

(No Model.)

3 Sheets—Sheet 1.

W. A. KONEMAN.
ORE DRYING APPARATUS.

No. 560,855.

Patented May 26, 1896.

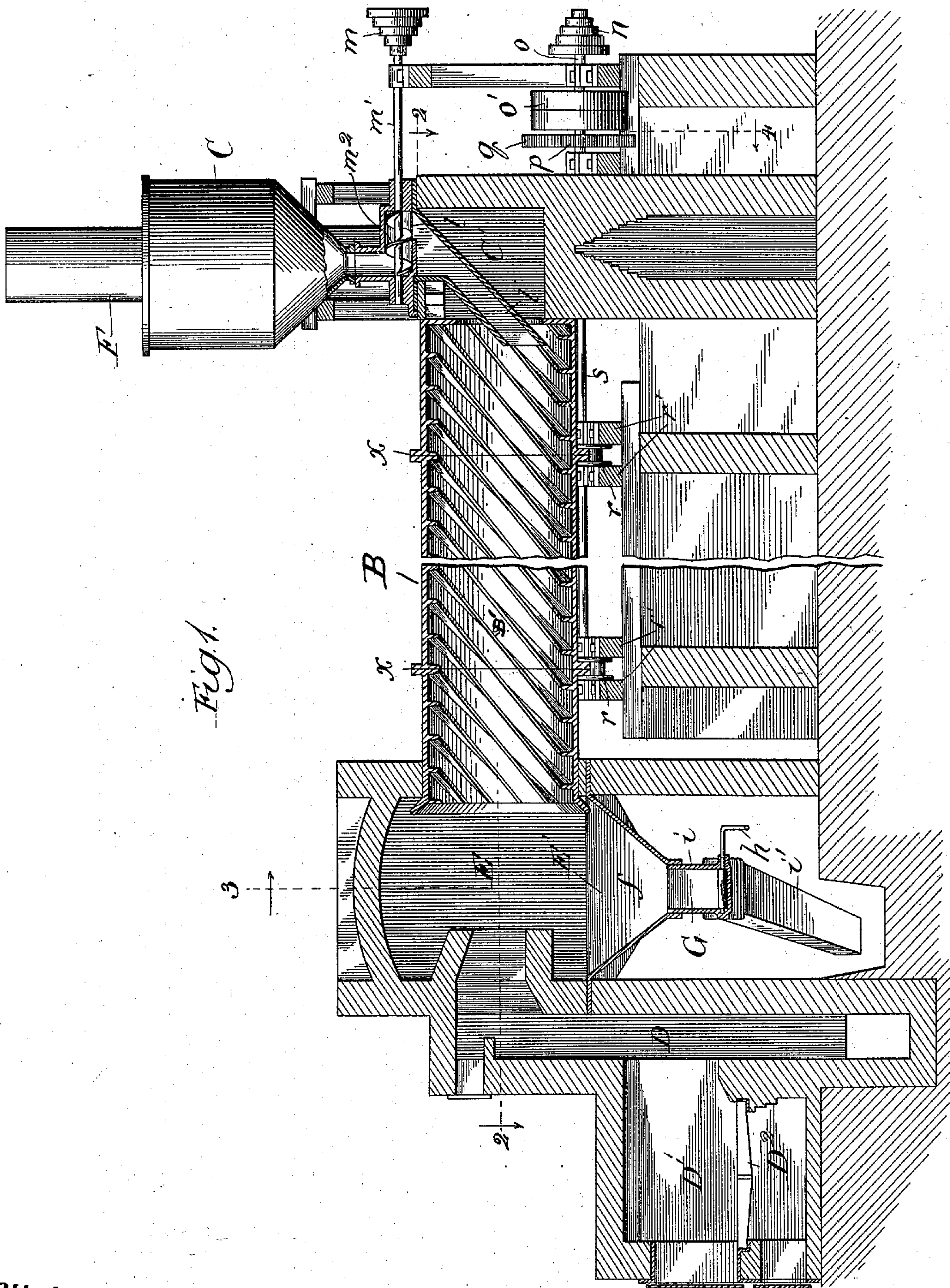


Fig. 1.

Witnesses:
Chas. E. Gaylord,
Levi S. Allen.

Inventor:
William A. Koneman,
By Dymally & Dymally,
Attys.

