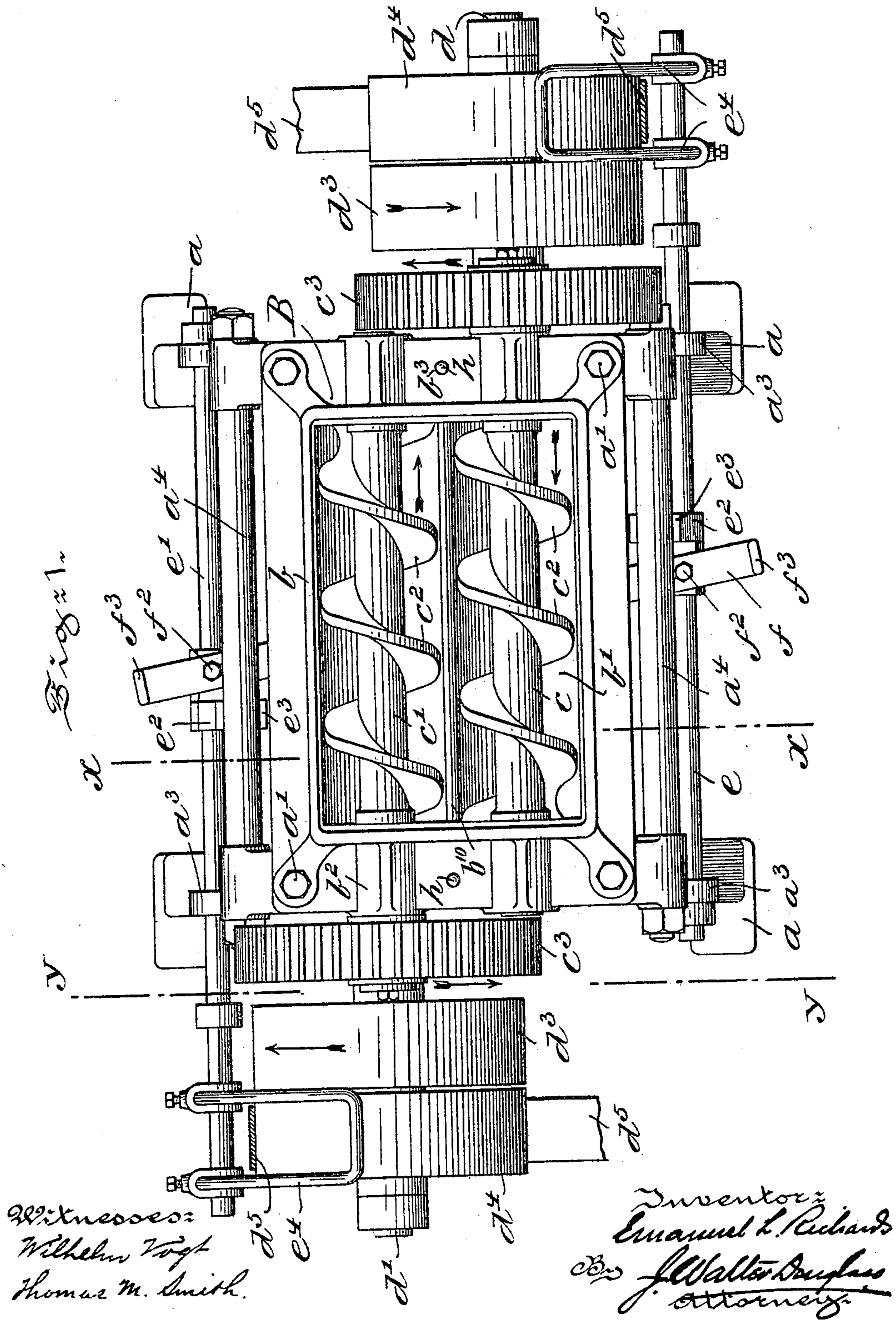


No. 819,800.

PATENTED MAY 8, 1906.

