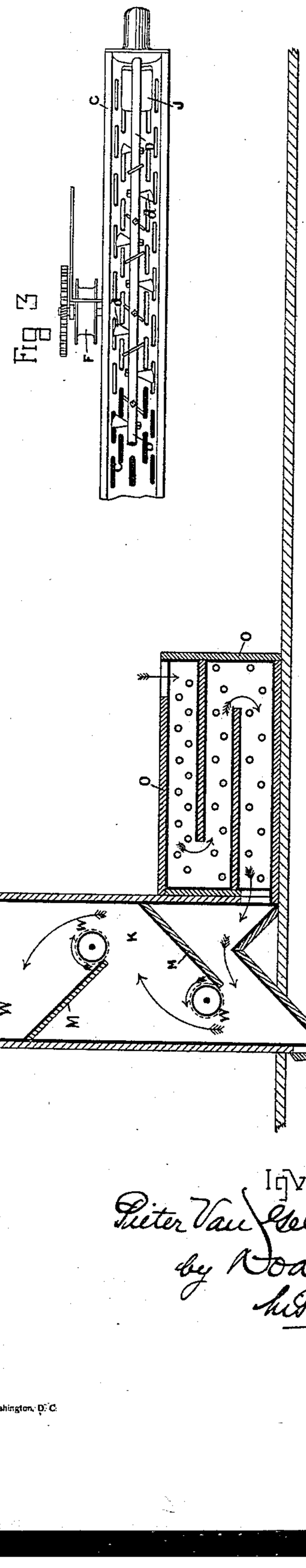

Fig 2

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(No Model.) 2 Sheets—Sheet 2.

P. VAN GELDER.

GRAIN WASHING AND DRYING MACHINE.

