

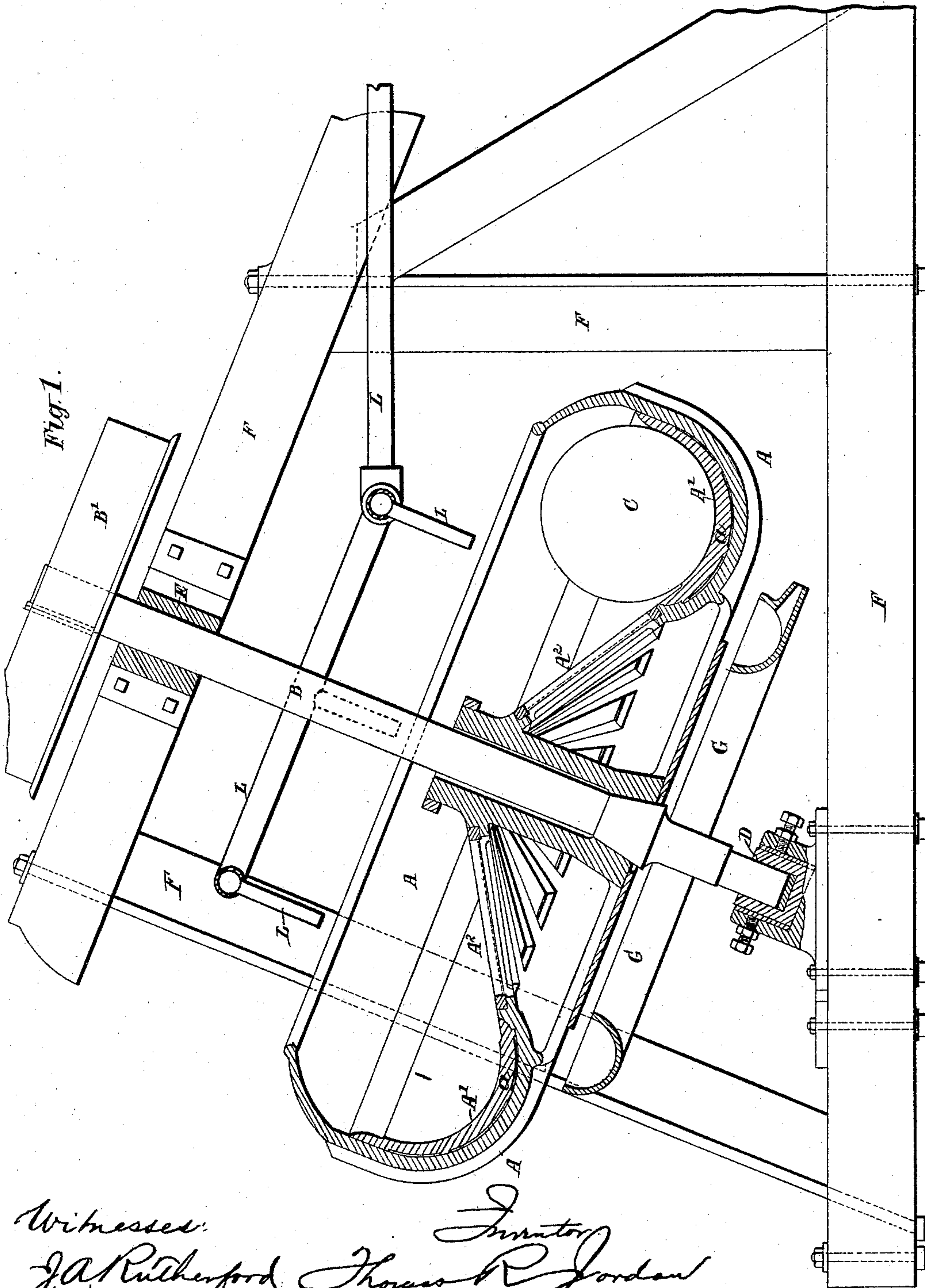
(No Model.)

