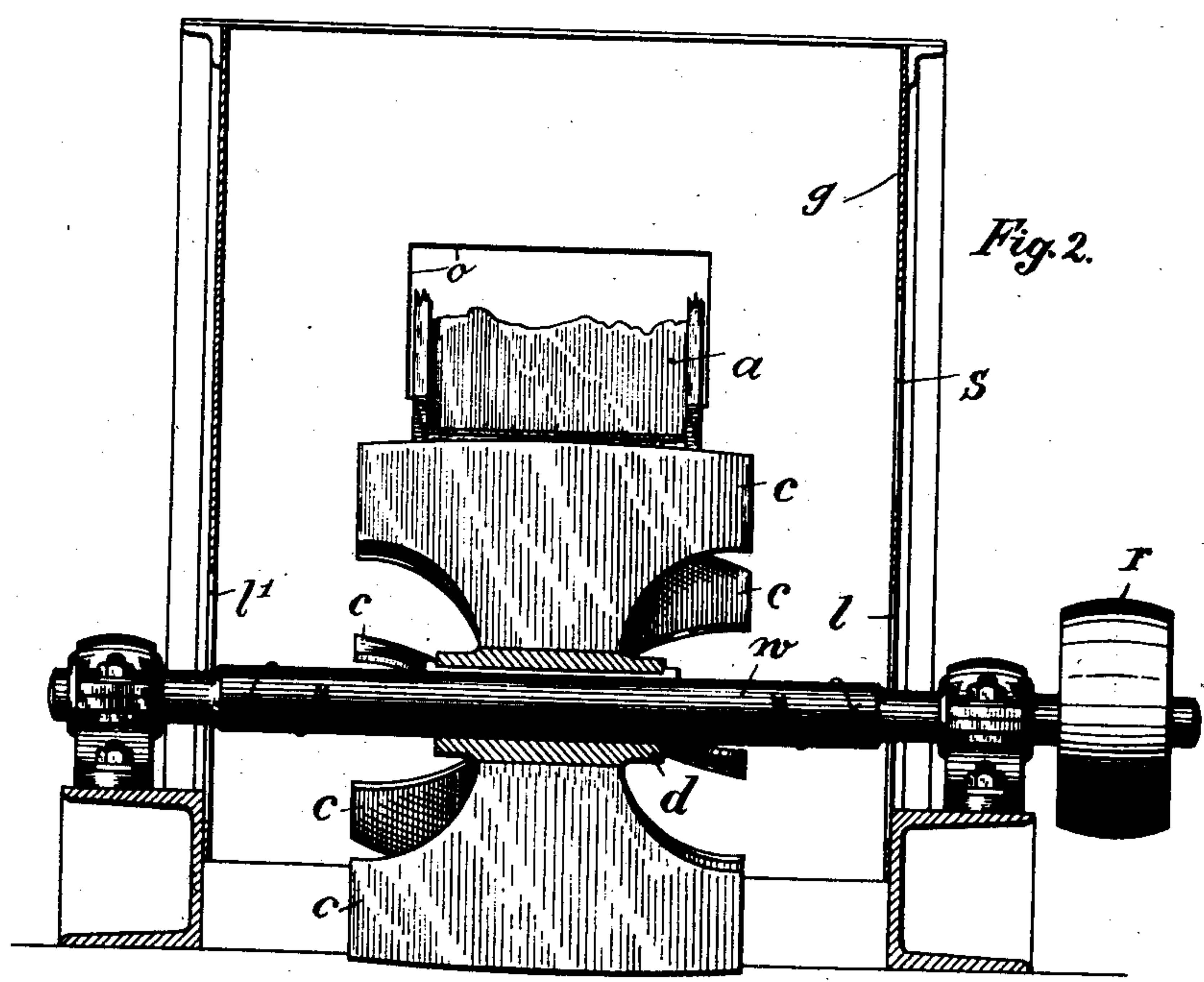
