

No. 812,749.

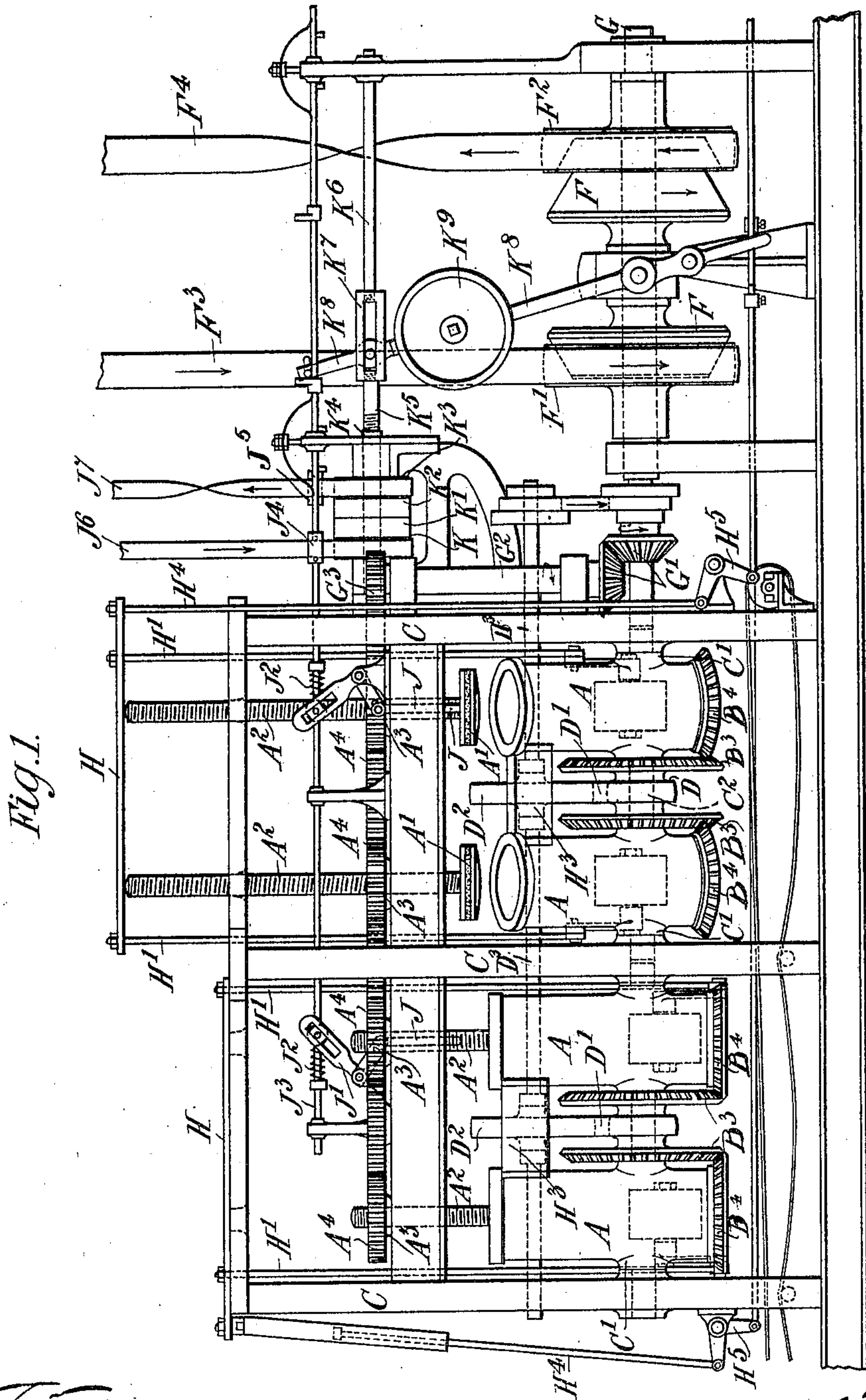
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A. E. IVESON & A. R. WILSON.


COMMUNUTING MACHINE.

APPLICATION FILED OCT. 20, 1904.

