

939,049.

Patented Nov. 2, 1909.

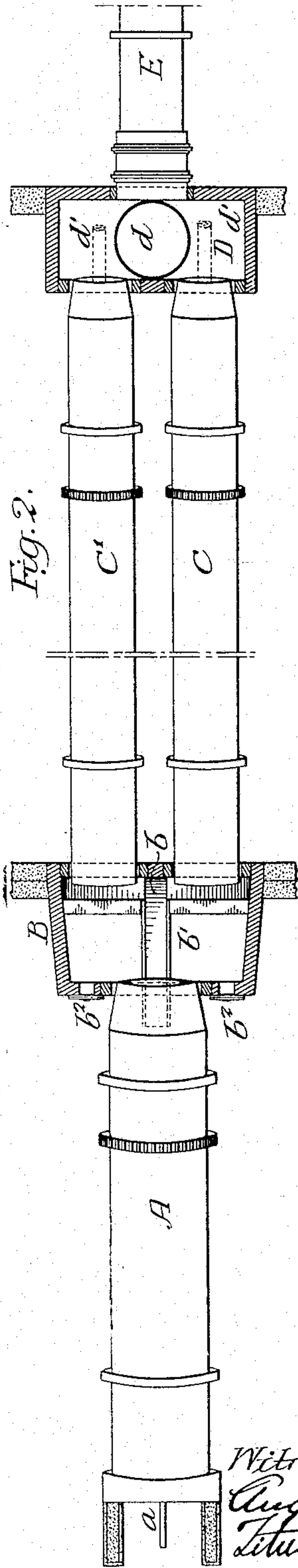


Fig. 2.

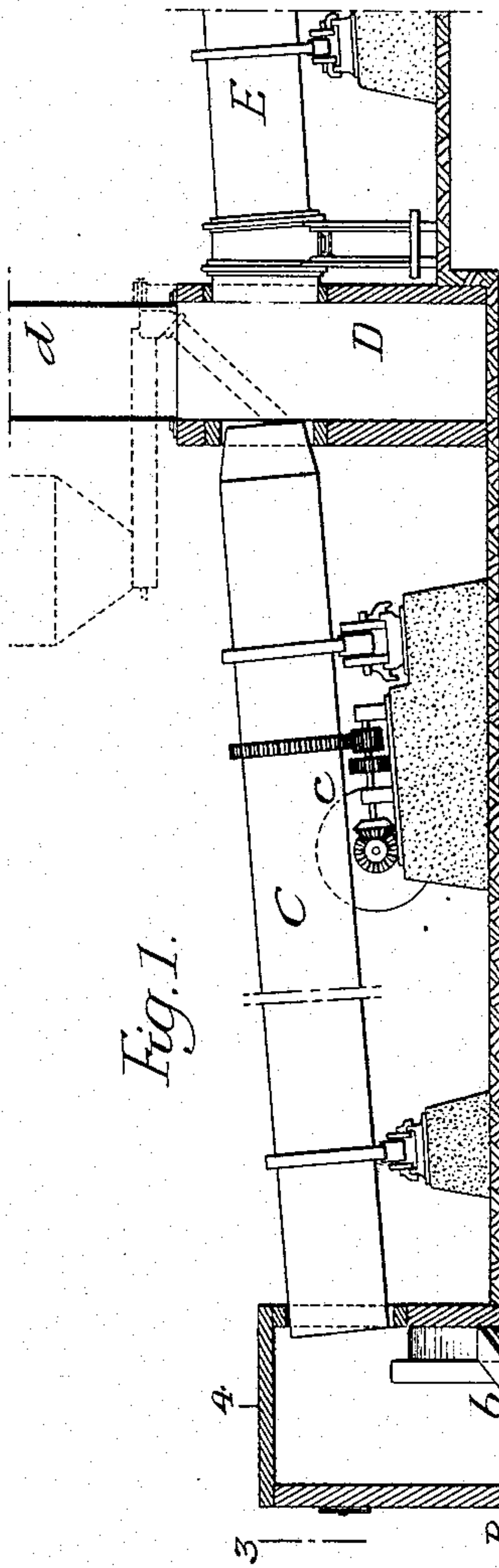


Fig. 1.

