

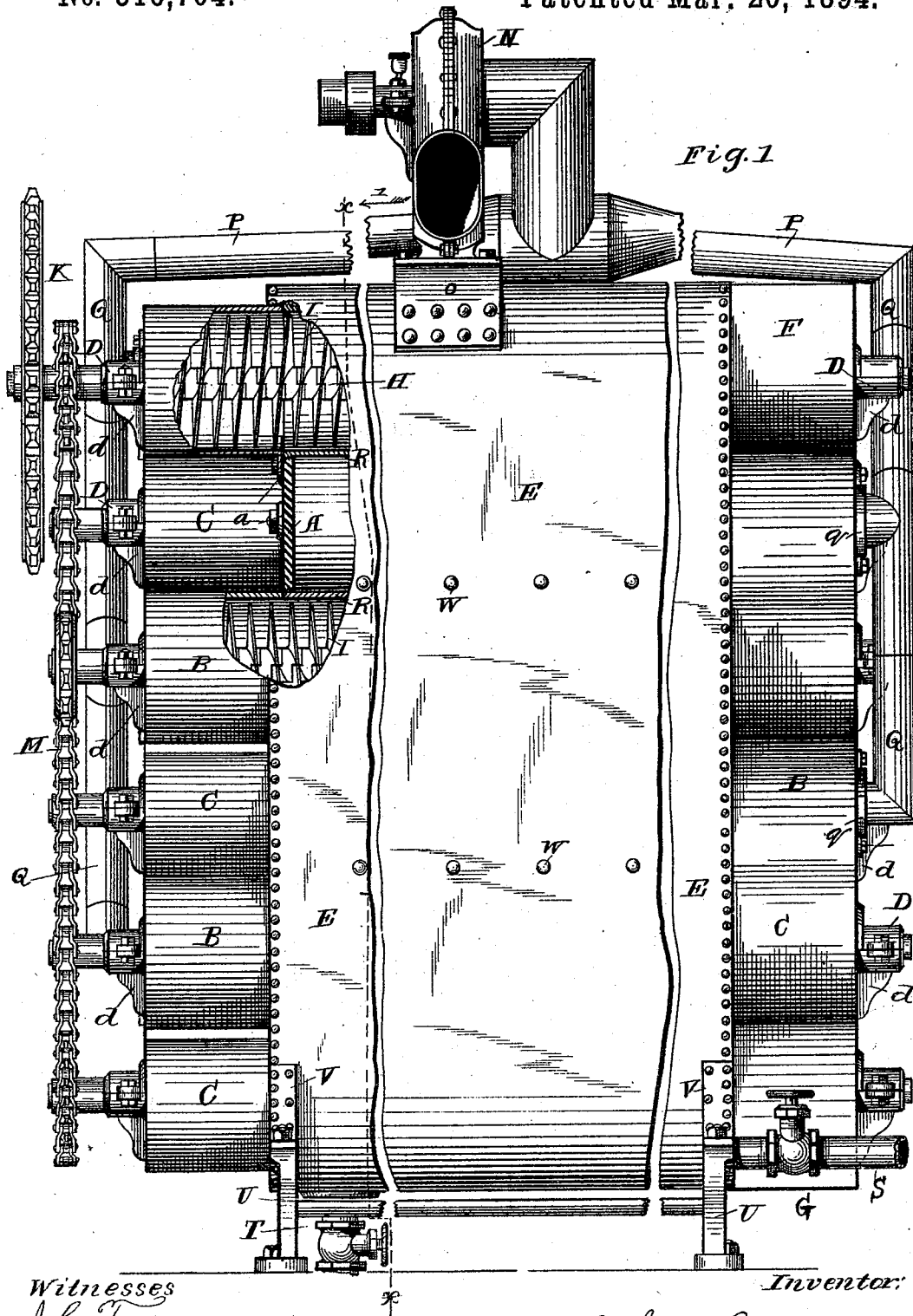
(No Model.)

3 Sheets—Sheet 1.

J. GREGORY.
GRAIN DRIER.

No. 516,704.

Patented Mar. 20, 1894.