E. L. RICHARDS.
MASS MIXING MACHINE.
APPLICATION FILED DEC. 19, 1905.

4 SHEETS—SHEET 1.

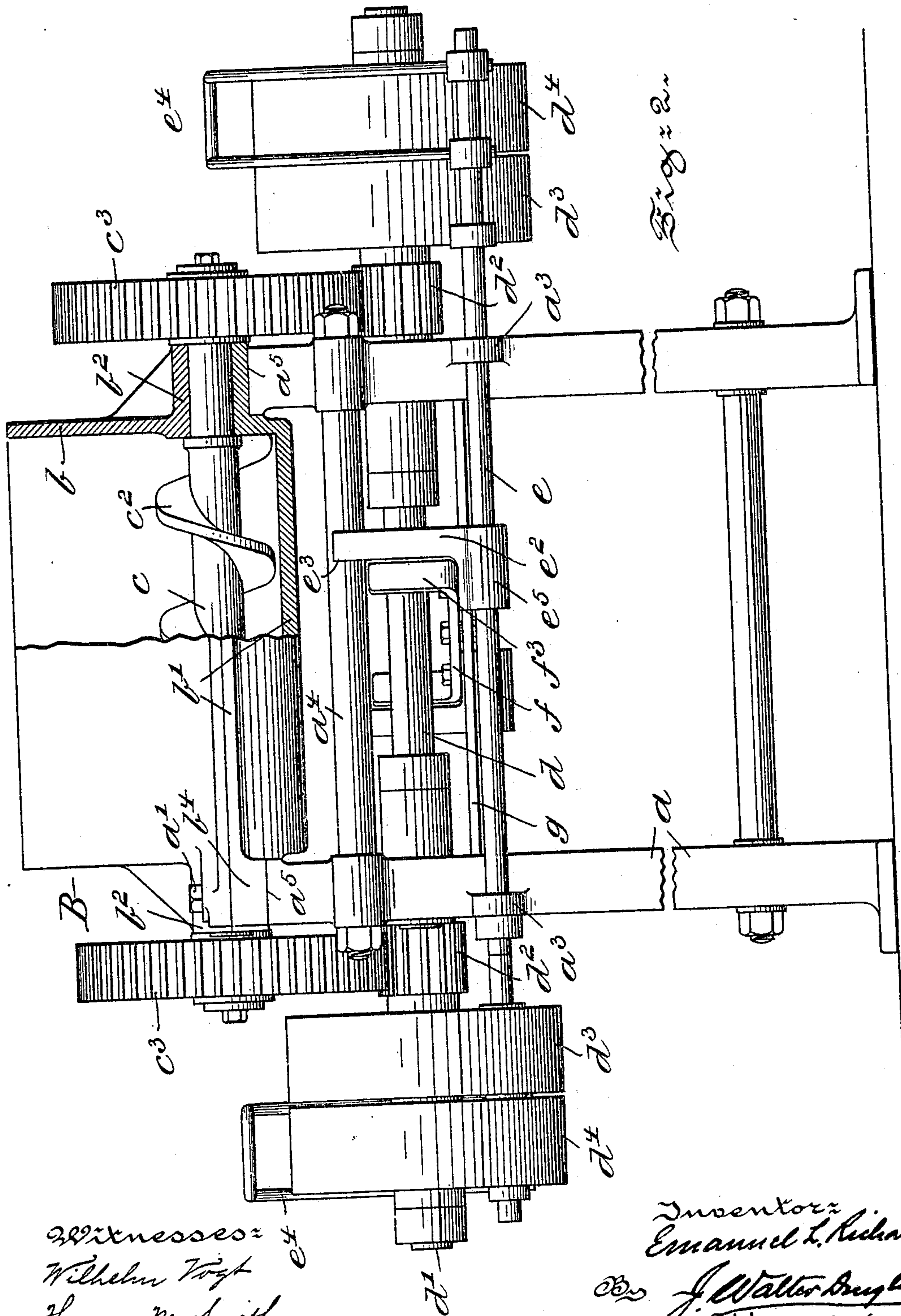


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4 SHEETS—SHEET 2.



