

No. 790,927.

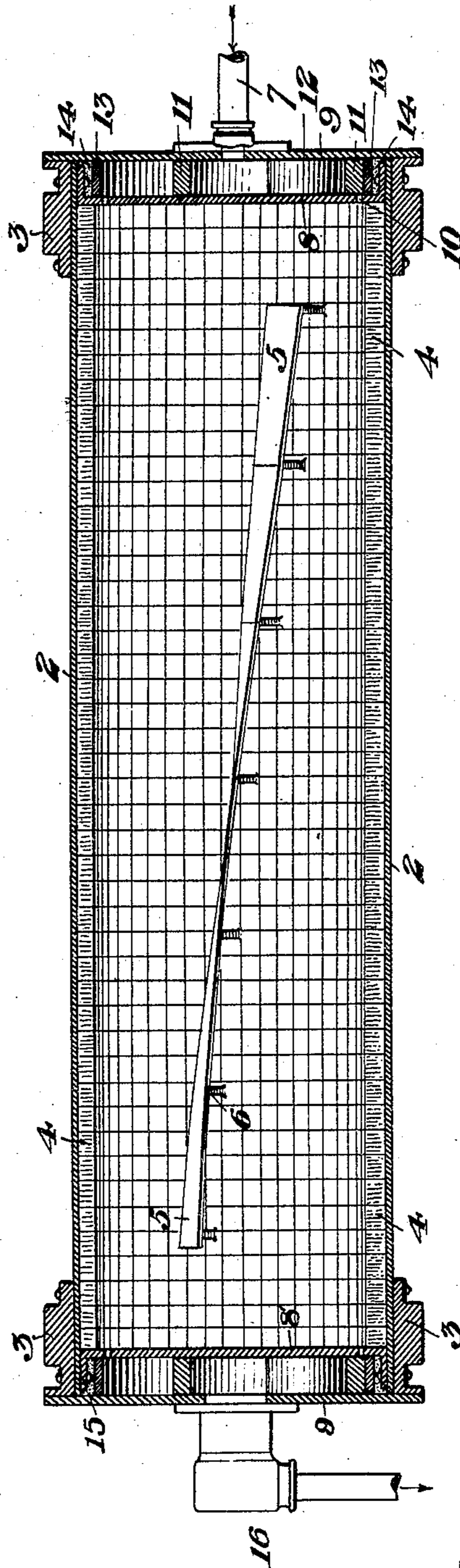
PATENTED MAY 30, 1905.

G. H. SHARP.
TUBE MILL.

APPLICATION FILED AUG. 19, 1901.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

L. A. Corwin
A. M. Corwin

INVENTOR

George H. Sharp
By Baker & Byrnes
his attys.

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2 SHEETS—SHEET 2.

Fig. 3.