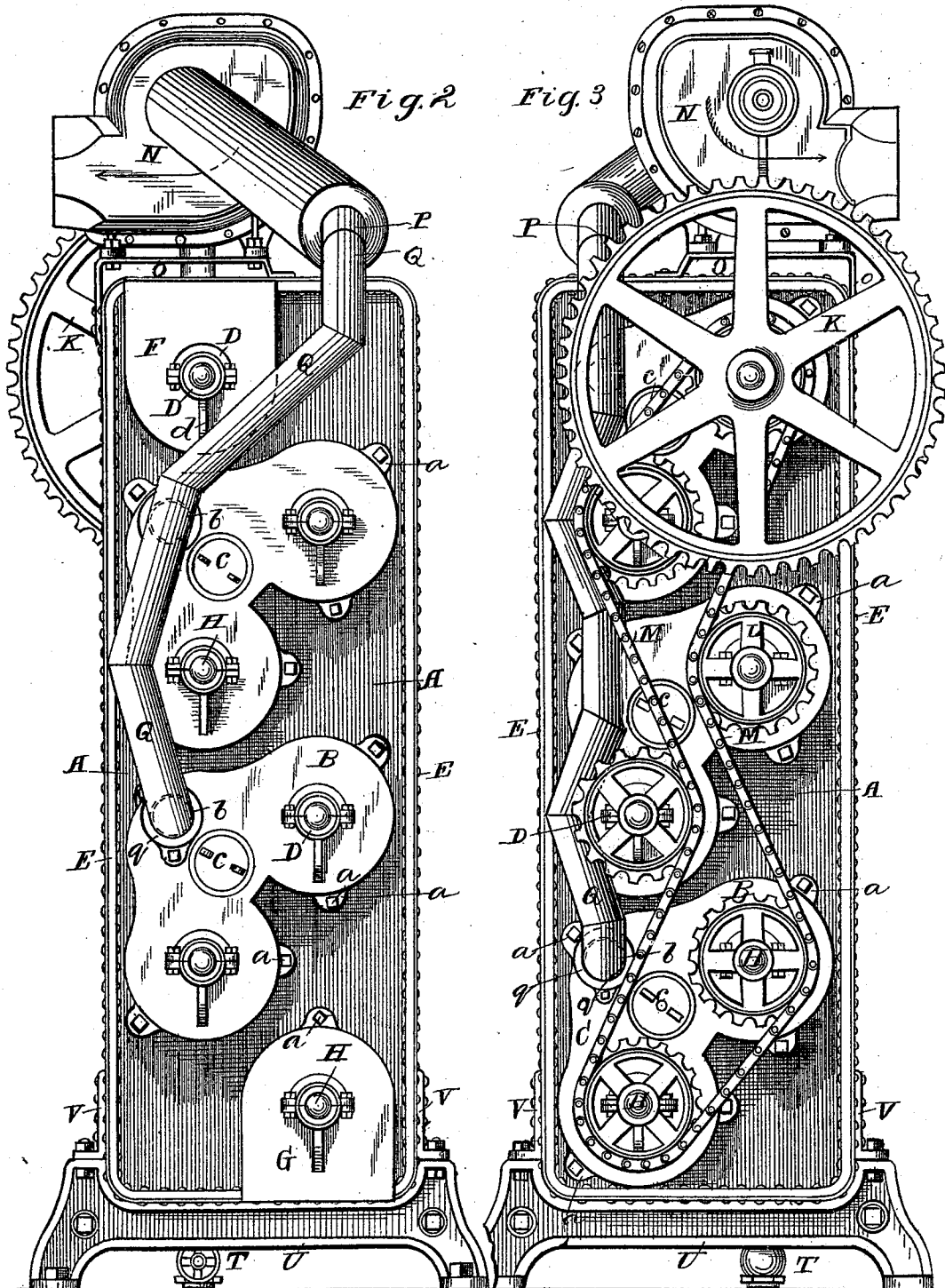
Witnesses
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C. W. Sommers.

Inventor:
John Gregory
by D. M. Dibley & P. H. H. H.