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Fig. 2

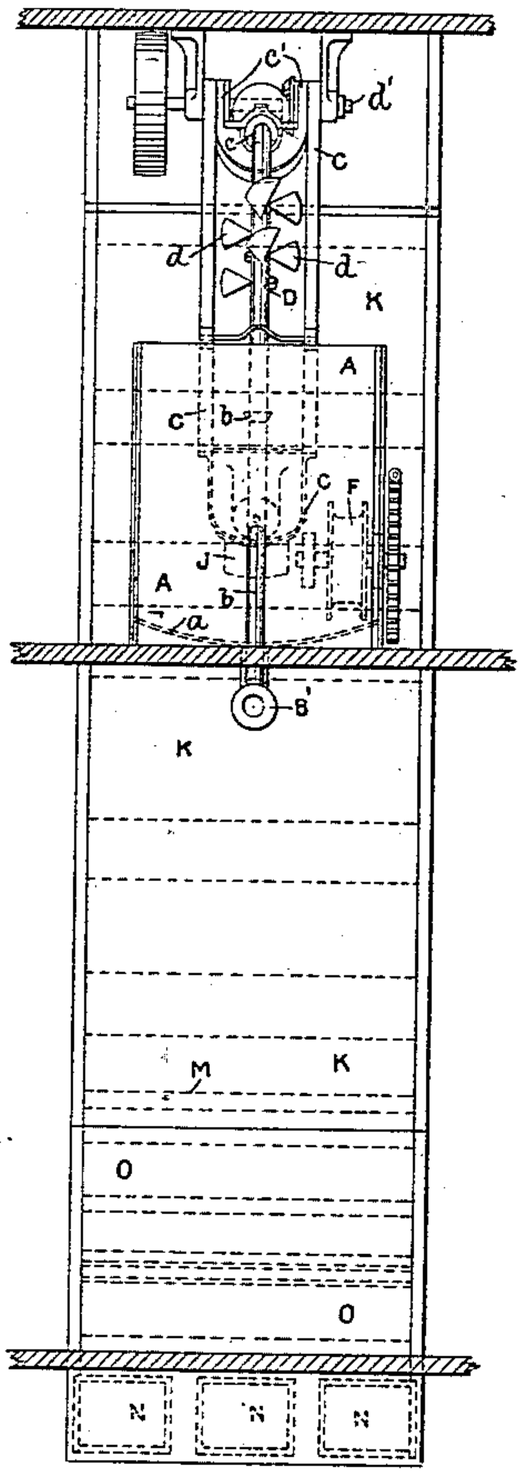


Fig. 4

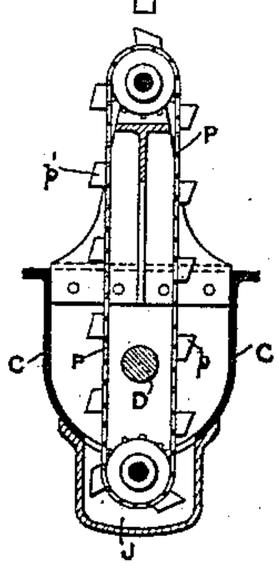
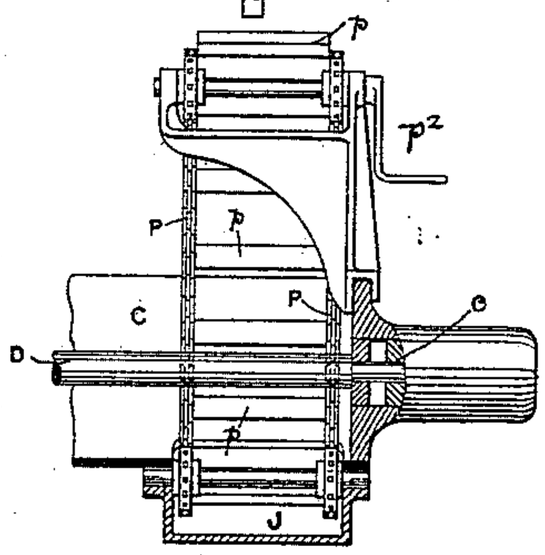


Fig. 5



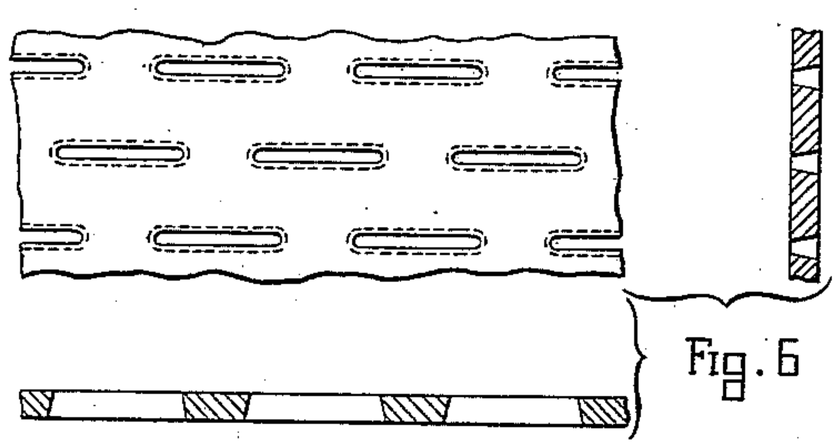


Fig. 6

Witnesses

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UNITED STATES PATENT OFFICE.

PIETER VAN GELDER, OF SOWERBY BRIDGE, COUNTY OF YORK, ENGLAND.

GRAIN WASHING AND DRYING MACHINE.

SPECIFICATION forming part of Letters Patent No. 379,498, dated March 13, 1888.

Application filed September 6, 1886. Renewed February 13, 1888. Serial No. 263,791. (No model.) Patented in England February 27, 1886, No. 2,851.