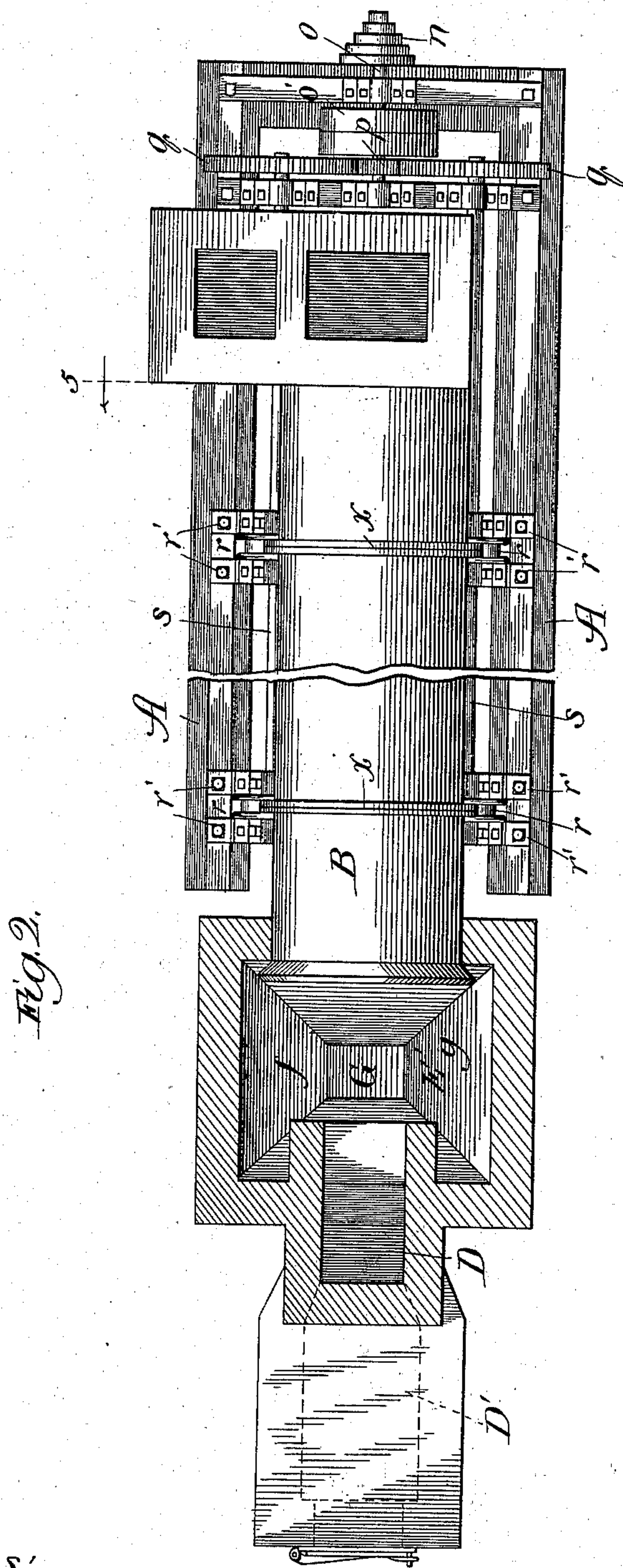
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3 Sheets—Sheet 3.