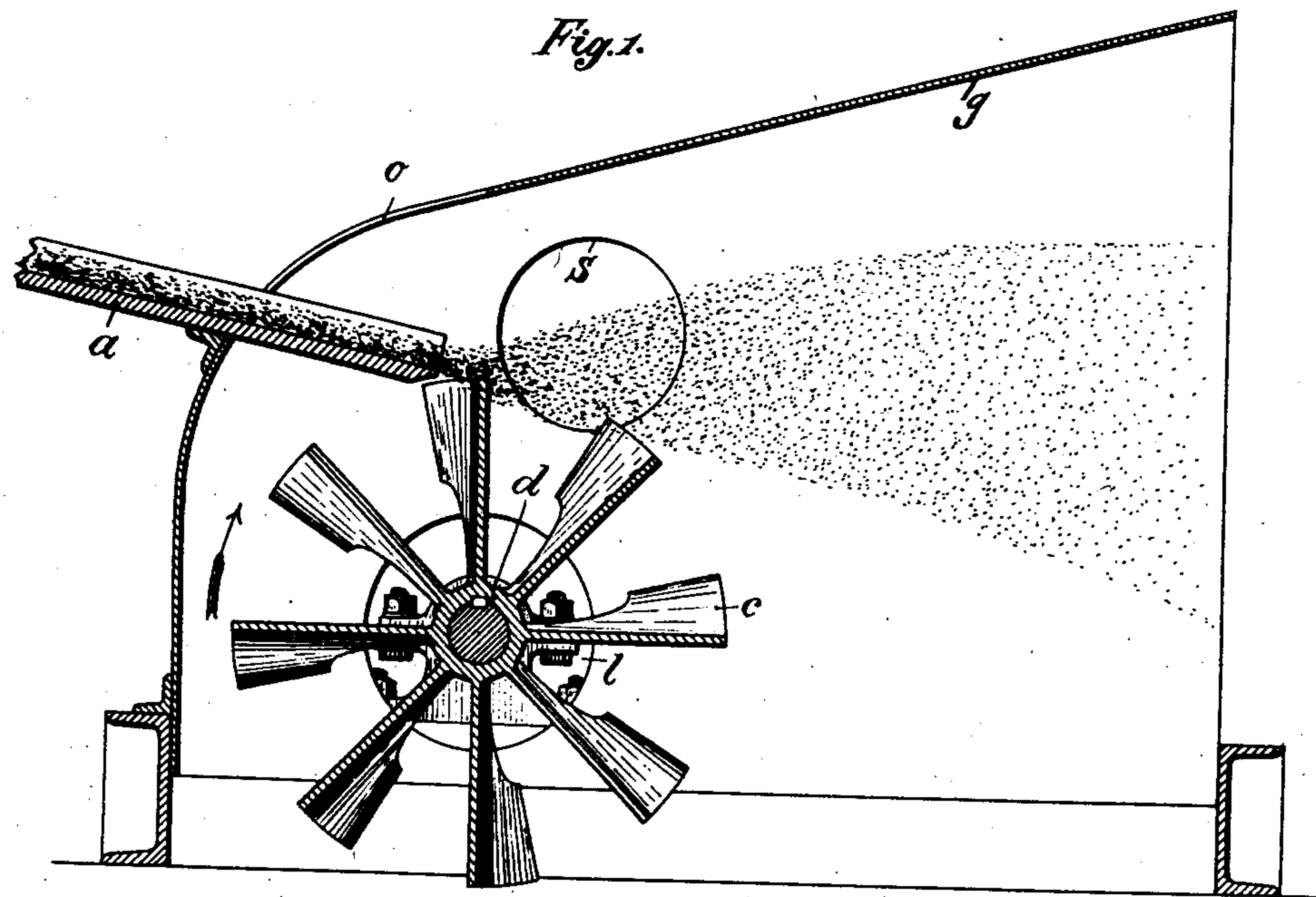