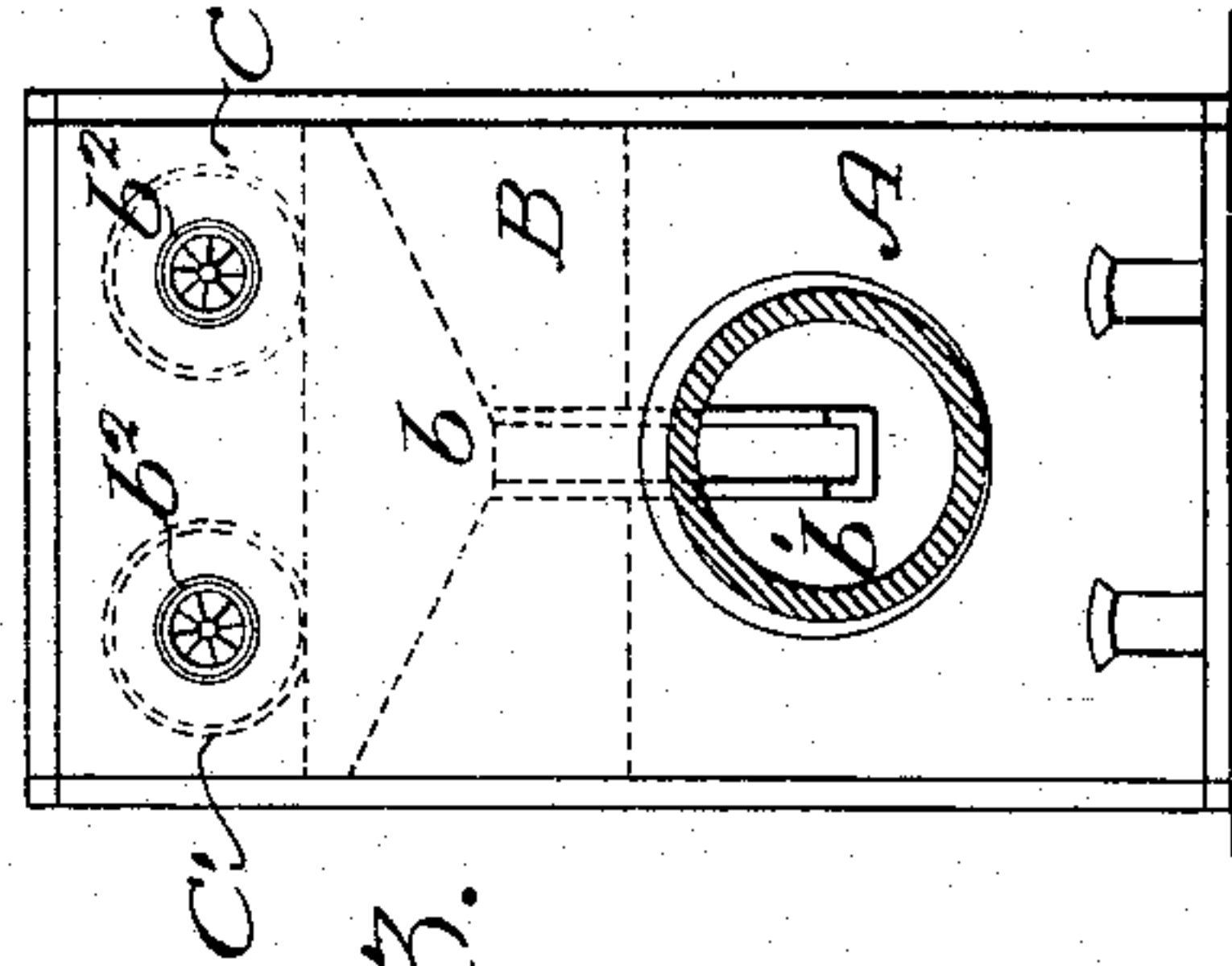


Fig. 3.