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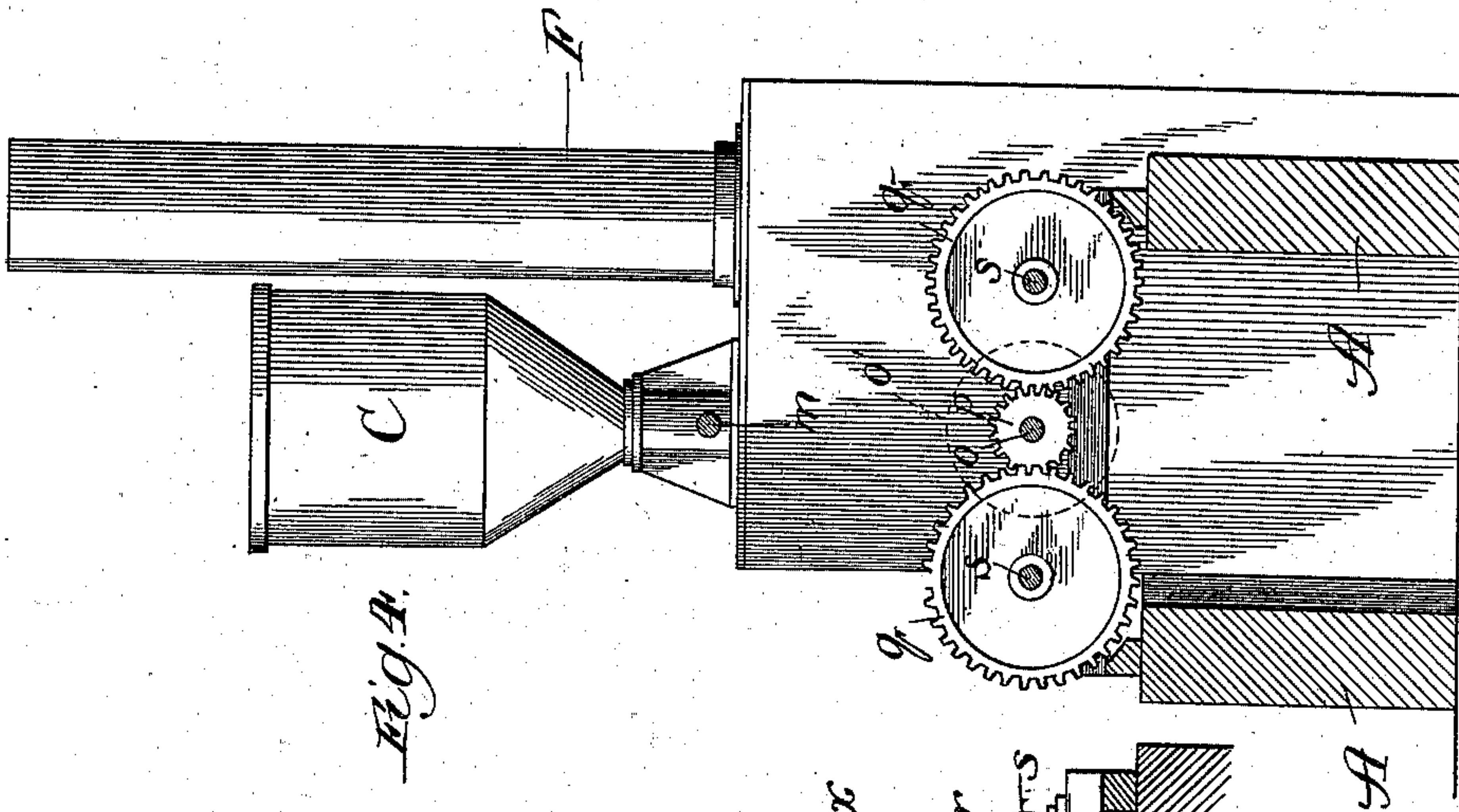


Fig. 1.