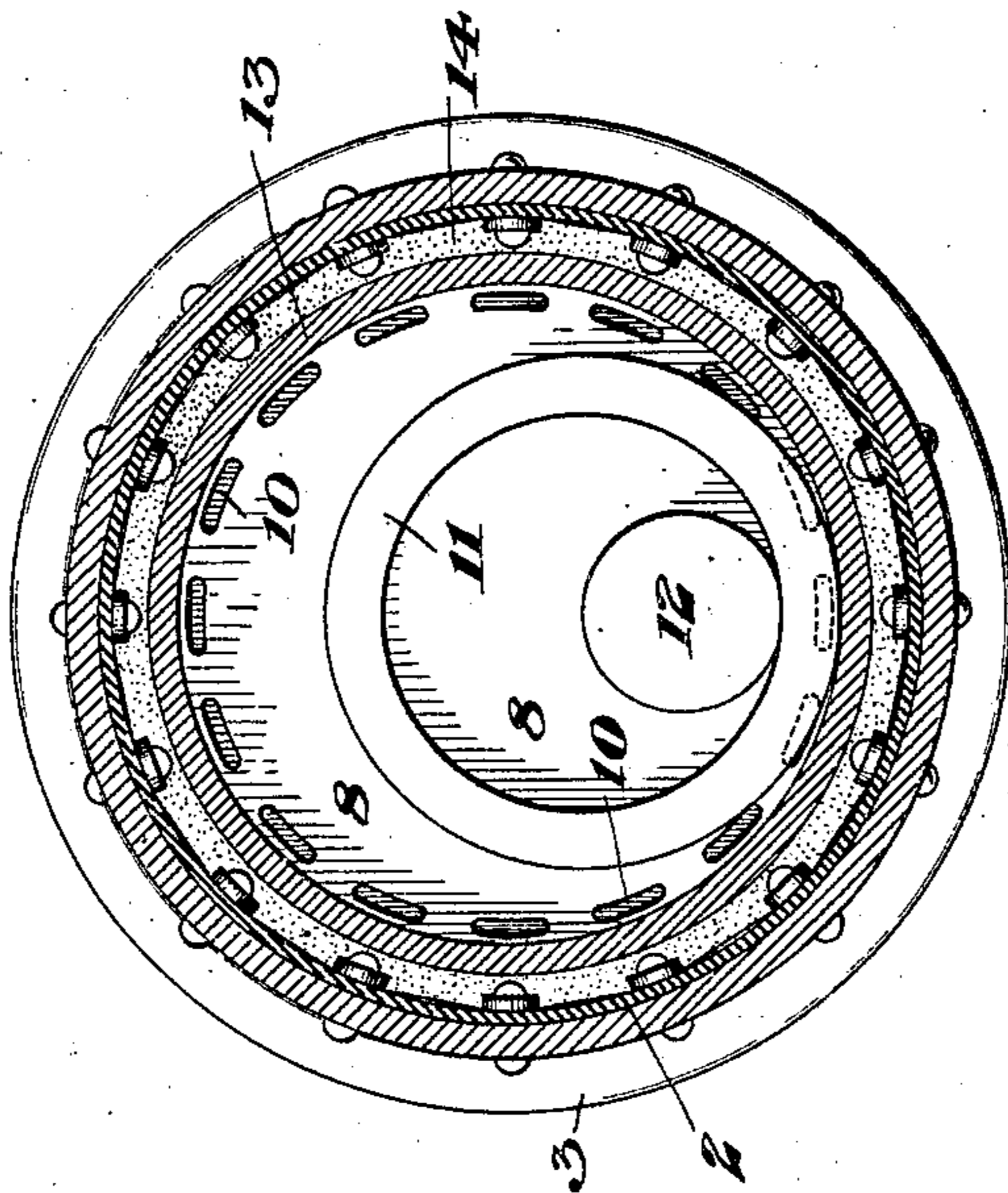
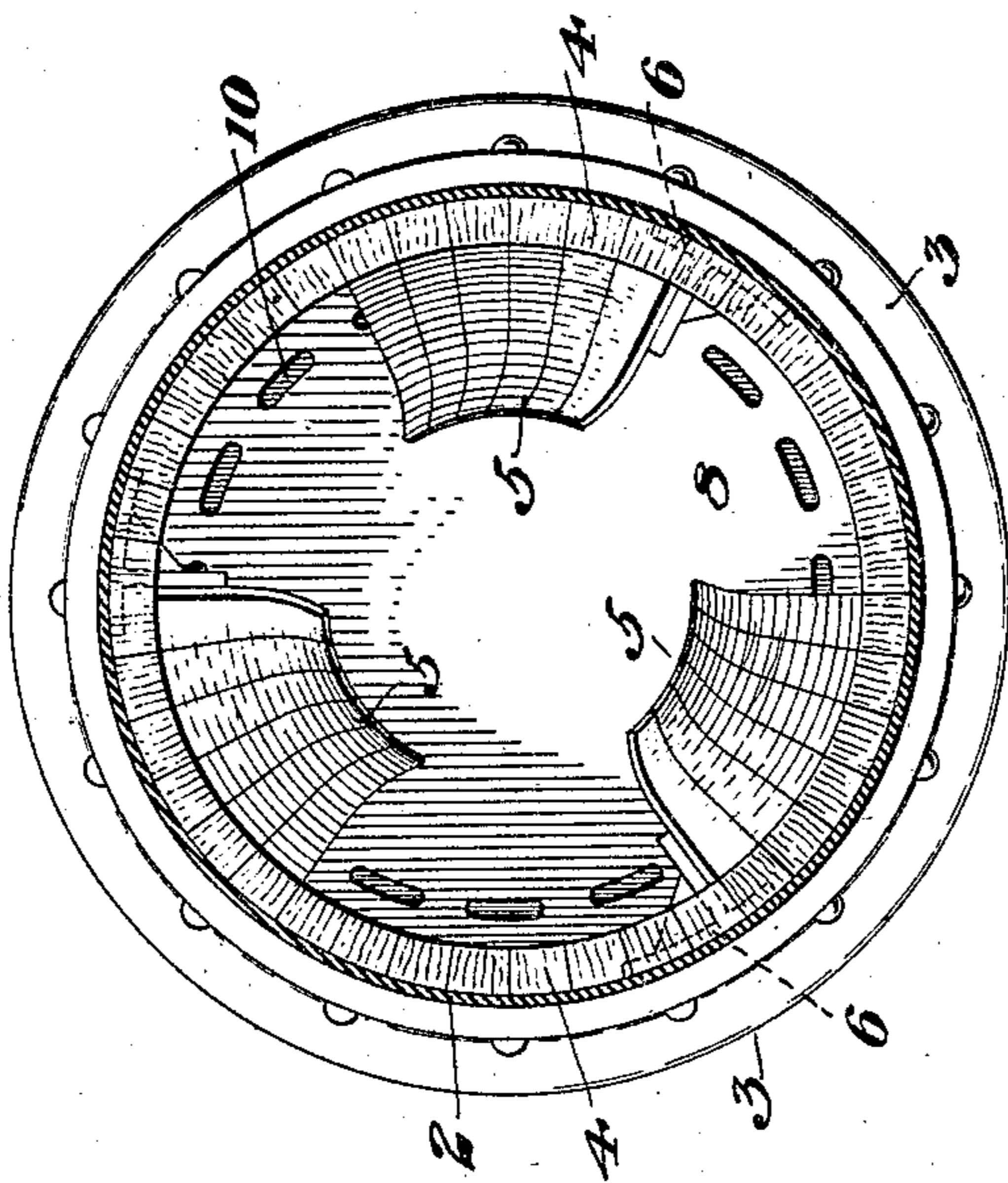