To all whom it may concern:

Be it known that I, PIETER VAN GELDER, a subject of the Queen of Great Britain, residing at Sowerby Bridge, in the county of York, in the Kingdom of England, have invented certain new and useful Improvements in Grain Washing and Drying Machines, (for which I have received Letters Patent in England, dated February 27, 1886, No. 2,851,) of which the following is a specification.

The object of this invention is to provide an apparatus for washing or dampening, conditioning, cleaning, or drying grain by the use of water and heated air, in which the length of time during which the grain is allowed to be immersed in or acted upon by the water may be increased or decreased according to the nature and requirements of the grain under treatment, and from which the grain will be discharged practically in as dry a state as required for grinding purposes.

Referring to the drawings, Figure 1 is a vertical longitudinal section; Fig. 2, an end elevation; Fig. 3, a part plan; Fig. 4, a sectional elevation of details of the stone-removing elevator; Fig. 5, a front elevation of same, and Fig. 6 the details (plan and sections) of the perforated material of which the trough is made.

A is a tank, constructed of rectangular or other suitable shape to hold or receive water, provided with a water-inlet pipe, B, and overflow-pipe *b* and a discharge-pipe or mud-pipe, B′, a valve, *b′*, closing the mouth of the pipe B′. The bottom *a* of the tank is made preferably inclined, as shown, so that any mud or refuse may settle down at the deepest end, and from there be readily removed through the pipe B′. The top of the tank need not be covered.

Into one end of the tank projects an inclined perforated trough, C. In the trough C, journaled at both ends, is a conveyer, D, preferably provided with paddles *d*, as shown, though an Archimedean screw or other conveyer, such as are at present used for collecting and moving grain and flour in many of the machines at present employed in the treatment of grain and manufacture of flour, may be used. The paddles *d* may be set at different angles relatively to the shaft to which they are attached, if required, for material of different densities. The perforated trough C incloses the conveyer on three sides and extends its entire length, the ends of the conveyer being supported in the journals or bearings *c*. E is a trough-casing, (imperforated,) which incloses the perforated trough C for about two-thirds or three-fourths of its length. The end of the perforated trough C not covered by the imperforated casing projects into the tank, so that the water flows around or over the grain that may be in the trough C.

The perforated trough C is pivoted at one end, so that it may be placed in either a horizontal or inclined position, as required, or the inclination at which it is placed be varied to regulate the speed at which the grain travels. The conveyer D will move the grain along at a greater speed when the trough C is horizontal, and the speed of the travel of the grain will decrease as the trough is inclined or the inclination increased.

When the grain travels quickly, it remains immersed or in contact with the water for a less period of time than when traveling slowly. Consequently the inclination of the trough C regulates the time of immersion of the grain. The conveyer is shown geared to a shaft, *d′*, running at right angles to it, and in this case the trough C should be pivoted about the center of the shaft *d′*, so that any movement thereof may not interfere with the gearing together of the two shafts. If preferred, however, the two shafts may be geared by means of a flexible joint or universal coupling.

In the drawings, *c′* is a journal or bearing on the end of the trough C, through which the shaft *d′* passes, the shaft sustaining the weight of the trough and conveyer.

E′ is a chain or rope passing over pulleys *e* and attached to a windlass, F, or other winding-gear. The end of the chain is secured to the perforated trough C and sustains the weight of the trough and the conveyer D. By means of this chain or rope the end of the trough is raised and lowered and its inclination adjusted.

G is a hopper for conducting the grain into the machine. This hopper is attached to the perforated trough and is provided with tele-

scopic sections to admit of the raising and lowering.

One or more pipes, H, connected with pipe B, and provided with a series of taps, *h*, extend the length of the conveyor, and from any or all these taps the water may be admitted as required. The pipe H is hinged or provided with a flexible joint, *h'*, to allow of its moving with the trough C.

The tank is fitted with an overflow-pipe, *b*, at one end. This pipe is made with a hinge or joint, so that the top may be turned over to receive the overflowing water at a lower level than when erect. The tank may be emptied through the pipe B', which is closed by the valve *b'*.