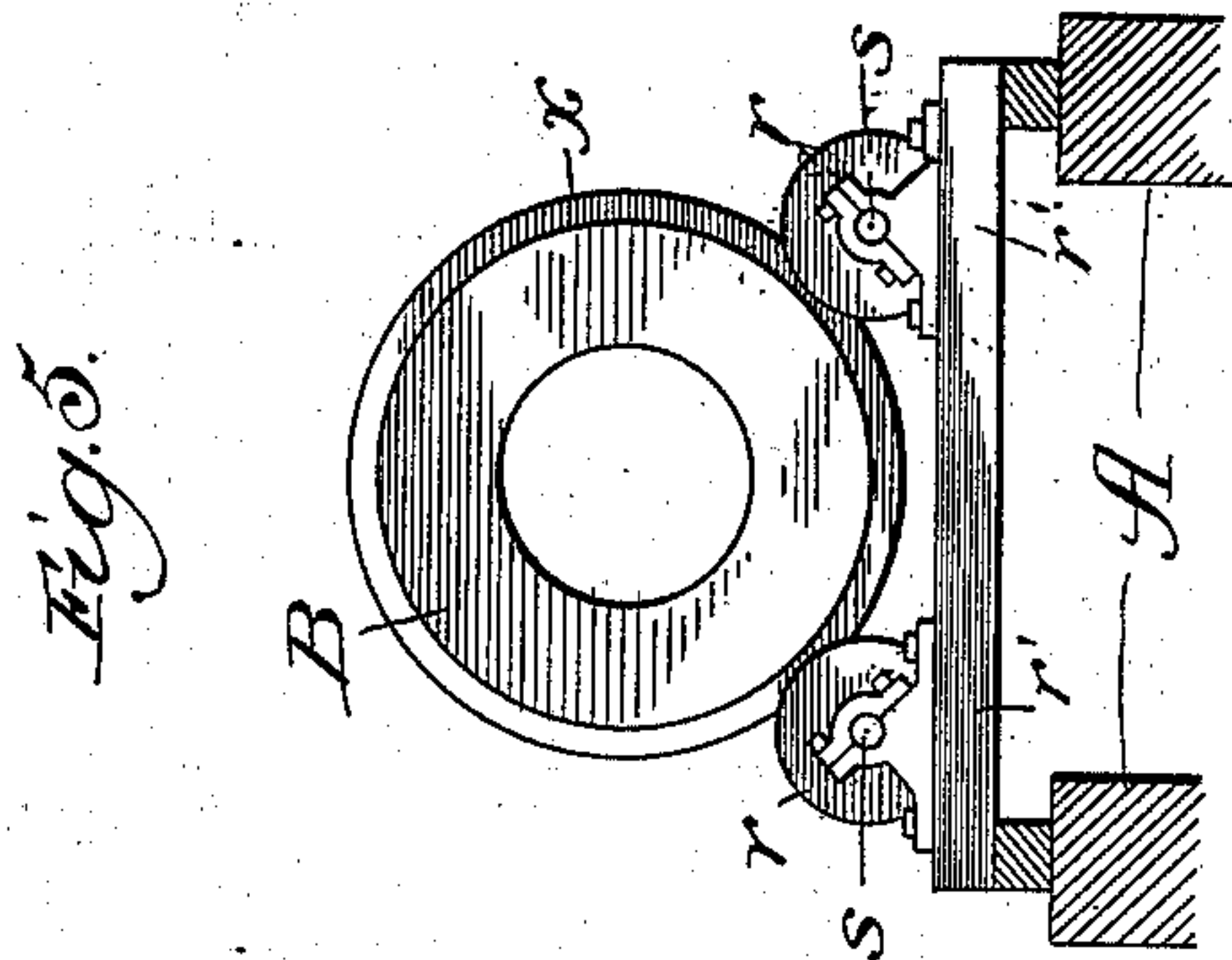


Fig. 2.