2 Sheets—Sheet 1.

T. R. JORDAN.
CRUSHING OR PULVERIZING ORES, &c.

No. 442,055.

Patented Dec. 2, 1890.



Witnesses:

J. A. Rutherford Thomas R. Jordan
Dennis Sumby. By James L. Norris.
attorney

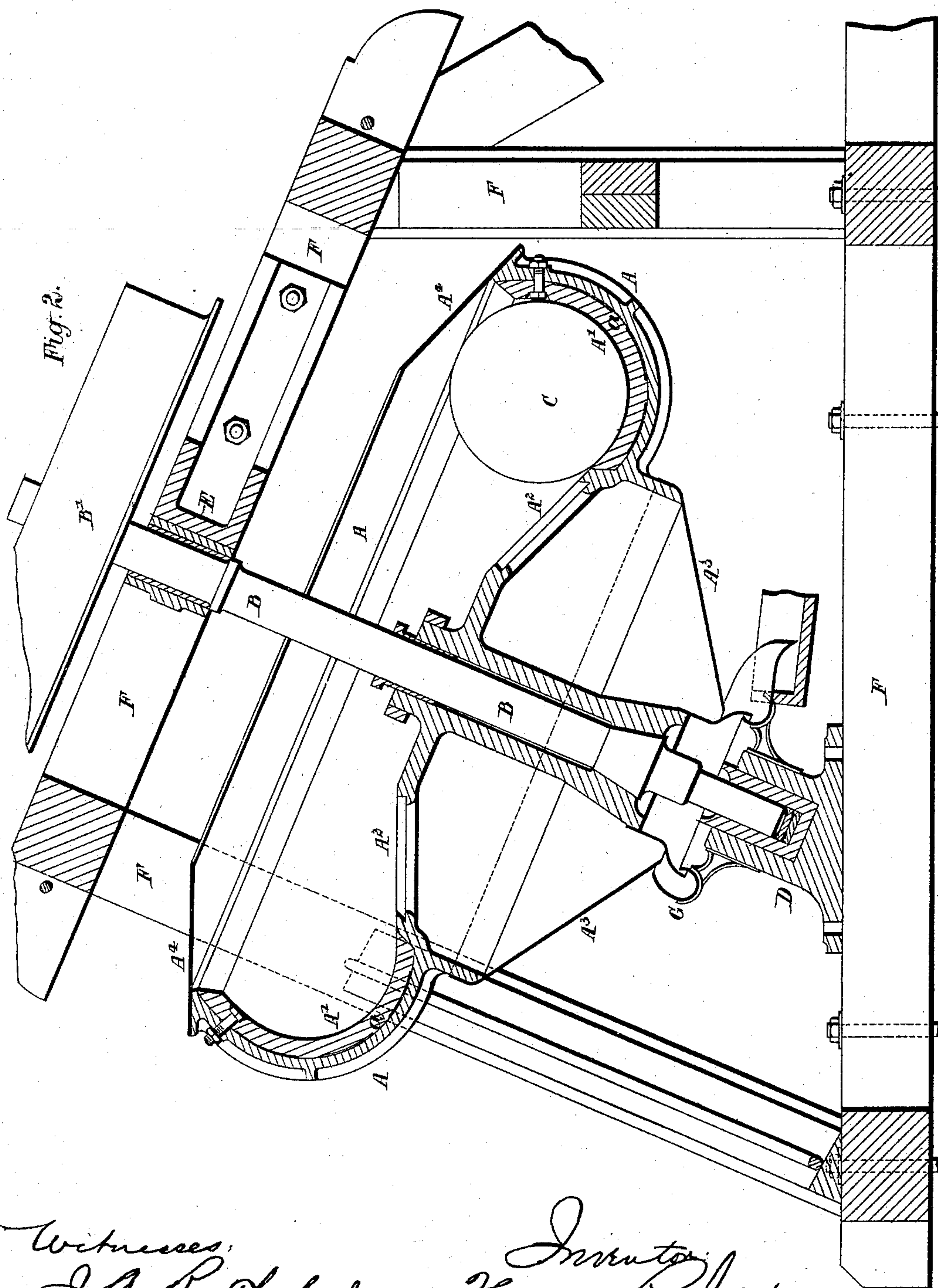
(No Model.)