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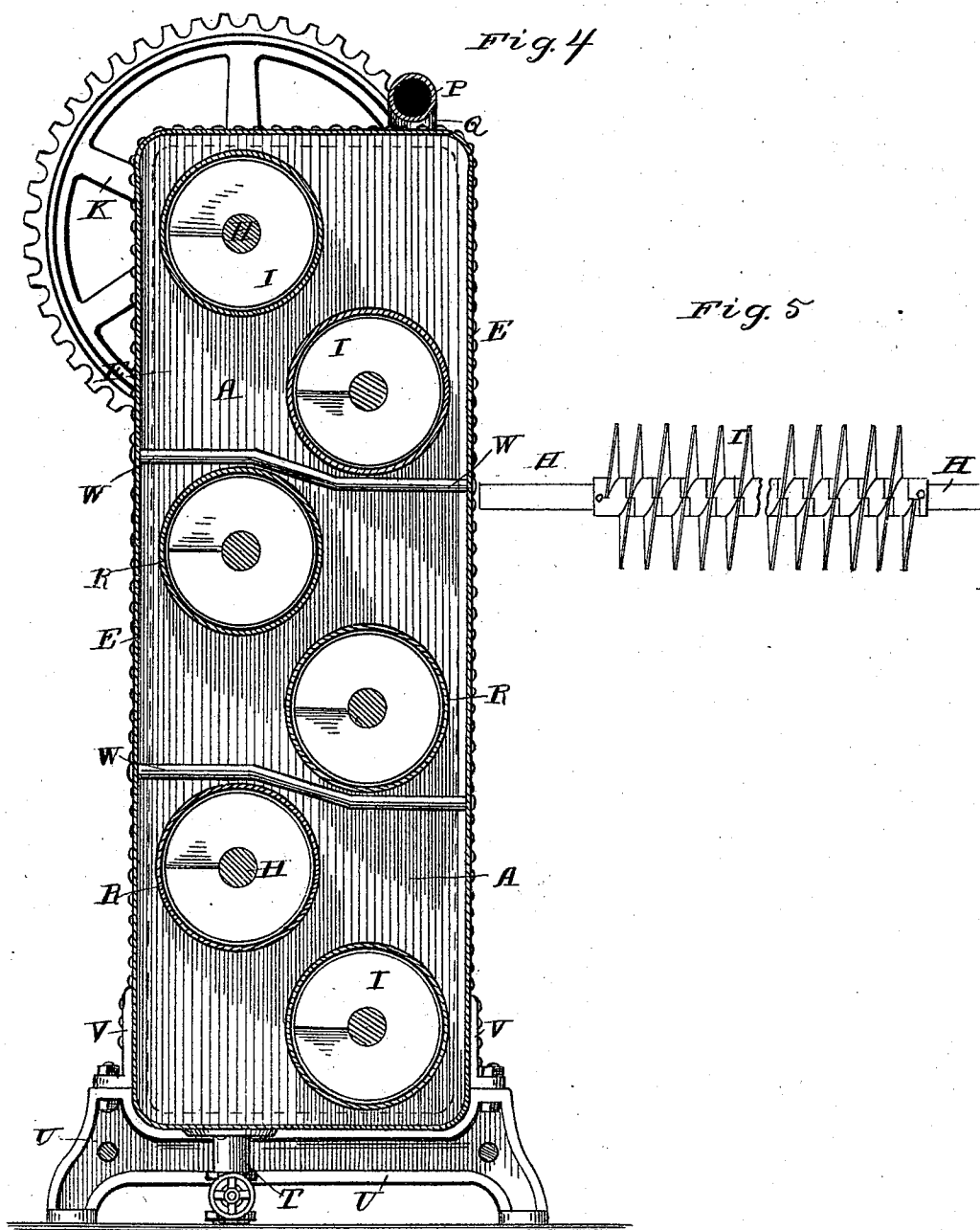
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Inventor
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UNITED STATES PATENT OFFICE.

JOHN GREGORY, OF MARION, OHIO.

GRAIN-DRIER.

SPECIFICATION forming part of Letters Patent No. 516,704, dated March 20, 1894.

Application filed March 9, 1888. Serial No. 266,711. (No model.)