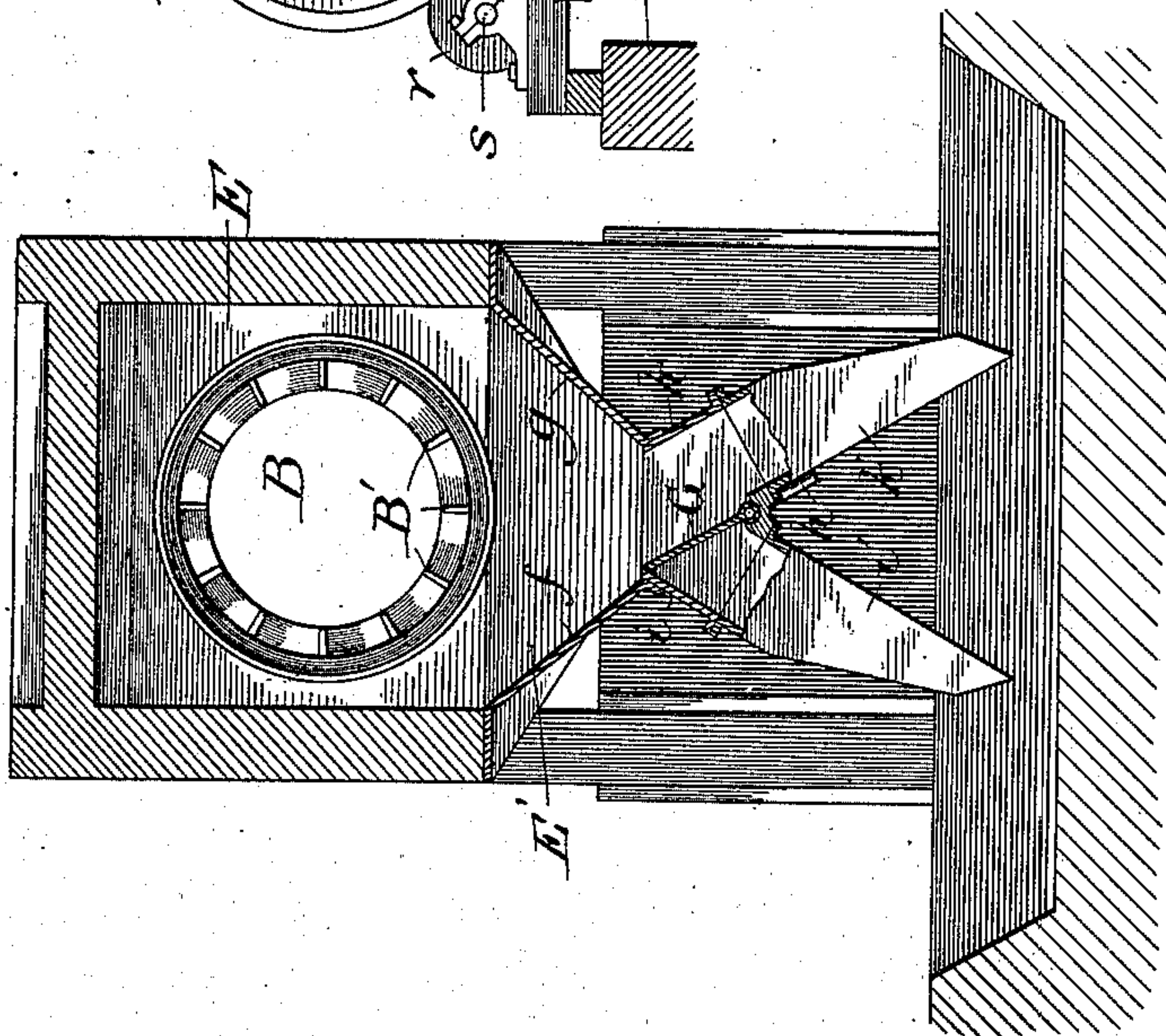


Fig. 3.

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UNITED STATES PATENT OFFICE.

WILLIAM A. KONEMAN, OF CHICAGO, ILLINOIS.

ORE-DRYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 560,855, dated May 26, 1896.

Application filed March 6, 1894. Renewed October 24, 1895. Serial No. 566,782. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. KONEMAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Ore-Drying Apparatus, of which the following is a specification.

My invention relates to an improvement in the class of apparatus for drying ore to prepare it for pulverization, and which has been crushed to reduce it to lumps in size suitable for subjection to drying.

Some varieties of precious-metal-bearing ore have their principal value in the form of deposits of mineral on the surfaces of the planes of natural fracture, or cleavage-planes, and for saving which does not require that the ore be previously pulverized. Other varieties of precious-metal-bearing ore are of a nature requiring that it be all subjected to the action of a pulverizing-machine to prepare it for subsequent treatment.

The object of my improvement is to provide an ore-drying apparatus which shall serve, by tumbling the ore of the variety first referred to while undergoing the drying operation, to scour off, or remove by attrition, the cleavage mineral and to deliver the contents of the drier to a point of discharge, from which it is subjected to a suitable screen for separating the freed mineral from the refuse, which latter may then be pulverized preparatory to its further treatment, thus causing the apparatus to perform a rough-concentrating operation, and which apparatus shall also serve for drying ore of the second variety referred to and be readily adaptable at the will of the operator to direct the ore, after it has been subjected to the drying operation, to a point of discharge different from that to which the variety of ore referred to as bearing the cleavage mineral is delivered, and from which to subject it all to the action of a suitable pulverizing-machine to prepare it for subsequent treatment.

My invention consists in the improved construction of the ore-drying portion of the apparatus.

Referring to the accompanying drawings, Figure 1 is a broken view showing my improved ore-drying apparatus in longitudinal sectional elevation. Fig. 2 is a broken plan

view of the same, showing the parts at the delivery end of the drum in horizontal section, taken at the line 2 on Fig. 1 and viewed in the direction of the arrow. Fig. 3 is a section taken at the line 3 on Fig. 1 and viewed in the direction of the arrow. Fig. 4 is a sectional end view of the apparatus, the section being taken at the line 4 on Fig. 1 and viewed in the direction of the arrow. Fig. 5 is a section taken at the line 5 on Fig. 2 and viewed in the direction of the arrow.

A A are supporting-walls affording a bed for the apparatus, on the top of which, at opposite sides of its longitudinal center, are supported bearings r' for rotatable shafts s , extending lengthwise of the bed and carrying, at suitable intervals, to rotate with the shafts, flanged rollers r . The shafts are provided at one end with cog-wheels q .