2 Sheets—Sheet 2.

T. R. JORDAN.
CRUSHING OR PULVERIZING ORES, &c.

No. 442,055.

Patented Dec. 2, 1890.



Witnesses,
J. A. Rutheford
Deane Sundry.

Inventor,
Thomas R. Jordan.
By James L. Norris,
Attorney

UNITED STATES PATENT OFFICE.

THOMAS ROWLAND JORDAN, OF LONDON, ENGLAND.

CRUSHING OR PULVERIZING ORES, &c.

SPECIFICATION forming part of Letters Patent No. 442,055, dated December 2, 1890.

Application filed October 10, 1889. Serial No. 326,558. (No model.) Patented in England February 23, 1889, No. 3,298; in Queensland February 27, 1889, No. 881; in Transvaal September 2, 1889; in Cape of Good Hope October 30, 1889, No. 101; in Victoria October 30, 1889, No. 7,222; in South Australia October 30, 1889, No. 1,447; in New South Wales October 31, 1889, No. 1,801; in Natal November 6, 1889; in Belgium November 15, 1889, No. 88,334; in France December 16, 1889, No. 201,242; in Spain February 1, 1890, No. 10,157; in Austria-Hungary May 1, 1890, and in Germany September 3, 1890, No. 53,382.

To all whom it may concern:

Be it known that I, THOMAS ROWLAND JORDAN, engineer, a subject of the Queen of Great Britain, and a resident of London, England, have invented a certain new and useful Improved Apparatus for Crushing or Pulverizing Ores and other Substances, (for which I have obtained patents in Great Britain, dated February 23, 1889, No. 3,298; in France dated December 16, 1889, No. 201,242; in Belgium, dated November 15, 1889, No. 88,334; in Germany, dated September 3, 1890, No. 53,382; in Austria-Hungary, dated May 1, 1890; in Spain, dated February 1, 1890, No. 10,157; in Cape of Good Hope, dated October 30, 1889, No. 101; in Natal, dated November 6, 1889; in Victoria, dated October 30, 1889, No. 7,222; in New South Wales, dated October 31, 1889, No. 1,801; in South Australia, dated October 30, 1889, No. 1,447; in Queensland, dated February 27, 1889, No. 881, and in Transvaal, dated September 2, 1889,) of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to apparatus for crushing or pulverizing ores and other substances.

The main object of my said invention is to provide a pulverizer which is simple in construction and in which the wear and tear involved in the pulverization of the said substances is minimized, and is concentrated upon or confined to parts which can be easily removed and replaced at a small cost.

A further important object of my said invention is to provide for the pulverization of a larger quantity of material in proportion to the power employed than is practicable with the well-known crushing or pulverizing machines. I obtain this result, first, by reducing, as far as practicable, the number of working parts and frictional surfaces of the machine; secondly, by insuring constant instead of intermittent action upon the material to be crushed or pulverized, and, thirdly, by providing for the constant and regular extrac-

tion from the machine of the ore or other substance immediately it is reduced to the required fineness.

In the accompanying drawings, Figure 1 is a vertical central section of one form or arrangement of my improved apparatus. Fig. 2 is a similar view showing another arrangement of the said apparatus.

A is a receptacle or pan, which is provided with a circular crushing path or channel A', and is fixed upon a strong shaft B, arranged to be rotated about an inclined axis. In this pan are placed heavy spherical mullers or balls C, which in the rotation of the pan A are caused by gravity to roll and revolve about their axes on the said crushing path or channel. The ore or other substance is fed into the said receptacle or pan and is therein subjected to a powerful crushing or grinding action between the said mullers or balls and the crushing-path of the said pan.