No. 786,573.

PATENTED APR. 4, 1905.

W. LESSING.
APPARATUS FOR SPRAYING BLAST FURNACE CINDER.
APPLICATION FILED NOV. 13, 1902.

3 SHEETS—SHEET 1.



Witnesses:
W. H. B. T. J. J. J.
Fritz Isler.

Inventor:
W. H. B. T. J. J. J.
Fritz Isler.

No. 786,573.

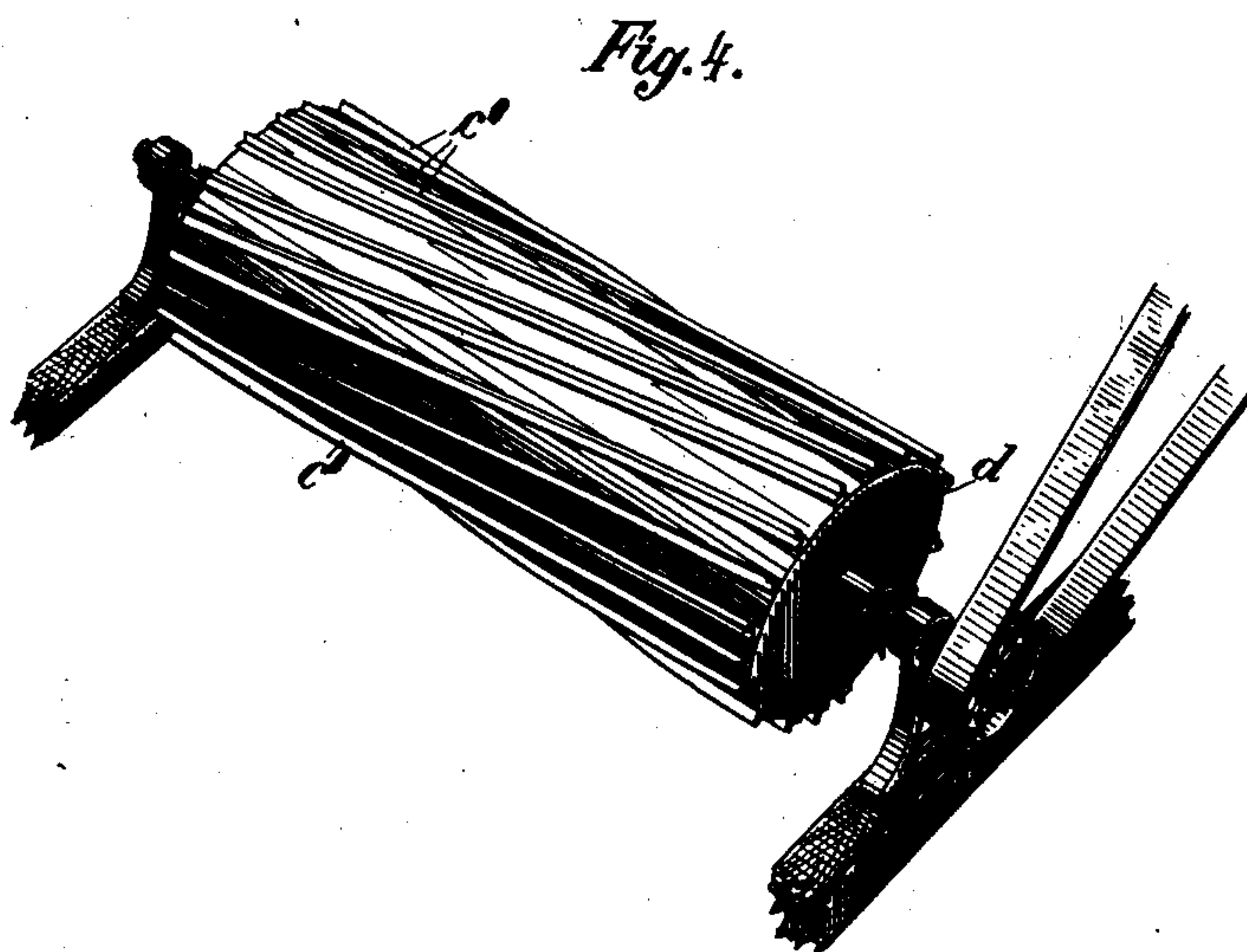
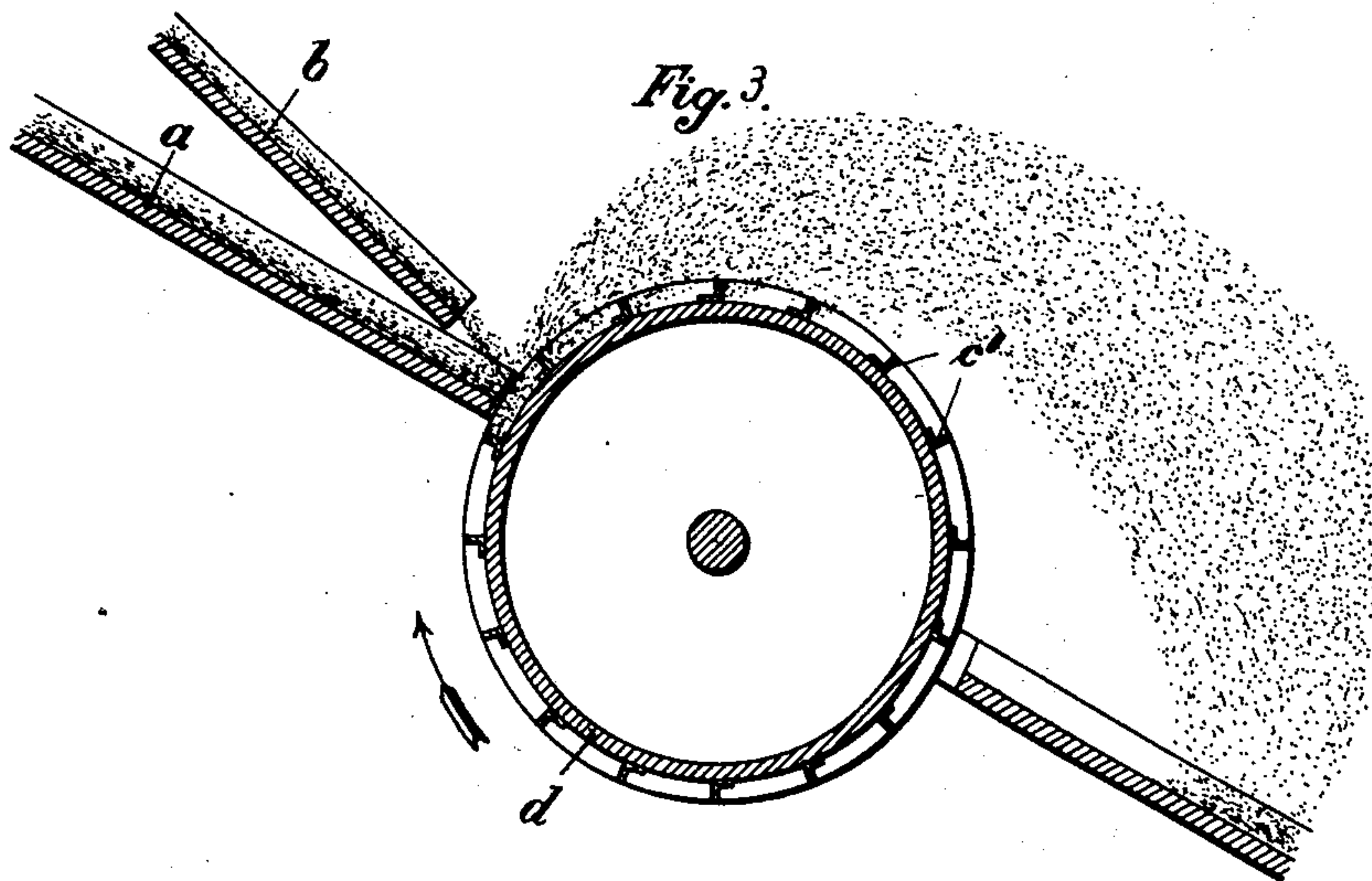
PATENTED APR. 4, 1905.