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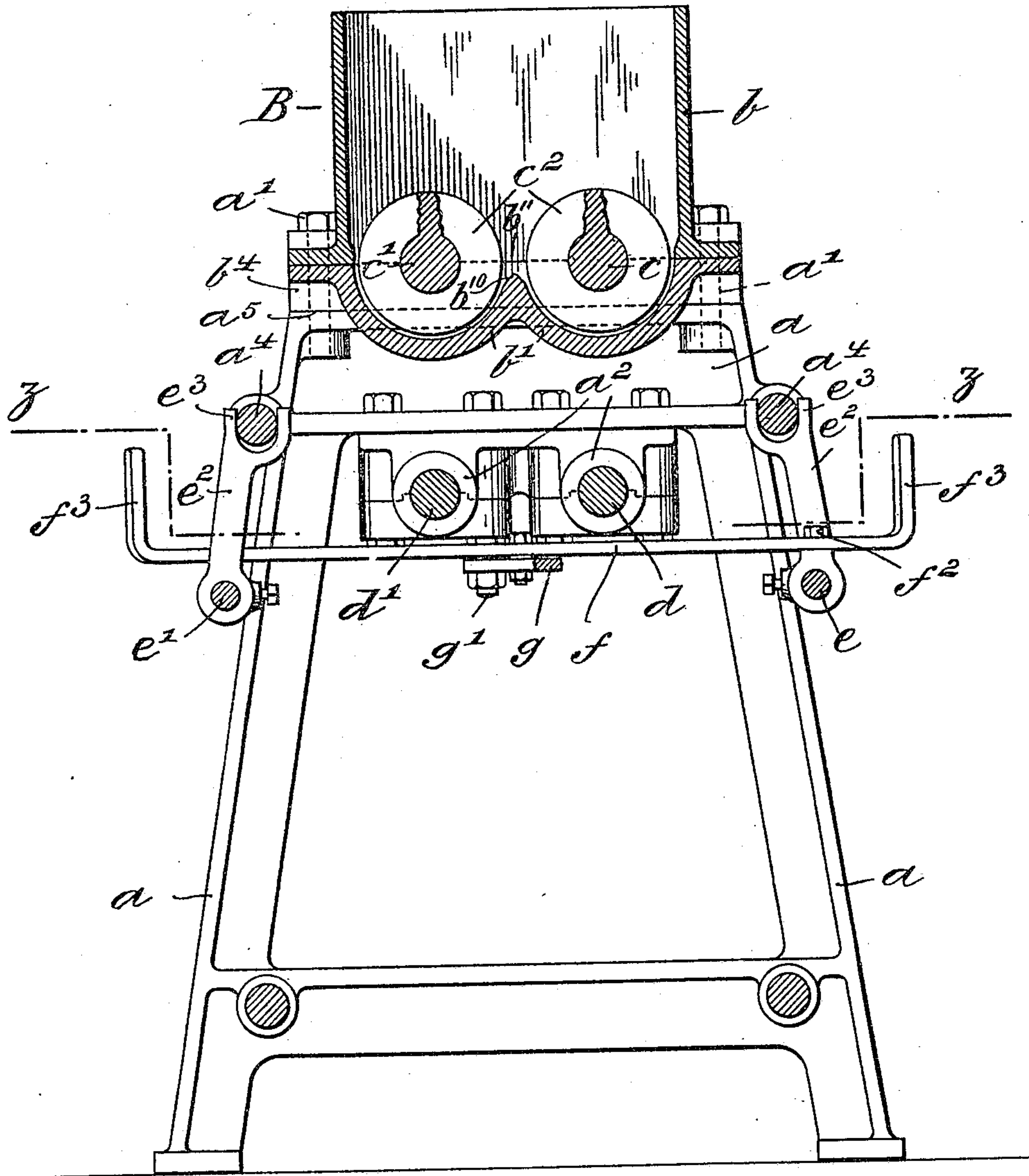
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4 SHEETS—SHEET 3.

Fig. 3.