To all whom it may concern:

Be it known that I, JOHN GREGORY, a citizen of the United States, residing at Marion, in the county of Marion and State of Ohio, have invented certain new and useful Improvements in Grain-Driers, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1, is a side elevation, partly in section. Fig. 2 is an end elevation of the head end or receiving end of the machine. Fig. 3, is an elevation of the opposite end. Fig. 4, is a transverse vertical section on line *xx* Fig. 1 looking in the direction of the arrow, Fig. 1. Fig. 5, is a detached view of one of the worms.

Referring particularly to Figs. 3 and 4, A is an end plate, preferably of cast metal, and having a series of circular holes arranged preferably in zigzag lines.

B C, represent a series of chambers or shells secured to the outer face of one of the end plates by means of bolts or set screws; as, for instance, at *aa*. Each of these chambers consists substantially of two parti-cylindrical portions which are open upon their inner faces, abutted against the outer face of the end plate, under such an arrangement that the inner walls of these shells register substantially with two adjacent holes which are seen in Fig. 4. Each of these shells is by preference provided with a hand hole *c*, for convenience in getting access to the chambers. Each of these shells is further provided with an opening as at *b*, for a purpose which will be hereinafter explained. Each of these shells is also provided with a bearing or boxing D, which may be formed in two parts as is customary with bearings and has a supporting web or bracket *d*. At the opposite end there is a similar end plate A, with two shells B C, and these end plates are united by a jacket or casing E, preferably of light boiler iron which is at its ends riveted to outward projecting flanges *e e*, which are formed integral with their respective end plates A A. I propose to make these end plates of cast iron, but they may be made of wrought iron or other suitable metal if preferred.

F, is a feed hopper attached to the end plate at the receiving end of the machine and provided with a bearing D.

G, is a discharge spout or hood at the bottom

of the same end of the machine, and by preference, the feed hopper and discharge spout are semi-cylindrical and are arranged to register with the upper and lower openings respectively, of that end plate.

H, is a conveyer shaft, the journals of which are mounted in the bearings D, D, the length of the worm I, of the conveyer being such as to enter near to the outer vertical walls of the above mentioned chambers C, D, F, G. The upper conveyer shaft is longer than either of the others and carries at its outer end a driving wheel K, preferably a sprocket wheel, which may be belted to any convenient motor.

L L, are a series of smaller sprocket wheels upon the ends of the conveyer shafts and geared to either by an endless belt or chain M, so that all the conveyers are driven in unison.

N, is a suction fan mounted upon a saddle, of which, the horizontal arm or plate O, is secured to the upper face or wall of the shell E, the vertical arm or plate O being attached to one of the vertical walls of the shell.

P P, are horizontal pipe sections connected with the eye of the fan, the ends of these pipes being connected by pipe sections Q Q, to the thimbles or collars *q q*, of the openings *b b*, which have been referred to. In practice, I propose to use one of these collars or thimbles for each of the openings *b, b*, the collars being provided with ears through which pass set screws or bolts into the shells or chambers B C, at both ends of the machine.

R R, are a series of tubes or cylinders secured at their ends in the openings of the end pieces in such manner by screw threads or by riveting as will insure steam tight joints. Thus, there is formed within the end plates and the shell or jacket E, a steam tight chamber surrounding these tubes, and the worms of the conveyers.

I am aware that grain driers have been made with a series of practically horizontal tubes mounted at their ends in the vertical walls of a steam chamber, with detachable shells or caps attached to the outer faces of the steam chamber ends (one for each conveyer tube) and provided with bearings for the conveyer shafts; such caps or shells being cylindrical in cross section, the conveyer

shafts being hollow and provided with bent pipes connecting the outer ends of two adjacent shafts; whereby a continuous air current could pass through the entire series of conveyer shafts. I am also aware that driers have been made with the conveyer tubes themselves projecting beyond both ends of the steam chamber, with caps surrounding the projecting ends of two adjacent tubes and supported thereby with bearings for the conveyer shafts. In this last referred to construction there is a fan for producing an air current continuously through the entire series of conveyer tubes. But in my invention the shells B C are expanded laterally between the conveyer tubes and combined with a series of air pipes connected with a fan common to them all, whereby a single fan with a number of short pipe sections equal to the number of conveyer tubes may be made to draw air currents from both ends of each and every one of the conveyer tubes except the upper and lower ones, and does in fact draw an air current from one end of these last referred to conveyer tubes.