W. LESSING.

APPARATUS FOR SPRAYING BLAST FURNACE CINDER.

APPLICATION FILED NOV. 13, 1902.

3 SHEETS—SHEET 2.



Witnesses:
W. B. Borden
Fritz Slev.

Inventor:
William Lessing
by *Ferdinand M. Smith*
Attorney

No. 786,573.

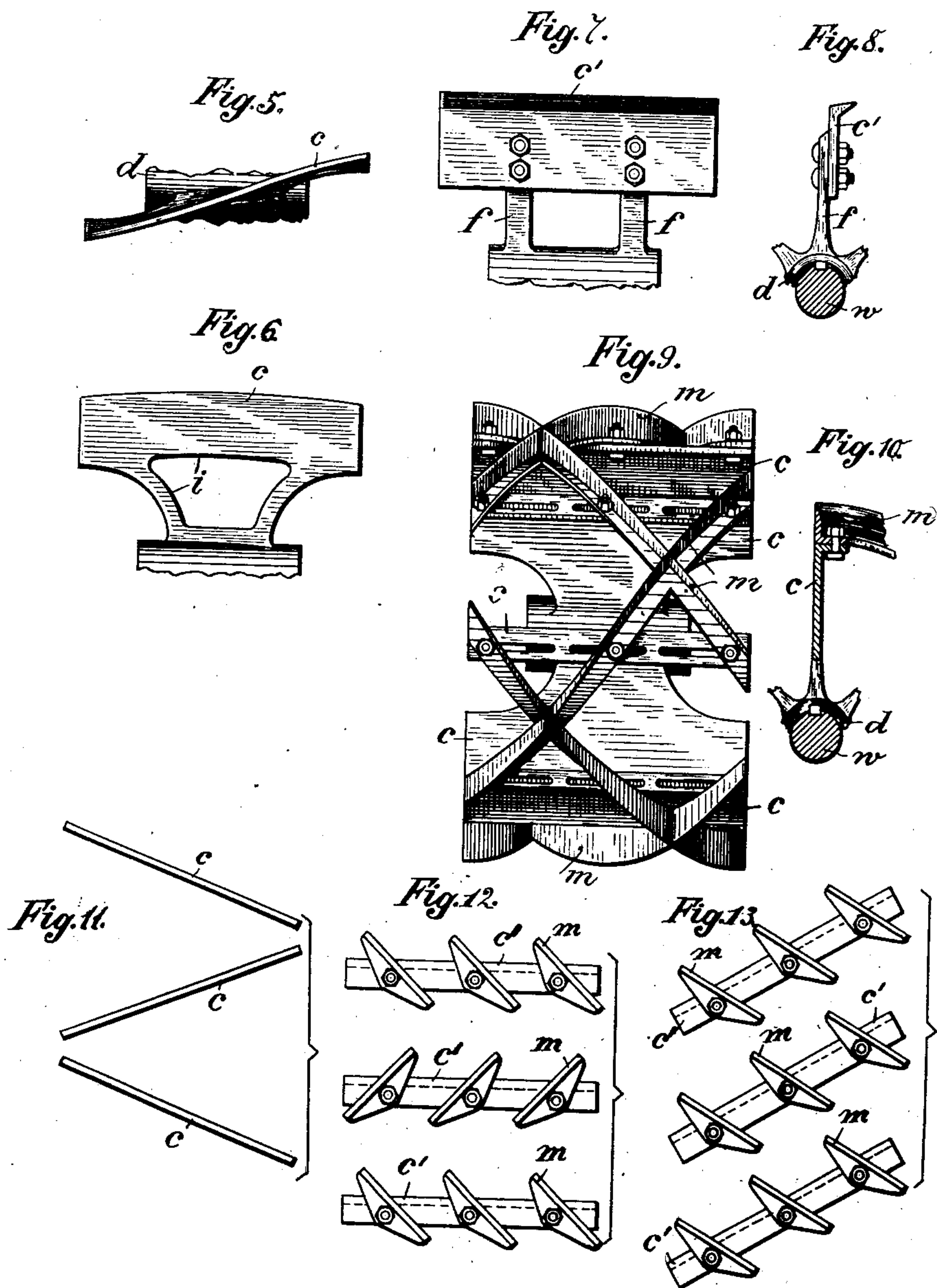
PATENTED APR. 4, 1905.

W. LESSING.

APPARATUS FOR SPRAYING BLAST FURNACE CINDER.

APPLICATION FILED NOV. 13, 1902.

3 SHEETS—SHEET 3.



Witnesses:
W. B. Atterden
Fitz. Isler.

Inventor:
Wilhelm Lessing
F. J. M. M. M.
Attorney.

UNITED STATES PATENT OFFICE.