Fig. 2.



WITNESSES

L. A. Sommer
L. H. V. Corwin

INVENTOR

George H. Sharp
by Baker & Symes
his attys.

UNITED STATES PATENT OFFICE.

GEORGE H. SHARP, OF JONESVILLE, MICHIGAN, ASSIGNOR OF ONE-THIRD TO LOUIS C. BONNOT, OF CANTON, OHIO.

TUBE-MILL.

SPECIFICATION forming part of Letters Patent No. 790,927, dated May 30, 1905.

Application filed August 19, 1901. Serial No. 72,495.

To all whom it may concern:

Be it known that I, GEORGE H. SHARP, of Jonesville, Hillsdale county, Michigan, have invented a new and useful Tube-Mill, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a sectional side elevation of my improved mill; and Figs. 2 and 3 are vertical cross-sections of the intermediate body portion and one of the end chambers, respectively, of the mill.

My invention relates to that class of tube-mills wherein a rotating horizontal cylinder is employed containing a mass of pebbles or balls, the material being fed in at one end and passing out at the opposite end; and its object is to increase the output of such mills by improving their grinding action.

In the drawings, 2 represents the horizontal cylindrical shell, having the usual annular shoes 3 3, which rest upon pairs of carrying or driving rollers. I have shown the cylinder as lined with wooden blocks 4, though any desired lining may be employed. Within the body of the cylinder and extending longitudinally of it I provide a set of spiral shelves 5, which may be of any desired number and of which I have shown three. These shelves are preferably formed of iron plates secured to brackets 6, which are fastened to the outer shell, as shown in Fig. 2, though they may be supported in any desirable manner. These shelves are inclined relatively to the axis of the cylinder and are also formed with a twist or screw-plane formation, as shown in Figs. 1 and 2, and in the action of the mill as it is rotated in a counter-clockwise direction these shelves lift the balls and material up to a certain height, from which they drop, and are also fed longitudinally of the cylinder on account of the spiral form of the shelves. The balls or pebbles in dropping are thus deflected from lines at right angles to the axis of the cylinder, and the increased rubbing action between them is thus obtained.

I have shown the cylinder as adapted for grinding a wet or slurry mixture, which is

fed into one end through a pipe 7. At this end the cylinder is provided with an inner head 8 and an outer head 9, the outer head having a central hole for the entrance of the material, while the inner head has an annular series of feeding-slots 10, as shown in Fig. 3, and through which the material feeds into the main chamber of the cylinder. In the chamber formed between the inner and outer heads is placed a ring-shaped muller 11. Within this is located an iron disk 12. The chamber is preferably formed with a cast-iron ring 13, backed with cement or other backing 14, and during the rotation of the cylinder the muller 11 rolls upon the inner face of the lining-ring 13, while the disk 12 rolls on the inner periphery of the ring or muller 11. This ring is of a diameter greater than the radius of the chamber, so that the entering slurry feeds into the space within this muller. It is there acted upon by the disk, and as it feeds out into the head-chamber it is acted upon by the peripheral face of the muller, and thus further ground. It then feeds through the outer slots into the lower portion of the mass of balls and material within the main chamber and is thus compelled to enter the balls instead of passing in upon the surface of the mass, as in ordinary practice. This is an important feature, since the mass of balls or pebbles begins to act upon the material as soon as it enters the main chamber, where ordinarily the entering material will feed forward for some distance over the top of the mass before entering it so that the grinding operation begins upon it.

