No. 889,560. PATENTED JUNE 2, 1908.

F. J. THULL.

GRAIN DRIER.

APPLICATION FILED MAY 27, 1907.

2 SHEETS—SHEET 1.

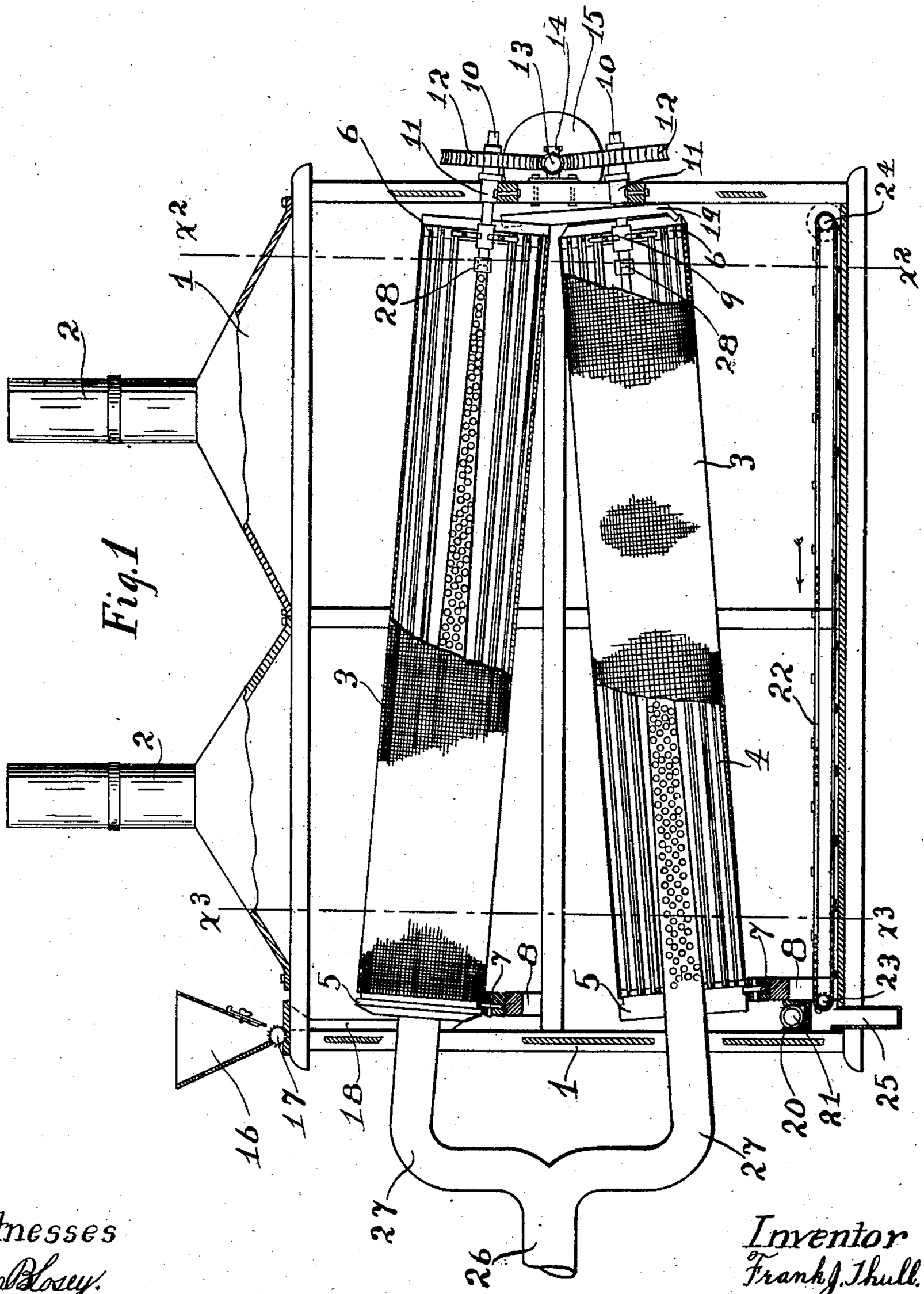

Fig. 1

Witnesses
Leon B. Losey.
A. H. Ospahl.