WILHELM LESSING, OF GESEKE, GERMANY, ASSIGNOR TO GESELLSCHAFT FÜR TROCKENZERSTÄNBUNG FLÜSSIGER MATERIEEN MIT BESCHRÄNKTER HAFTUNG, OF BERLIN, GERMANY.

APPARATUS FOR SPRAYING BLAST-FURNACE CINDER.

SPECIFICATION forming part of Letters Patent No. 786,573, dated April 4, 1905.

Application filed November 13, 1902. Serial No. 131,225.

To all whom it may concern:

Be it known that I, WILHELM LESSING, merchant, a subject of the German Emperor, and a resident of Geseke, Westphalia, in the German Empire, have invented new and useful Improvements in Apparatus for Spraying Glowing Liquid Blast-Furnace Cinder, of which the following is a specification.

It is old to spray liquid glowing blast-furnace cinder by means of a spraying-disk rotating around a vertical axle simultaneously supplying air for combustion for the purpose of burning the noxious admixtures, and thus obtaining a firmly - holding cement. This known method has a great many disadvantages. The drums rotating around a vertical axle throw the cinders in all directions, so that much space is required for carrying out this method. A further disadvantage is that the speed of rotation diminishes from the periphery toward the center of the disk or drum, so that the cinders falling near the center of the spraying-disk are thrown with much less energy, and consequently a much shorter distance, than the cinders falling on the spraying-disk closer to the periphery of the same.

According to my improved apparatus a drum rotating around a horizontal axle is used, which is provided with ribs on the surface. The drum can be cooled inside by air, water, or in any other suitable way. The liquid blast-furnace cinders are supplied to the drum by means of a large inclined channel. Above the channel for the cinders a similar channel for the supply of materials, such as lime or the like, is provided, which are necessary to obtain a slag-cement of good quality. The flow of liquid cinder is thrown upward and forward in a large and thin spray as soon as it touches the surface of the drum. The length of the drum and the width of the slag-channel can be increased *ad libitum*, so that the flow of cinders becomes thinner, and consequently the cinders are sprayed more finely and more intimately mixed with the raw material. The degree of spraying can be further regulated by varying the inclination of the slag-channel. The cinders being sprayed away from the

blast-furnace, the device can be mounted close to the furnace. The speed at which the drum is rotated can be regulated according to requirement.

If the cement obtained by this improved apparatus has to be burned again, a calcining-furnace of suitable shape can be arranged in the vicinity of the spraying-drum, so that the slag-cement directly falls into the funnel of the calcining-furnace.

In the accompanying drawings the apparatus is shown.

Figure 1 is a longitudinal section of the apparatus. Fig. 2 is an end view showing the casing in section. Fig. 3 is a section through the drum, showing the modification. Fig. 4 is a perspective view of the drum shown in Fig. 3. Figs. 5 and 6 show detail views of one of the fans *c*. Figs. 7 and 8 are detail views of a modification in which the fan-blades have sharp projecting edges. Figs. 9 and 10 are detail views of a drum having spiral crossed cutters. Figs. 11, 12, and 13 are detail plan views showing various arrangements of the ribs or fans *c* and *c'* and the cutters *m*.

The longitudinal spraying-drum *d* is fixed on a horizontal axle *w*, which is adapted to be rotated at varying speed in any suitable manner. The supports of the axle can be suitably arranged on a carriage running on rails, so that the whole apparatus can be easily transported from one blast-furnace to the other. The spraying-drum *d* has projecting ribs *c* on its outer surface extending over the whole length of the drum, which suitably run at an angle to the axle, so as to prevent jolting of the drum, which would occur if the ribs were parallel to the axle, and consequently struck on their whole length by the cinder.

The cinder is supplied by means of the inclined slag-channel *a*, above which the channel *b* for the supply of the material to be mixed with the cinder is arranged in such a manner that the strong heat rising from the cinder serves for heating the materials to be mixed with the same. The supply of cinder can be regulated either by increasing or decreasing

the breadth of the supply-channel or by partly closing the mouth of the channel. The fineness of the spray can be further regulated by varying the angle of inclination of the slag-channel and by the variation of speed of rotation of the spraying-drum. The supply-channel for the cinder and for the material to be mixed with the same can be eventually inclosed in a common casing, so as to better utilize the heat emanating from the cinder.