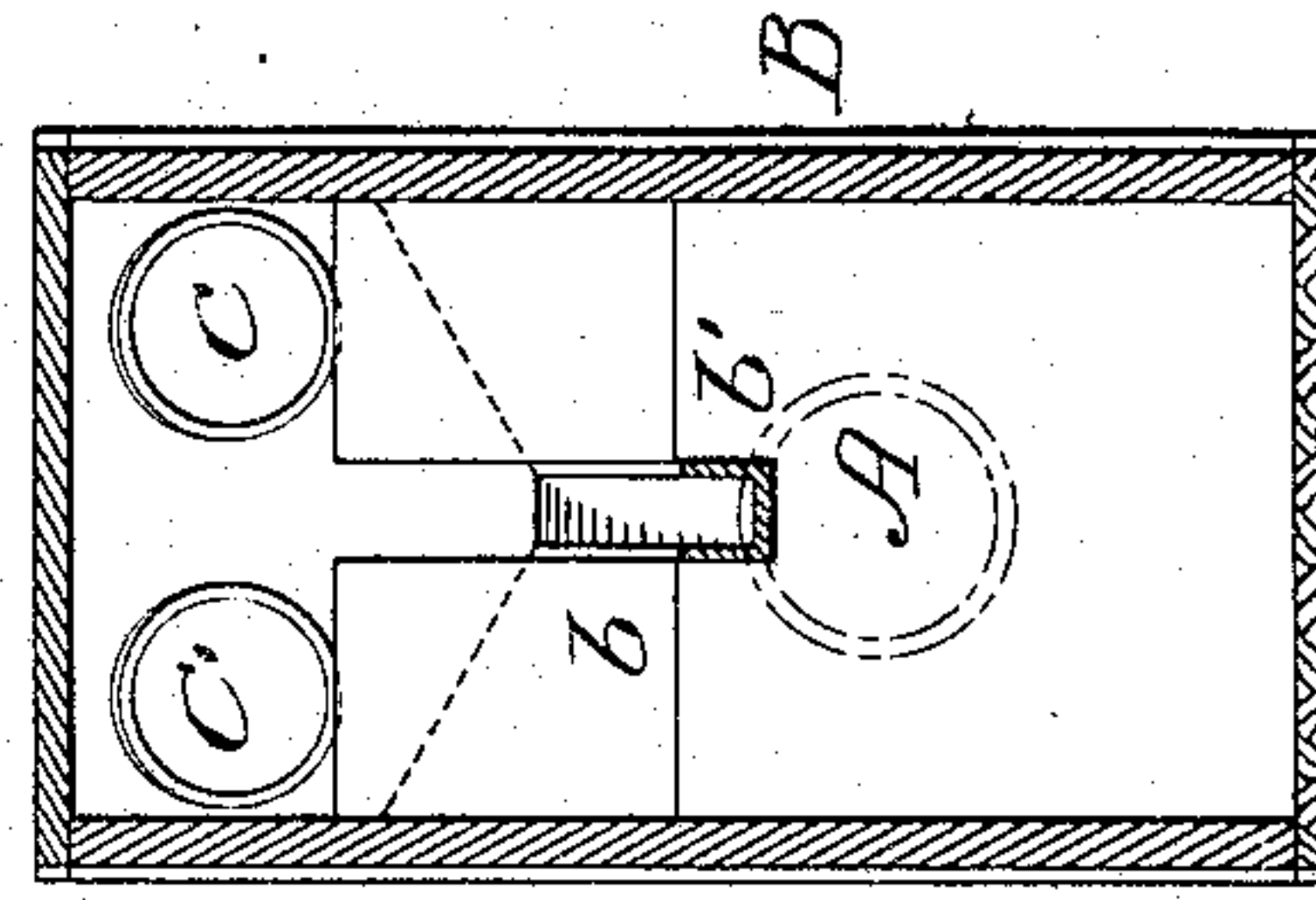
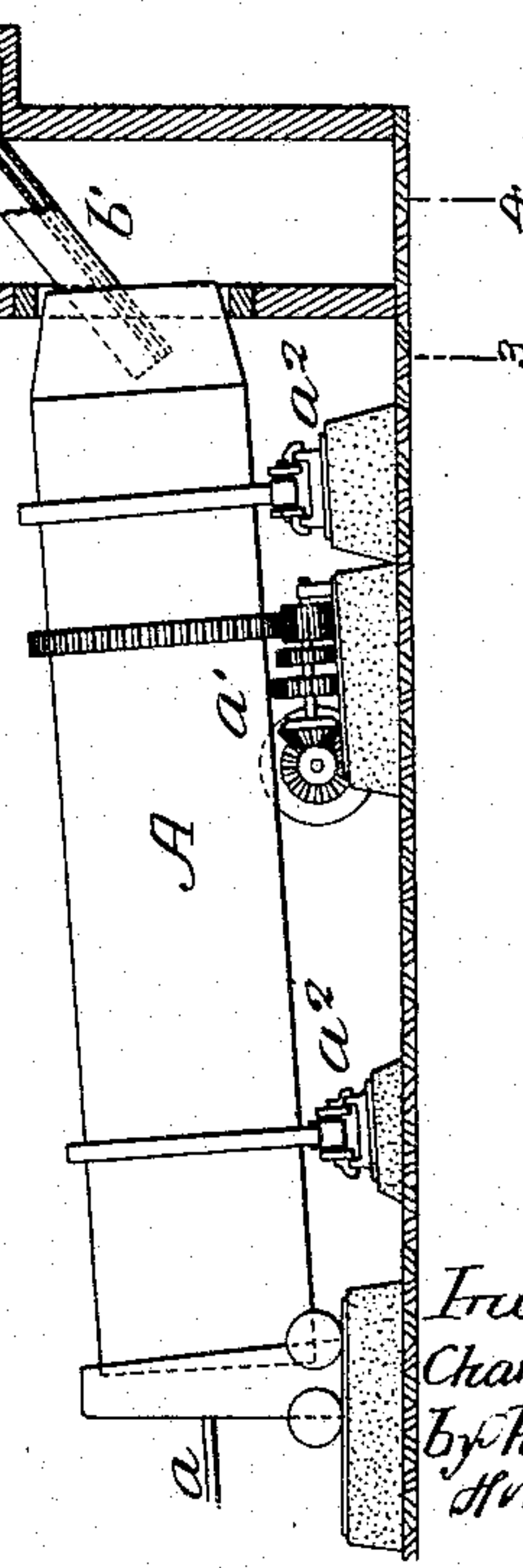