Inventor
Frank J. Thull.
By his Attorneys
Williamson & Merchant

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Fig. 2

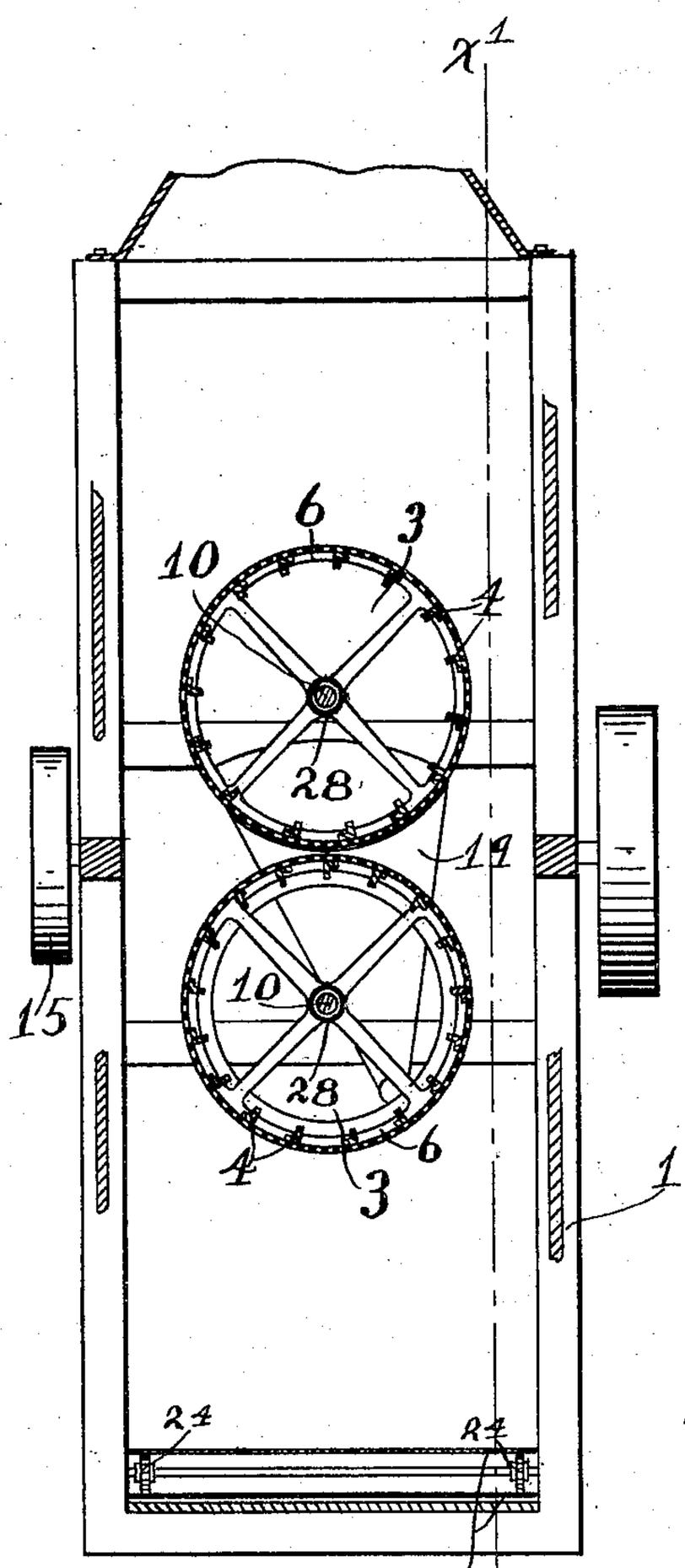
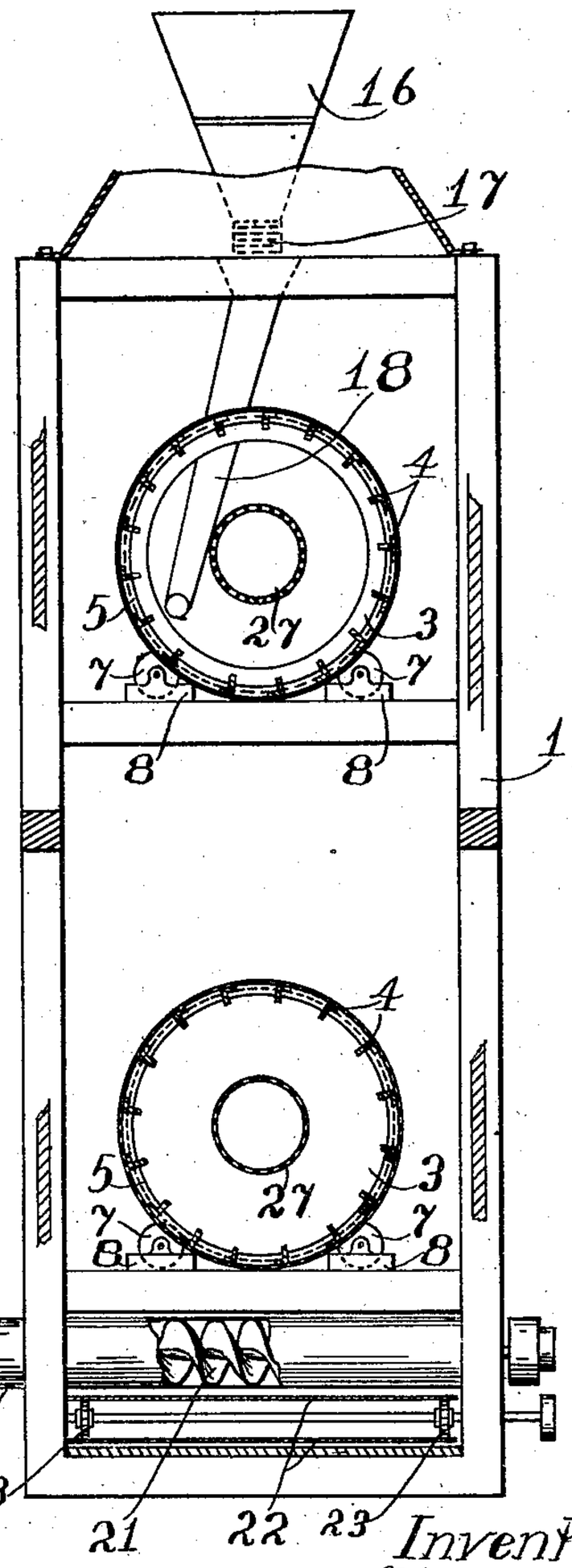