B is the receptacle for the ore while being subjected to the drying operation. It is shown in the form of a horizontally-supported hollow cylinder or drum of considerable length—say about thirty feet—and between four and five feet in diameter, formed in tubular sections fastened together at circumferential flanges x , with which the rollers r are caused to coincide, whereby the flanges x seat between the flanges of the rollers, rotation of which by revolving the shafts s thus causes the drum to revolve. To this end the cog-wheels q are engaged to produce contrary rotation of the two shafts s by an interposed pinion p on a drive-shaft o , carrying a tight and loose belt-pulley o' , at which the driving power is applied. At its outer end the shaft o carries a cone-pulley n , adapted to be connected by a belt with a reversely-extending cone-pulley m , supported directly above it on a rotary shaft m' , journaled in position to extend horizontally between the discharge end of an ore-feeding hopper C and the inlet C' to the drum B, at one end thereof, as shown, the opening l to the said inlet being below and to one side of the discharge-outlet from the hopper, and the shaft m' carrying a housing-worm m^2 for conveying the ore from such discharge-outlet to the opening l , which is in the base of the housing covering the mouth of the chute l' , through which the chute l' is directed into the drum. Thus clogging of the hopper-outlet is prevented, and the cone-

pulleys afford means for regulating the feed of the ore. On the inner cylindrical surface of the drum are formed a series of spiral conveyer-flanges B', which operate by rotation of the drum to propel its contents toward the discharge end and in propelling the ore to cause the lumps to rub against each other, with the effect of separating the cleavage mineral from it when the ore under treatment is of the cleavage-mineral variety.

The spiral conveyer-flanges glide the ore along and upon the inner surface of the drum thus without throwing it, whereby the finer particles of the ore, which usually contain the greatest value, are not subjected to agitation and are saved without the provision of an expensive system of dust-collectors, which would otherwise be required.

For supplying the heat for drying I provide near the discharge end of the drum a flue D, which leads from a suitable coal-gas supply (not shown) into a chamber E, interposed between the flue and drum, and having its bottom in the form of a hopper E'; and to enable the drying to be produced with the products of combustion directly from a wood or other fire I provide a supplemental furnace D', having a grate D² and communicating with the flue D to lead through the latter into the chamber E and thence into the revolving drum B the products of combustion, which (like the coal-gas ignited in the chamber E when used) pass through the drum contrarily to the course of the ore and escape, together with the fumes liberated from the ore by the heat, at the stack F.

The hopper E' is provided with two relatively-divergent outlet-spouts *k* and *i* at its base, from which, respectively, proceed chutes *k'* and *i'*, the former to one point of discharge, where there may be any suitable construction of screen, (not shown, as it need not involve any features of novelty and forms no part of my invention,) and the latter to another point of delivery, where there may be a suitable pulverizing-machine. (Also not shown, for the same reasons, that no screen is illustrated.) At the junction of the spouts *k* and *i* I hinge a deflecting-valve G and provide a handle *h* for turning it to coincide at will with the side *g* of the hopper E' for directing the contents thereof into the chute *i'* and with the side *f* of the hopper for directing its contents into the chute *k'*. The first-named position of the valve G, according to the arrangement hereinbefore described, is the one when the variety

of ore being dried is that which is all to be subjected to pulverization, and the last-named position of the valve would be that when the variety of ore being run through the drier is that having the cleavage-deposits of mineral, which is rubbed off in the cylinder B by attrition of the ore, requiring the latter to be screened to separate from it the released mineral.

For the scouring purpose the cylinder is required to be of considerable length, and I accordingly make it about thirty-two feet long. This renders desirable the employment of a long-flame fuel, and I therefore construct the apparatus for firing with coal-gas, which is fuel-gas generated by the combustion of bituminous coal with an air or an air and steam blast. Inasmuch, however, as the supply of coal in mining-regions, where the apparatus is used, is at times unreliable, it becomes important to provide for permitting ready substitution of one character of fuel for another, and I therefore so construct the means of gas-admission as to provide for conducting the flame and heat from a wood-burning furnace D' into the flue D to supply heat when coal for gas-making purposes is not available.

The horizontal position in which the rotary drum is supported is important, as it prevents greater speed being imparted to the ore in one portion of the drum than to that in another portion thereof, which would ensue were the drum inclined downward toward its discharge end, with consequent loss by the dust, which would thereby be generated.

What I claim as new, and desire to secure by Letters Patent, is—

In an ore-drying apparatus, the combination with the rotatably-supported drum provided with the internal spiral flange conveyer, of a flue, at the discharge end of the drum for directing therein hot products of combustion, an outlet for the gases at the opposite feed end of the drum, a chute at said feed end, a hopper supported over said chute and a feed-regulating device for the ore comprising a rotatable shaft carrying a worm in a housing between the hopper-outlet and the mouth of the chute, and covering the latter, said housing having a discharge-opening in its base to one side of the plane of the hopper-outlet, substantially as described.

WILLIAM A. KONEMAN.

In presence of—

M. J. FROST,

W. N. WILLIAMS.