Fig. 6 shows the construction of the material from which the perforated trough C is made, and, although the perforations may be of other form or shape than those shown, I prefer the oblong tapering perforations. At the lower end of the perforated trough C is formed a well or receptacle, J, to receive or collect stones or other foreign material of high specific gravity. This may simply be furnished with a slide, by means of which it can be emptied periodically; or it may be fitted with a small elevator, P, Figs. 4 and 5, whose buckets *p* will pass down into the well J and raise stones or other material therefrom. This is shown in Figs. 4 and 5, with a handle, P^2, for operating it, though, if required to be continually in operation, it may be geared so as to receive continuous motion.

The grain passes through the spout or hopper into the lower end of the perforated trough C, which is immersed in the water in the tank B. The rotation of the conveyer D causes the grain to travel upward to the other end of the trough. As the grain moves along, the paddles of the conveyer turn it over and over and it becomes thoroughly washed. Stones or similar material of high specific gravity are washed out of the grain as it partially floats in the water and are deposited in the well or receptacle J. The grain does not fall into the well J, as it is caught by the paddles of the conveyer before falling to the bottom and does not at once come in contact with the bottom of the perforated casing. Stones, however, or heavy material fall to the bottom. The grain gradually travels from the water in the tank to the other end of the perforated trough C, and as it travels it meets the stream of water from the taps on the pipe H. The grain is thus continually brought in contact with a fresh stream of clear water, while the dirty water escapes at the lower end of the conveyer through the overflow. By the time the grain reaches the top of the perforated trough C it is thoroughly drained, the water which has drained off having passed through the perforations and down the casing E into the tank A. The grain then passes into a drying-chamber, K, through which it falls against an upward current of air, preferably dry and heated. In order to cause the grain to fall in a thin layer or stream through the drying-chamber, it is received by a slide, M, and an externally-pitted roller, L, similar to what are used for regulating the feed of grain in other machines, which I now construct, and which have been patented by me. The externally-pitted revolving roller receives the grain in a regulated stream from slide M and empties it down onto a second sloping board or iron slide, M, from the bottom of which the grain is again raised and turned by means of a similar roller, W. Two, three, or more sets of slides and rollers may be employed as found necessary, and finally the grain is discharged through a chute, N, in a dry condition.

Below or at the side of the drying-chamber is conveniently placed a coil, O, heated by steam or otherwise, over which a current of air is drawn, preferably by an aspirating fan (not shown) placed on top of the drying apparatus. The current of heated air rising and impinging against the particles of falling grain carries off with it the moisture. The temperature of the air may be regulated to any required degree, preferably not above 120° Fahrenheit.

I do not claim in this application the construction of the drying apparatus shown in Figs. 1 and 2, but reserve the right to make it the subject-matter of a separate application.

I claim as my invention—

1. In a machine for washing and drying grain, the combination, with a tank adapted to contain water, of a perforated trough extending at its lower end into the tank and independent thereof, an imperforate casing surrounding or partially surrounding the trough and connected therewith, a conveyer mounted within the trough, means for imparting motion to said conveyer, and mechanism, substantially such as shown and described, for raising and lowering the trough and its casing.

2. In combination with a tank and the inclined and adjustable trough, casing, and conveyer, the telescopic hopper G, arranged to feed the grain to the perforate trough.

3. In combination with a tank, a perforated trough, a conveyer mounted therein, a well at the head of the trough, and an elevator working within the well, as and for the purpose set forth.

4. In combination with an adjustable trough, a conveyer mounted therein, a shaft carried in fixed bearings and arranged to impart motion to the conveyer, a fixed water-supply pipe, and a distributing-pipe mounted upon the trough and connected with the supply-pipe by means of a flexible joint.

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

PIETER VAN GELDER.

Witnesses:

WM. P. THOMPSON,

J. OWDEN O'BRIEN.