Fig. 3



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UNITED STATES PATENT OFFICE.

FRANK J. THULL, OF MINNEAPOLIS, MINNESOTA.

GRAIN-DRIER.

No. 889,560. Specification of Letters Patent. Patented June 2, 1908.

Application filed May 27, 1907. Serial No. 375,897.

To all whom it may concern:

Be it known that I, FRANK J. THULL, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Grain-Driers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its especial object to provide an improved grain drier, and to this end it consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

The invention is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Referring to the drawings, Figure 1 is a view partly in side elevation and partly in vertical section taken through the machine on the line x^1 x^1 of Fig. 2. Fig. 2 is a transverse vertical section taken on the line x^2 x^2 of Fig. 1, some parts being broken away; and Fig. 3 is a vertical section taken transversely through the machine on the line x^3 x^3 of Fig. 1, some parts being broken away.

The numeral 1 indicates a casing which, as shown, is provided with two air discharge stacks 2. Mounted to rotate within this casing 1 is a pair of perforate or reticulate reversely inclined rotary drums or cylinders 3. Preferably, these drums 3 are stiffened longitudinally by angle iron ribs 4 which at their ends are rigidly secured to stiff metal rings 5 and 6. The rings 5 are externally grooved to receive the upper edges of supporting rollers 7 that are suitably journaled in bearings 8 supported from the casing 1. These rollers 7 thus rotatively support the receiving end of the upper drum 3 and the delivery end of the lower drum 3. The rings 6 which are at the delivery end of the upper drum and at the receiving end of the lower drum are connected to the radial arms of hubs 9, which hubs are rigidly secured to short shafts 10 journaled in suitable bearings 11 on the casing 1. The upper shaft 10, therefore, supports the delivery end of the upper drum, while the lower shaft 10 supports the receiving end of the lower drum. On the outer ends of the shafts 10 are worm gears 12 that mesh with a common intermediate worm or screw 13, which worm, as shown, is mounted in a suitable bearing 14 on the case 1 and is connected to rotate with a driving pulley 15.