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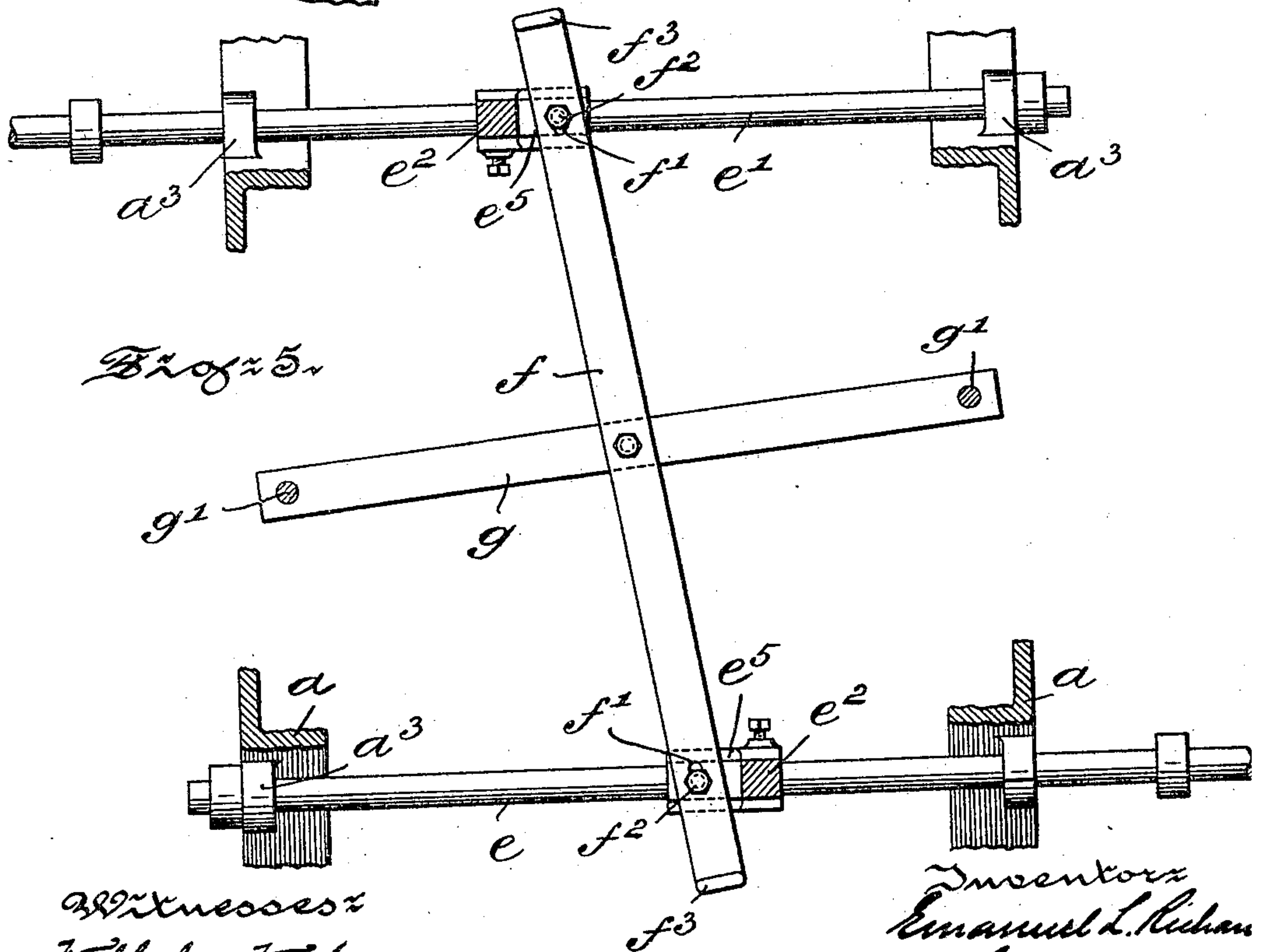