I have shown the exit end of the cylinder as formed similarly to the feeding-in end, so as to thus get a further grinding action. Thus the inner head 8' at this end, which is secured by lips or flanges 15 riveted to the shell, similarly to the head 8, is provided with an outer row of slots near the lining. The outer head 9 is imperforate, except for a central feed-out hole connecting to pipe 16, and within the chamber at this end are located a ring-shaped muller 11' and a disk 12'. The grinding action at this end is similar to that at the entrance end, the feeding of the material being reversed—that is, the material

passes through the slots into the chamber and is acted upon by the muller. It then feeds into the muller and is acted upon by the disk and feeds out through the central hole in the outer head.

The advantages of my invention result from the use of the spirally-inclined shelves, which not only lift and agitate the mass of balls, but also cause them to drop at an angle to the vertical, so as to cause further rubbing and grinding action, and, further, from the end chamber with its contained grinding device and row of feed slots or openings, since additional action is thus obtained and the material is fed directly into the mass in the main chamber instead of upon its surface.

It will be readily understood that while I have shown in the drawings my invention applied to grinding a wet or slurry mixture I do not desire to limit myself thereto, as I may attain the same advantages in grinding dry material by arranging the feeding and delivery end of the cylinder so as to handle dry material.

Many changes may be made in the form and arrangement of the parts without departing from my invention.

I claim—

1. In a tube-mill, a horizontal, rotatory cylinder arranged to contain a mass of grinding-bodies, and having spiral shelves on its inner surface, the shelves being arranged to lift the contents of the cylinder and drop them during its rotation and being inclined in such direction as to retain the grinding-bodies near the end at which the material to be ground enters the cylinder; substantially as described.

2. In a tube-mill, a horizontal, rotatory cylinder having inlet and outlet orifices, an interior, wooden grinding-surface and arranged to contain a mass of grinding-bodies, said cylinder having a set of longitudinally-extending, helical shelves secured therein and arranged to lift the contents of the cylinder and drop them during its rotation, the inclination of the shelves tending to retain the grinding-bodies near the inlet-orifice; substantially as described.

3. A tube-mill comprising a horizontal rotatory cylinder containing a mass of balls or pebbles, said cylinder having at one end two separated heads, the inner head having an outer

annular row of slots, and the outer head having an axial feed-opening and a loose muller between the heads and projecting inwardly beyond the slots in the head; substantially as described.

4. In a tube-mill, a horizontal rotatory cylinder containing a mass of balls or pebbles, said cylinder having at the feed end two separated heads, the inner head having an outer annular row of slots, a loose muller between the heads and projecting inwardly over the slots, and an axial feed-inlet leading into the chamber between the head; substantially as described.

5. In a tube-mill, a horizontal drum arranged to contain a mass of balls or pebbles, and having an end chamber formed by two separate heads, the inner head having an annular row of slots, while the outer head has a central feed-opening, and a ring-shaped muller within this end chamber, and of greater diameter than the radius of the chamber; substantially as described.

6. In a tube-mill, a horizontal drum containing a mass of balls or pebbles, mechanism for rotating the drum, said drum having an end chamber formed by separated heads, the inner head having an annular row of slots, while the outer head has a central feed-opening, a ring-shaped muller within the end chamber, and of greater diameter than the radius of the chamber, and a loose grinding-disk within the muller; substantially as described.

7. In a tube-mill, a horizontal rotatory drum having its main chamber arranged to contain a mass of balls or pebbles, a set of spiral shelves extending longitudinally and projecting inwardly from the inner wall of the chamber, said drum having an end chamber formed by the separated heads, the inner head having an annular row of slots, while the outer head has a central feed-opening, and a mulling-grinder within said end chamber; substantially as described.

In testimony whereof I have hereunto set my hand.

GEORGE H. SHARP.

Witnesses:

CHAS. F. WADE,

H. J. TUBBS.