The grain to be dried is delivered into a feed hopper 16 having a forced feed device 17 in its bottom and arranged to deliver into a depending feed spout 18, the lower end of which opens into the receiving end of the upper drum 3. The grain from the lower end of the upper drum 3 is delivered into the expanded upper end of a depending spout 19, the lower end of which opens into the upper or receiving end of the lower drum 3. The grain discharged from the lower end of the lower drum 3 is delivered into a transversely extended trough 20 in which works a power driven spiral conveyer 21. Working longitudinally of the casing 1 and covering approximately the entire bottom thereof is an endless conveyer belt 22 which, as shown, is mounted to run over sprocket-equipped shafts 23 and 24, one of which is adapted to be power driven. The conveyer belt 22 is driven in the direction of the arrow marked adjacent thereto on Fig. 1, and it is arranged to deliver into a depending discharge spout 25 the dust and all other fine material blown from the grain through the peripheral openings or meshes of the drums 3, and precipitated within the casing.

The hot air from a blast furnace of any suitable construction is conveyed by a hot blast pipe 26 to a pair of branch pipes 27, one of which opens into the upper drum 3, and the other of which opens into the lower drum 3. Those portions of the hot air pipes 27 that are within said drums are provided with a multiplicity of perforations for the discharge of air, and they are tapered from the left hand ends toward the right hand ends of the said drums, directions being taken with respect to Fig. 1. This taper of the perforated air discharge pipes toward the ends of the drums that are remote from the ends through which they enter, is because of the fact that the column of air contained within the said perforated pipes is necessarily reduced in the direction indicated. This taper of the pipes, therefore, compensates for the diminishing amount of air and tends to maintain a constant pressure throughout the said perforated pipe sections. The small inner ends of said perforated pipe sections 27 are connected to the inner ends of the shafts 10 by swivel couplings 28 and, hence, are in part supported by said shafts, and at the same

time the shafts are permitted to freely rotate while the said pipe sections 27 remain stationary.

Under rotation of the perforated drums 3, the grain introduced into the same will be carried upward by the lifting flights afforded by the angle strips 4 and will be precipitated, thereby maintaining a constant shower of grain within the said drums which are subjected to the hot, dry blast of air from the perforated pipes 27. Also in this connection, the grain will be continually worked toward the lower ends of the said drums. All fine materials, such as dust or fuzz removed from the grain by the action of the air blast and attrition will be blown through the meshes or openings of the said drum and, as already indicated, will fall to the bottom of the casing and be carried off therefrom by the conveyer 22 and spout 25, while the dry and clean grain will be carried from the casing by the spiral conveyer 21.

It is, of course, evident, that the apparatus, while above referred to as a grain drier may, nevertheless, be used as a steamer, in which case steam may be introduced into the perforated drums through the pipes 27.

What I claim is:

1. The combination with a casing and a conveyer in the bottom of said casing for carrying away the material removed from the stock, of a perforated drum rotatively mounted within said casing and adapted to receive the grain at one end and to discharge the same at the other end, and a blast pipe terminating in a perforated section located within said drum, substantially as described.

2. The combination with a casing having an air discharge stack at its upper portion and a conveyer at its lower portion, of a pair of reversely inclined perforate rotary drums, the upper drum being arranged to discharge into the lower drum, and a blast pipe having perforated branches extended axially into said two rotary drums, substantially as described.

3. The combination with a casing having an endless conveyer in its bottom for carrying away the material removed from the stock, and an air discharge stack at its upper portion, of a perforate inclined drum, rotatively mounted within said casing and adapted to receive grain at one end and discharge the same at its other end, said drum having internal lifting flights, and a blast pipe terminating in a perforated section located within said drum and extending axially thereof, substantially as described.

4. The combination with a casing, of a perforate inclined drum within said casing, adapted to receive grain at one end and discharge the same at its other end, anti-friction devices engaging with the exterior portion of the upper end of said drum, to rotatively support the upper end of said drum, a shaft mounted on said casing and connected to the lower end of said drum for supporting and rotating the same, and a blast pipe terminating in a perforated section extending axially through said drum and connected to the inner end of said shaft by a swivel coupling, substantially as described.

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

FRANK J. THULL.

Witnesses:

H. D. KILGORE,

F. D. MERCHANT.