Fig. 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

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KILN.

939,049.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed August 22, 1906. Serial No. 331,595.

To all whom it may concern:

Be it known that I, CHARLES A. MATCHAM, a citizen of the United States, residing in Allentown, Pennsylvania, have invented certain Improvements in Kilns, of which the following is a specification.

One object of my invention is to so combine three or more rotary cement kilns as to secure an increased production of clinker at less cost than has hitherto been possible; it being further desired that the arrangement and construction of the parts be such that the most complete combustion of fuel is insured, whether such fuel be gas, oil or powdered carbonaceous material. These objects I attain as hereinafter set forth, reference being had to the accompanying drawings, in which:

Figure 1, is a vertical sectional view of a cement kiln constructed according to my invention; Fig. 2, is a plan, partly in section, of the kiln illustrated in Fig. 1; Fig. 3, is a transverse sectional view on the line 3-3, Fig. 1, and Fig. 4, is a transverse sectional view on the line 4-4, Fig. 1.

As is known to those skilled in the art, it is desirable in the burning of cement clinker to secure thorough combustion of the fuel and as high a temperature as possible from such combustion. In burning cement clinker according to the present practice the products of combustion pass into a stack at a relatively high temperature and in many instances while still containing combustible matter, and it is to insure complete combustion, as well as to take advantage of all of the heat contained in the products of combustion, that my invention is particularly devised. The arrangement of parts is such, moreover, that the device as a whole may be operated at a higher speed.

In the above drawings, A is a rotary kiln of the general construction well known in this art, into the front end of which fuel is introduced from a burner *a*. This kiln may be of any length, though in the particular case taken for illustration it is thirty to forty feet long. Its rear end projects into or communicates with the lower portion of a brick hood B and is suitably rotated by mechanism indicated at *a'*; the kiln being, as usual, supported on roller bearings *a*². The brick hood has, extending into the upper portion of the side opposite that with which the kiln A communicates, two other

rotary kilns C and C' in the present instance and is provided with an apron *b* having an inclined floor for the reception of cementitious material discharged from the kilns C and C' and a spout or conduit *b'* leading from said apron to the upper end of the kiln A. Said hood has also any desired number of openings *b*² for the admission of air, which may be of any size suited to the work at hand and may be placed in any desired positions, in the present instance at each side of the kiln A, which will be hereafter referred to as the main kiln.