3 SHEETS—SHEET 1.



Witnesses: -
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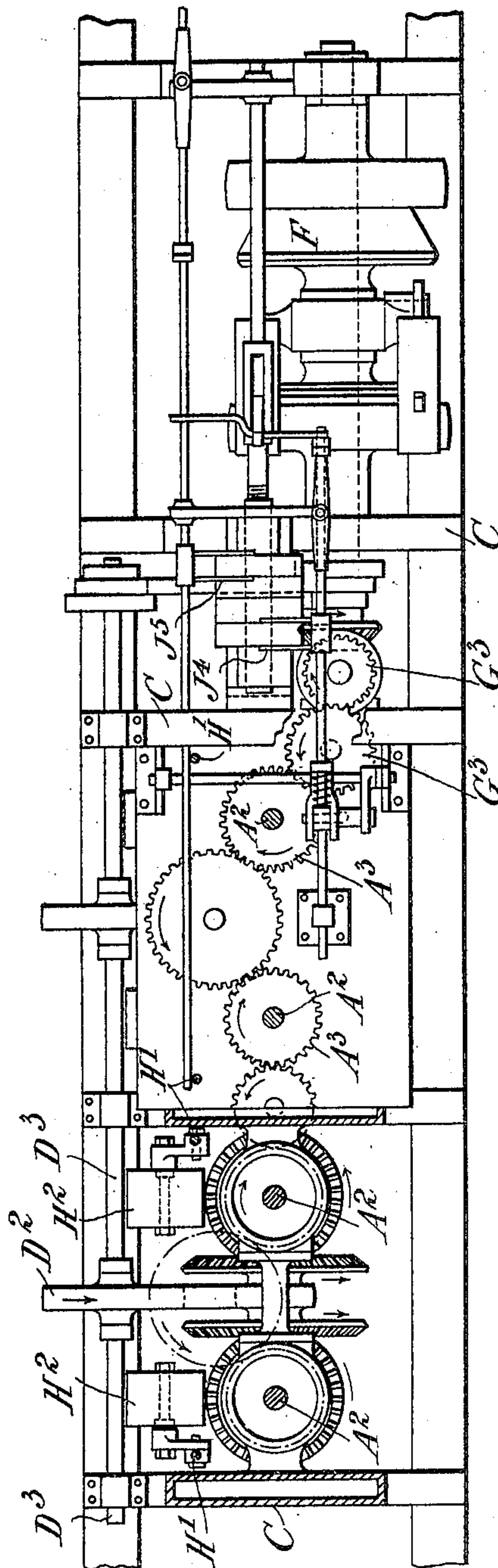
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3 SHEETS—SHEET 2.

Fig. 2.