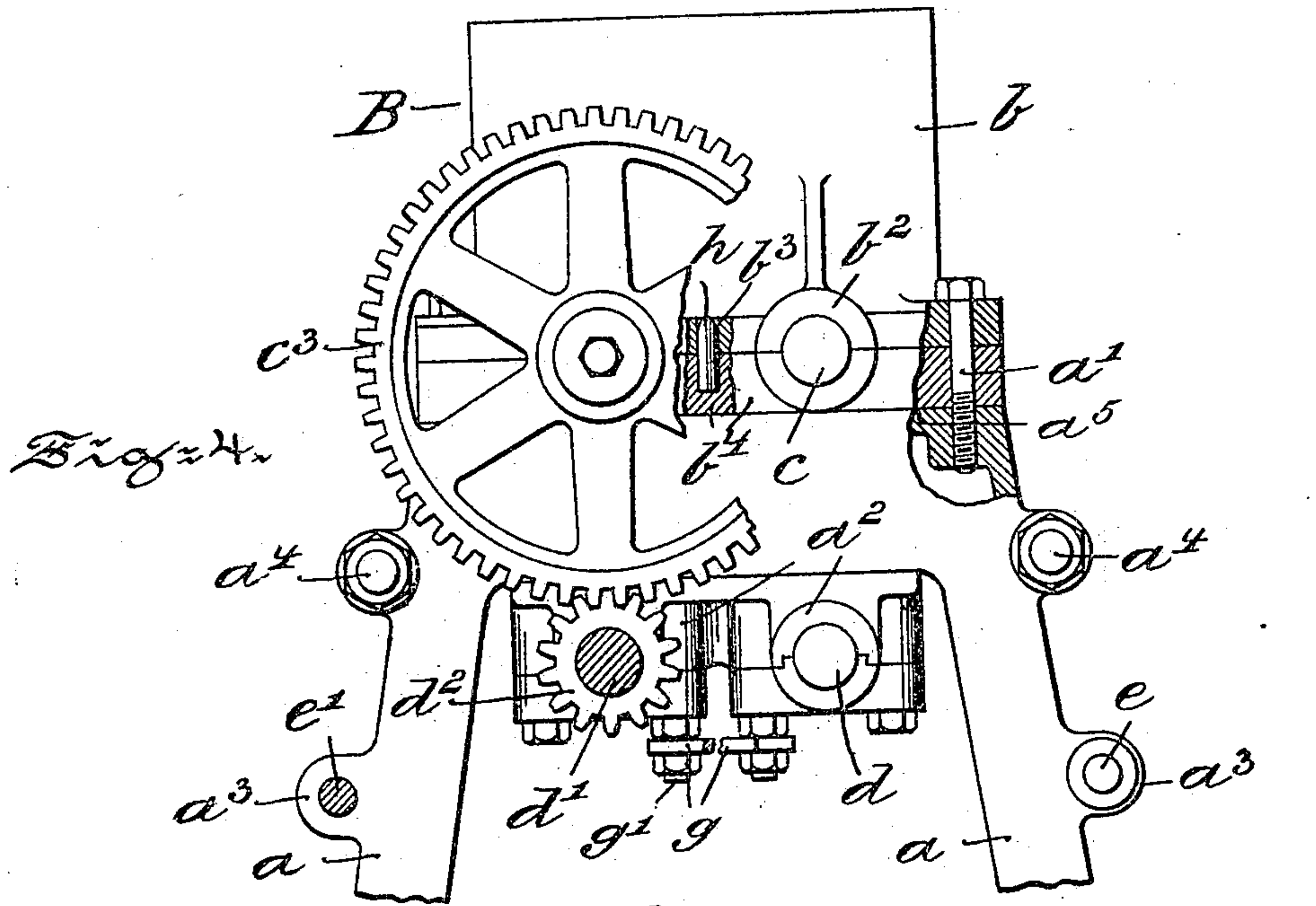
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UNITED STATES PATENT OFFICE.