According to the modified construction of the drum shown in Figs. 3 and 4 of the drawings the spraying-drum d has peripheral ribs or fans c' instead of ribs c , as hereinbefore described with reference to Figs. 1 and 2. The object of this modified construction is to obtain an automatic cooling of the drum, thereby preventing the sticking of the cooling-cinder to the drum-surface and simultaneously obtaining a more perfect spraying of the cinder and a better mixing of the materials.

The spraying-drum, as shown in Figs. 1 and 2, is inclosed in a casing, in the upper part of which an opening o is provided for the passage of the inclined slag-channel a . The horizontal axle w of the spraying-drum d is supported in suitable bearings arranged outside the casing g , and it is rotated from a pulley r , fixed to the projecting end of the axle. At the places where the ends of the axle w pass through the walls of the casing g openings l l' are arranged, which allow the entrance of the outer air. There can be further provided in the wall of the casing g an opening s , through which the working of the drum may be inspected. This opening is suitably closed by a mica plate. The spraying-drum d , fixed to the horizontal axle w , has fans c' projecting from its outer surface. These fans c' stand at an angle to the horizontal axle w , as shown in Fig. 4, or they may be parallel to the same. The surface of the fans, as shown in Fig. 5, is undulated.

If the fans c' are parallel to the axle w , as shown in Fig. 12, the air is driven away in radial direction and is continuously replaced by fresh air entering through the openings l l' , so that the fans c' , as well as the drum d and the axle w , are continuously surrounded by cold air. If, however, the fans c' are arranged at an angle to the horizontal axle, the air is only partly driven away in radial direction, the largest part flowing out through the opening l' , the fresh air entering through the opening l . If the fans run at an angle to the axle w , it is suitable to have cutouts i provided in the fans, as shown in Fig. 6. The same effect can be obtained by fixing the fans c' to arms f , projecting from the drum d , as shown in Figs. 7 and 8. The outer ends of the fans can be provided with sharp edges, as shown in Fig. 8. The undulating form of the fans is the most profitable, as with fans of this form the cinder does not touch at the same time the entire surface of the fans, so

that vibrating of the drum is prevented. A further advantage of this undulating surface of the fans is that each particle of the slag is thrown away at a different angle from the other particles, so that a more thorough mixture of the material is obtained. To obtain the same effect with fans c arranged parallel to the horizontal axle, it is recommendable to fix cutters m on said fans, (see Fig. 9,) which are twisted and stand at an angle to the surface of the fans. Fig. 10 shows in what manner the cutters m can be fixed to the surface of the fan. If desired, instead of arranging the ribs or fans c parallel with each other and with the axis of the drum the said ribs or fans may be inclined, as shown by the diagram in Fig. 11.

The cutters m may be screwed to the upper edges of the fans c' parallel to each other, but at an angle to the plane of the fan, as in Fig. 12, in which case it is advisable to place the cutters m of two adjoining fans at opposite angles. This arrangement of the cutters offers the advantage that their position can be easily regulated. The cutters can be further arranged parallel to each other on the upper edge of the undulating fans, as shown in Fig. 13. In any case the cutters m are removably connected with the fans, so that they can be easily replaced or sharpened if required.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In apparatus for spraying molten cinder, the combination, with a revoluble drum provided with ribs or fans which spray the cinder and circulate the air, of an inclosing casing for the said drum having an air-inlet opening in its side at one end of the drum and having also an opening above the drum, and a chute for supplying the cinder to the drum which projects through the last said opening.

2. An improved apparatus for spraying glowing liquid blast-furnace cinder comprising in combination a horizontally-situated rotatable spraying-drum, fixed on a rotatable horizontal axle, fans projecting from the surface of said drum having undulated surfaces, an adjustable channel for the supply of the material to be mixed with the cinder, an adjustable slag-channel above said drum, a casing inclosing the drum and accessories, having an opening in the upper part of said casing for the passage of the slag-channel, and having openings in the walls of the casing around the ends of the axle of the drum, substantially as described and shown and for the purpose set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILHELM LESSING.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.