The two kilns C and C' are preferably of a diameter less than that of the kiln A and while they may be of any desired length, in the present instance, are approximately double the length of said main kiln, so as to insure the greatest possible heating of the material before it is delivered to the main or clinkering furnace. The kilns C, C' are supported on roller bearings and may be rotated by mechanism *c*. Said auxiliary kilns are substantially parallel to one another and like the furnace A inclined upwardly, while their rear ends communicate with a chamber D leading to a stack *d*, which, if desired, may be also combined with a drier E in the manner fully set forth in my reissued United States Patent No. 12,474, dated April 24, 1906, and forming no part of the present invention.

Under operating conditions all three of the kilns are turned by their driving mechanism and finely powdered raw material is fed into the upper or rear end of each of the auxiliary kilns C and C' through chutes *d'* by suitable means well known to the art. At the same time any suitable fuel is supplied to the burner *a* at the front end of the main kiln and it will be seen that as the rotation of the kilns C and C' is continued the raw material is fed through them and deposited upon the inclined apron from whence it flows to and through the spout *b'* into the rear end of the main kiln A. In the kilns C and C' the heat of the products of combustion causes chemical action resulting in the giving off of carbon-dioxid and other gases, while in the main kiln A the clinkering takes place; the dimensions of the apparatus being such that what is known as the point of "clinkering" is within this latter kiln. From the front end of this main kiln the clinker is discharged and subse-

quently treated in the manner customary in this art.

As is usual, air enters the kiln A with the fuel, and while the highest available temperature from said fuel is in this kiln a further supply of air is drawn or forced into the hood B through the openings b^2 , thereby securing a supply of air at a point in the current of burning fuel intermediate the burner and the stack. From the hood B the current of hot gases divides into two parts respectively passing through the kilns C and C' from whence they pass to the stack chamber D and to either the stack d or the drier E.

While I have shown two auxiliary kilns, it is obvious that any desired number of auxiliary kilns may be used in conjunction with one or more main kilns; there being a plurality of these longer and less diameter kilns for the purpose of securing the greatest possible heating of the raw material from the products of combustion before such material is finally delivered to the main or clinkering kiln.

It is obvious that the smaller kilns C and C' may be rotated at a relatively higher speed than that of the kiln A, and that this latter may be rotated more rapidly than is now possible to insure proper burning of the material treated on account of the fact that said material has been previously brought to a much higher temperature than is possible when but a single long kiln is employed.

It is, of course, obvious that the speeds of rotation of the main and auxiliary kilns may be independently regulated and that, for the reasons above noted, a much larger body of cement clinker be burned in a given time with an apparatus constructed according to my invention than is possible

with a single unit of the present type. It is further obvious that the fuel is utilized to the fullest possible extent and in what is the most advantageous manner, since not only is it supplied with all the oxygen needed for complete combustion by reason of the use of the air inlets b^2 , but also because of the fact that before being discharged into the stack the products of the combustion of the fuel are employed to raise the temperature of the raw material prior to its introduction into the main kiln.

It is to be understood that either forced or natural draft may be used to insure the necessary supply of air through the opening b^2 , as well as to the burner a .

I claim:—

In the combination of a main rotary kiln, in which the clinkering is accomplished, a plurality of auxiliary kilns in which carbon dioxid is driven off, said auxiliary kilns being placed back of the main kiln, means for supplying fuel to said main kiln, a casing built between the main and the auxiliary kilns, the rear end of the main kiln entering the lower portion of one side of the casing, and the forward ends of the auxiliary kilns entering the upper part of the opposite side of the casing, a stack communicating with the rear ends of the auxiliary kilns, and a trough in the casing for transferring material from the auxiliary kilns directly to the main kiln.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

CHARLES A. MATCHAM.

Witnesses:

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