EMANUEL L. RICHARDS, OF NEW LONDON, CONNECTICUT.

MASS-MIXING MACHINE.

No. 819,800.

Specification of Letters Patent.

Patented May 8, 1906.

Application filed December 19, 1905. Serial No. 292,461.

To all whom it may concern:

Be it known that I, EMANUEL L. RICHARDS, a citizen of the United States, residing at the city of New London, in the county of New London and State of Connecticut, have invented certain new and useful Improvements in Mass-Mixing Machines, of which the following is a specification.

My invention has relation to mass-mixing machines, particularly such as are employed in the manufacture of pharmaceutical preparations, and in such connection it relates particularly to the construction and arrangement of the machine to permit of the thorough mixing of the mass and the bringing of the same to a state in which it is substantially dry for being worked or formed into tablets, pastels, or the like.

Heretofore mass-mixing machines for materials constituting the ingredients of pharmaceutical preparations consisting of powdered materials or substances, liquids, and sticky matter could only be mixed or combined when the mass had reached the consistency of clay, after which the mass had to be removed from the machine and subjected to a drying operation necessary to permit of granulation preparatory to compression. This premature removal of the mass before the same reached a dry state was necessary, as the driving mechanism of the machine could only withstand the strain when the mass during mixing reached a clay-like consistency, after which gear-wheels actuating the mixing mechanism broke, thus limiting the efficiency of the machine and requiring a drying of the mass before being thoroughly mixed.

The principal objects of my invention are, first, to overcome the above-defined disadvantage of removing the mass for drying from the machine before a thorough mixing of the materials or substances has been accomplished; second, to so arrange the driving mechanism of the machine as to drive each of the mixing mechanisms employed independently of each other, so as to prevent transmission of resistance offered by the materials or substances from one mixing mechanism to the other, which tends to breakage of the driving and mixing mechanisms; third, to so connect and arrange the separate parts forming a mixing-receptacle with respect to a supporting-standard as to permit by the loosening of bolts of ready disconnection of the mixing-receptacle from the standard by

sliding the receptacle sidewise out of engagement therewith and of the ready separation of parts forming the mixing-receptacle, and, fourth, to provide a machine with means to permit of simultaneous stopping or starting of the mixing mechanism of the machine.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a top or plan view of a mass-mixing machine, illustrating two worm or mixing shafts, driving mechanism for independently actuating the same, and means for simultaneously stopping and starting the actuation of the mixing-shafts embodying main features of my invention. Fig. 2 is a side elevational view, partly in section, illustrating driving-shafts for the mixing or worm shafts arranged in a mixing-receptacle, belt-shifters for each of the driving-shafts, and means for simultaneously actuating both of the belt-shifters. Fig. 3 is a vertical sectional view of the machine on the line xx of Fig. 1. Fig. 4 is an end elevational view, partly in section, on the line yy of Fig. 1; and Fig. 5 is a view on the line zz of Fig. 3, illustrating, partly in top or plan view and partly in section, the belt-shifters and their supporting means.

Referring to the drawings, a represents the standard of the machine, to the upper straight portion a^5 of which is secured, by means of bolts a' , the indented base b' and a hopper b , forming a mixing-receptacle B. The downwardly-projecting flange b^4 of the base b' directly engages the upper straight portion a^5 of the standard a , as shown in Figs. 3 and 4. The indented base b' is so arranged as to form a central rib b^{10} , and in the indentations of the base b' are mounted worm-shafts, which are separated from each other by said rib b^{10} , which, in conjunction with said shafts, form a chamber b^{11} , as hereinafter more fully explained. By the arrangement of the indented base so as to provide the central projecting rib b^{10} there is permitted in the operation of the worm-shafts in said receptacle B a thorough commingling of material moved in opposite directions thereby, particularly between the worm-shafts in the chamber b^{11} , to effect thereby not only a thorough mixing but also drying of the material of the receptacle B. This receptacle is provided with bearings b^2 , preferably formed