Another advantage arising from connecting the air tubes with the shells is this. It enables me to arrange the air pipes in close proximity to the ends of the steam chamber or hot air chamber and thus make a very compact machine. In fact as shown in the drawings the air pipes do not project beyond the line of the conveyer shafts at either end of the machine; so that these shafts and their bearings, as well as the gearing which drives the conveyers, practically protect these air pipes from injury or being disturbed by anything coming in contact with them.

My plan of connecting the fan with each of the conveyer tubes by means of the interposed shells B C, is also advantageous because of convenience in making all of the pipes being located wholly outside of the steam chamber, thus greatly facilitating the manufacture of the machine while at the same time it secures the benefit arising from withdrawing from each conveyer tube such vapors as are given off from the material to be dried. This construction is also preferable to those which employ open ended conveyer tubes because the rarefaction of the air by means of the exhaust fan facilitates the giving off of such vapors. So also my construction of driving devices, to wit, the chain and sprocket wheels is preferable to a series of cogged gears; because I am thereby enabled to locate the hand holes practically between the conveyers, so as to afford convenient access to the ends of two adjacent conveyer tubes and to both ends of the shell through a single opening in each shell.

S, is a steam inlet pipe, and T, is a steam outlet pipe.

U U, are base pieces, each inclosing or fitting closely to the bottom of the chamber at one end, and V V, are angle irons, the upright arms or shanks of which are riveted to

the shell in such position that the base pieces may be conveniently bolted thereto in order that when the base pieces are secured to the floor, the drier shall be supported in an upright position.

W. W are stay rods or tie rods connecting the sides of the jacket E and supporting them against outward pressure.

This machine may be operated as follows. Steam being introduced through the inlet pipe, which, together with the steam outlet pipe are provided with suitable stop cocks, the temperature within the shell or jacket is raised to the required point. The grain, meal, or other material to be treated is fed into the hopper F from an elevator or other supply and, the worms of the conveyers being driven in the direction indicated by arrows, Fig. 3, such material is moved along through the upper tube of the series J J and delivered thence through the upper shell or chamber B, C at the opposite end of the machine to the next tube below. The screw of this conveyer has a pitch the reverse of the one above it so that the material is moved in an opposite direction, and is by the uppermost of the shells B C at the head or receiving end delivered to the third tube from the top of the machine. The conveyer of this third tube moves the material to the opposite end of the machine, where it is transferred to the next lower tube and so on through the remainder of the series until it is finally discharged at G; as will be readily understood without further explanation. During this travel of the material, it is subjected to a rolling and tumbling action in contact with not only the heated metal of the conveyers or worms and the tubes, but also of the heated air within the tubes, whereby the moisture is given off and taken up by the air. A constant circulation of this heated air through the tubes from the outlet and, under ordinary circumstances, from the hopper F, is effected by the suction fans whereby the operation of drying the material is rapidly and thoroughly effected.

Of course the joints between the shells B C, F, G, and the end plates may be packed when desired to prevent leakage although under ordinary circumstances they can be made sufficiently tight by the ordinary methods of manufacture; and the same is true concerning the thimbles or collars q, q, at the openings b b. Or the collars may be cast or otherwise made integral with the shells or they may be omitted and the pipe sections Q, Q, provided with short laterally projecting pipes or T-pieces which may be inserted in the openings b b.

While I have described the best construction now known to me for carrying out my invention, yet I do not wish to be limited to the details herein shown; because many modifications will readily suggest themselves to a skilled mechanic without departing from the spirit of my invention.

What I claim is—

1. In a grain drier, the combination of the heating chamber provided with a series of conveyer tubes, the conveyer worms within the tubes, and the shells attached to the ends of the heating chamber and provided with bearings for the conveyer and with openings for the air pipes, the air pipes connected with the shells, and means for exhausting the air substantially as set forth.

2. In a grain drier, the combination of the heating chamber provided with a series of conveyer tubes, the conveyer worms within

the tubes, the shells attached to the ends of the heating chamber, and provided with bearings for the conveyers and with openings for the air tubes, the fan, and a series of air pipes connecting the fan with the shells, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN GREGORY.

Witnesses:

J. E. DAVIDS,
OSCAR TRAVIS.