The shaft B, on which the crushing-pan is mounted, is supported at its lower end in a massive step or bearing D and at its upper end in a bearing E, held in position by a framing F of wood or other suitable material.

B' is a pulley firmly keyed or otherwise secured upon the shaft B. Rotary motion is imparted to the said shaft and pan from a steam-engine or other motor by means of belt-gearing or in any other convenient manner.

A suitable automatic feeding apparatus is by preference combined with the crushing-pan in such a manner that it will feed the ore or other material to be ground into the aforesaid crushing path or channel. Provision is, moreover, made by means of pipes L, Fig. 1, for the introduction into the pan at one or more suitable points of one or more jets or streams of water, which are so regulated and directed as to wash the crushed or pulverized material over the upper side of the conical sieve or screen, hereinafter described, the finely-reduced particles passing through and away from the machine and the coarser particles passing down over the cone to the crush-

ing-path. The upper edge of the pan is turned inward to prevent the escape of the water or slime.

I sometimes provide a circular trough or channel G beneath the crushing-pan for the delivery or discharge of the crushed material or slime. Brushes or scrapers may, if desired, be provided for throwing the crushed material and water over the aforesaid gratings.

In using my improved machine the pan is rotated at such a velocity that the mullers or balls will be caused by centrifugal force and by gravity to exert a very powerful grinding or crushing action upon any material between the same and the crushing-path. The said mullers or balls will, moreover, by their vibration and by striking against each other very rapidly and effectually crush or grind the material fed into the pan.

I find it advantageous to make the central portion A² of the base of the grinding-pan of conical form and the sides of the said pan curved in transverse section, as shown. There is thus formed within the pan and near its periphery the circular crushing path or channel A'. This crushing path or channel is preferably fitted with a false bottom a, which is formed in sections of hard steel, white cast-iron, or other suitable material to resist wear and tear. The said sections are so secured in place that they can be readily replaced when worn. The mullers or balls C may also be made of hard steel or white cast-iron. The conical portion A² of the base of the pan is provided with a sieve or grating and forms the outlet for the pulverized material from the machine when crushed sufficiently fine. The surface of this conical sieve or screen, by reason of the inclination of the pan, is approximately horizontal at the upper side, and is suitably inclined at the lower side, as shown in the drawings.

In the arrangement shown in Fig. 2 the crushing-pan is provided with a conical casing A³ for conducting the water and slime discharged from the said pan to a central de-

livery-aperture, through which it will flow into the trough or channel G. The crushing-pan is, moreover, provided with a sheet-metal deflecting-plate A⁴ to prevent escape of the water over the edge of the said pan.

What I claim is—

1. A pulverizer comprising a pan which is provided with a circular crushing path or channel and which is mounted upon a shaft arranged to rotate about a fixed or stationary inclined axis, mullers or balls which in the rotation of the said pan revolve about their own axes and roll upon the said crushing-path, but do not revolve about the axis of the said pan, an annular discharge-aperture surrounding the said shaft beneath the said crushing-path, a central conical sieve or screen above the said discharge-aperture, and an annular trough arranged beneath the said discharge-aperture, substantially as and for the purposes above specified.

2. In a pulverizer, the combination of a pan provided with a circular crushing path or channel and mounted upon a shaft which rotates about a fixed or stationary inclined axis, mullers or balls which in the rotation of the said pan revolve about their axes and roll upon the said crushing-path, an annular discharge-aperture surrounding the said shaft beneath the said crushing-path, a conical sieve or screen in the center of the said crushing-path and above the said discharge-aperture, a conical casing below the said sieve or screen to conduct the water or slime to the said discharge-aperture, and an annular trough arranged beneath the said discharge-aperture, substantially as and for the purposes set forth.

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

THOS. ROWLAND JORDAN.

Witnesses:

THEODORE ALLPRESS,
EDMUND S. SNEWIN.