integral with the hopper *b* and base *b'* thereof, serving to receive and to support shafts *c* and *c'*. Each of the shafts is provided with a spiral blade *c²*, preferably formed integral therewith, which shafts and blades are hereinafter designated as the "worm-shafts." The worm-shafts *c* and *c'* are independently driven by shafts *d* and *d'*, secured by bearings *a²* to the standard *a*, and held by the same below the receptacle B, as shown in Figs. 2, 3, and 4. Gear-wheels *c³* and *d²* serve to connect one of the worm-shafts *c* or *c'* with one of the driving-shafts *d* or *d'*. The gear-wheels *c³* of the worm-shafts *c* and *c'* are preferably arranged at opposite sides of the receptacle B, as well as the gear-wheels *d²* and fixed and loose pulleys *d³* and *d⁴*, which are secured to each of the driving-shafts *d* and *d'*. The fixed pulleys *d³* permit of a separate driving of the shafts *d* and *d'* by means of belts *d⁵* from any suitable source of power. (Not shown.) In order to simultaneously shift the belts *d⁵* from the fixed pulley *d³* to the loose pulley *d⁴*, or vice versa, of each of the driving-shafts *d* and *d'*, the following preferred mechanism is employed.

As shown in Figs. 1 and 4, in bosses *a³* of the standard *a* are slidably-arranged rods *e* and *e'*, to each of which is adjustably secured an arm *e²*, serving to hold a belt-shifter *e⁴* in proper position with respect to the pulleys *d³* and *d⁴* by engaging with its forked end *e³* a tie-rod *a⁴* of the standard *a*, forming guides for the arms *e²*. The rods *e* and *e'* are connected with each other by a bar *f*, which by means of bolts *f²*, passing through slots *f'* of the bar *f*, connects the same with the tubular extension *e⁵* of the arms *e²*, and thus with the rods *e* and *e'*, as shown in Figs. 3 and 5. The bar *f* is supported intermediate of its ends by a bar *g*, connected by bolts *g'* with the standard *a* of the machine, as shown in Figs. 2 and 3. By engaging one of the upwardly-bent ends *f³* of the bar *f*, forming a handle, the rods *e* and *e'* are shifted in opposite directions to each other, thus bringing the belts *d⁵* into or out of engagement with the fixed or loose pulleys *d³* and *d⁴* to simultaneously start or stop the actuation of the worm-shafts *c* and *c'*. As indicated by the arrows in Fig. 1, the worm-shafts *c* and *c'* are rotated in opposite directions to each other to force portions of material placed in the mixing-receptacle B against each other and to move the same in the receptacle in a substantially circular path. The materials or substances to be thoroughly mixed and to be united with each other generally consist of various medicinal preparations in a dry powder, liquid, and sticky state. These materials by the actuation of the worm-shafts *c* and *c'* are mixed and by the mixing operation are gradually transferred from a liquid state into a dry condition. The resistance offered by the mate-

rials against the blades *c²* of the worm-shafts *c* and *c'* increases proportionally with the degree of dryness obtained by the advance of the mixing of the materials with each other. However, the gradual increasing resistance offered by the materials to the worm-shafts *c* and *c'* and blades *c²* thereof, which heretofore compelled a removal of the materials before being thoroughly mixed and had only assumed a clay-like consistency requiring a separate drying, is now readily borne by the shafts *c* and *c'*, as each of the same is directly driven by a shaft which in turn is positively driven by a belt *d⁵*. Thus the power for actuating the shafts *c* and *c'* is doubled by driving each independently of the other and not, as heretofore, driving one shaft by the other. Furthermore, the angle of pitch of the spiral blades *c²* and their strength and of the shafts *c* and *c'* is such as to efficiently withstand all strain to which the same may be subjected by the resistance offered by the materials. Thus the mixing of the materials can be safely continued until the same become thoroughly mixed and are transferred in a dry state, due to complete absorption of the sticky and liquid materials by the dry material and to heat generated by the compression and friction between the particles forming the mass during the mixing operation thereof. The mass is not only thoroughly mixed, but also dried by a single or continuous operation, and is now ready to be granulated and to be compressed into pharmaceutical or other tablets when removed from the receptacle B.

When it becomes necessary to clean the mixing-receptacle B and worm-shafts *c* and *c'*, this can readily be accomplished by the loosening of the bolts *a'*, connecting the hopper *b* and base *b'* with each other as well as with the straight portion *a⁵* of the standard *a*, as shown in Fig. 4. When the bolts *a'* are removed, the hopper *b* and base *b'*, which are still connected with each other by dowel-pins *h*, can be now shifted sidewise by sliding the projecting flanges *b⁴* out of engagement with the portion *a⁵* of the standard *a* and bringing the same onto or into any suitable receptacle for cleaning. (Not shown.) After this the hopper *b* can be readily removed from the base *b'* by merely lifting the same out of engagement with the dowel-pins *h*, loosely engaging the openings *b³* of the hopper *b*, as shown in Figs. 1 and 4. The worm-shafts *c* and *c'* can now be removed from the base *b'* for cleaning or other purposes. The reassembling of the shafts *c* and *c'*, base *b'*, and hopper *b* is accomplished in a reverse manner to that hereinbefore described, and the base and hopper of the mixing-receptacle B when shifted into its normal position onto the standard *a* can be reconnected with each other and the standard *a* by means of the bolts *a'*.

Instead of driving each of the worm-shafts *c* and *c'* by means of a driving-shaft the same may be directly driven by a belt engaging a pulley directly secured to each of the shafts *c* and *c'*.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine of the character described, a mixing-receptacle provided with a base having indentations arranged to form a central rib, worm-shafts mounted in the indentations of said base, and means to independently rotate said shafts to cause material moved in opposite directions in the chamber formed between said shafts to be thoroughly commingled or mixed and dried prior to the removal of the same manually from said receptacle.

2. In a machine of the character described, a mixing-receptacle having worm-shafts for mixing materials introduced into said receptacle, said receptacle consisting of a base-plate and hopper and forming combined bearings for said worm-shafts, shafts having fixed and loose pulleys, each of said shafts, when actuated, by the fixed pulley adapted to actuate one of said worm-shafts, and means for simultaneously shifting a belt from the fixed pulley of each of said shafts to a loose pulley thereof.

3. In a machine of the character described, a standard having shafts, means for independently driving each of said shafts, a mixing-receptacle carried by said standard having worm-shafts, gear-wheels connecting one of said driven shafts to one of said worm-shafts to permit of the independent actuation of one of said worm-shafts by one of said driven shafts, and means for controlling said driving means to permit of the simultaneous stopping or starting of each of said driven shafts and by the same of each of said worm-shafts.

4. In a machine of the character described, a standard having shafts, loose and fixed pulleys arranged on each of said shafts, belts for driving said shafts when engaging the fixed pulley thereof, rods having belt-shifters engaging said belts, means for holding the belt-shifters in operative position with respect to said pulleys, means for connecting said rods with each other and when actuated to permit of the simultaneous shifting of said belts from the fixed pulley to the loose pulley of each of said shafts, a mixing-receptacle having worm-shafts for mixing material introduced into said receptacle, and gear-wheels for connecting one of said driven shafts with one of said worm-shafts to permit of the independent actuation of said worm-shafts by said driven shafts.

5. In a machine of the character described, a standard having guide-rods and shafts, fixed and loose pulleys arranged on each of said shafts, belts for driving said shafts when engaging the fixed pulley thereof, rods slidably carried by said standard having belt-shifters engaging said belts, arms secured to said rods and engaging said guide-rods to hold the belt-shifters in operative position with respect to said pulleys, a bar for connecting said belt-shifter rods with each other, means for connecting said bar with said standard, said connecting-bar arranged when actuated to simultaneously shift said belts from the fixed pulley to the loose pulley of each of said shafts, a mixing-receptacle having worm-shafts each of said worm-shafts being operatively connected with one of said driving-shafts.

In witness whereof I have hereunto set my signature in the presence of two subscribing witnesses.

EMANUEL L. RICHARDS.

Witnesses:

EDWARD T. BROWN,
MALCOLM M. SCOTT.