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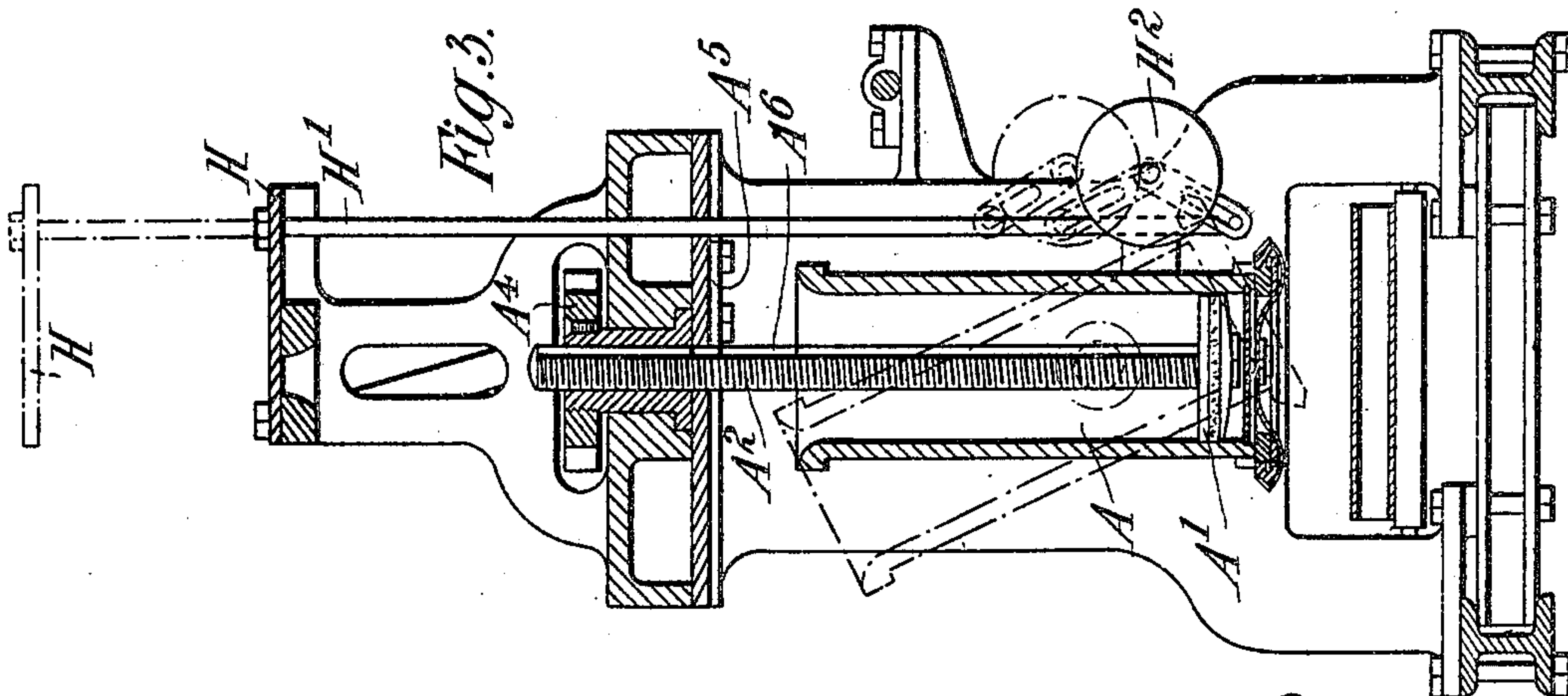
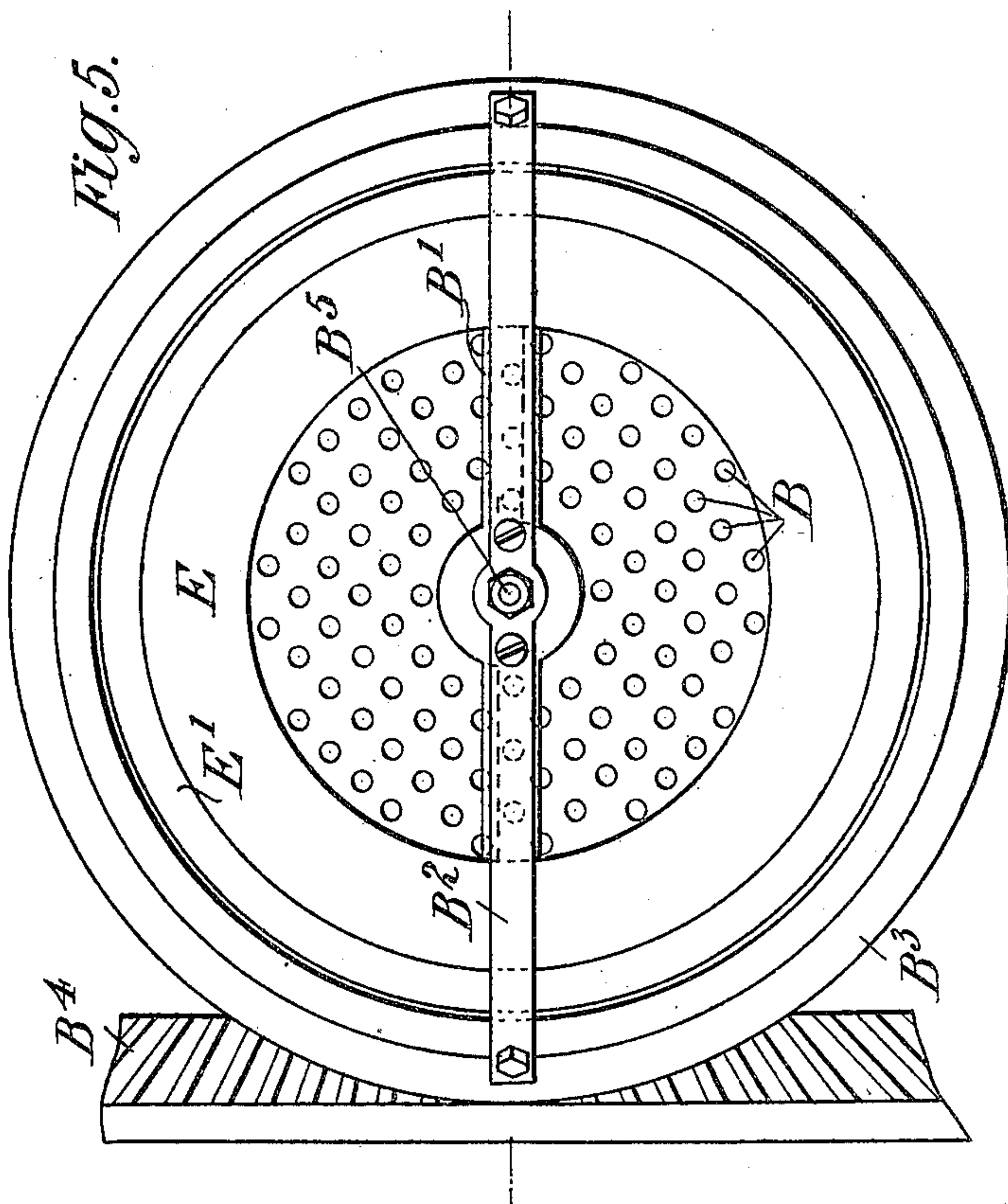
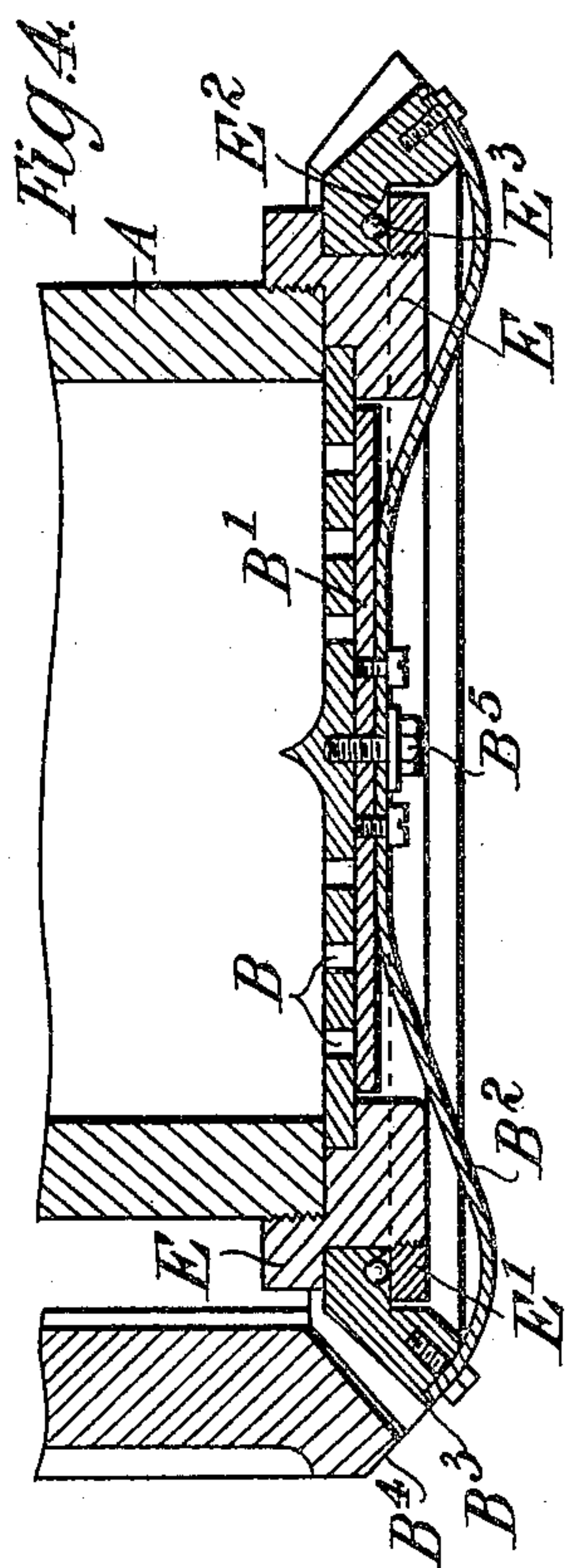
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

ALBERT E. IVESON, OF GAINSBOROUGH, AND ARCHIBALD RALPH WILSON,
OF BRIGHTON, ENGLAND; SAID WILSON ASSIGNOR TO SAID IVESON.

COMMUNUTING-MACHINE.

No. 812,749.

Specification of Letters Patent.

Patented Feb. 13, 1906.

Application filed October 20, 1904. Serial No. 229,340.

To all whom it may concern:

Be it known that we, ALBERT ERNEST IVESON, manufacturer, residing at "The Hollies," Gainsborough, in the county of Lincoln, and ARCHIBALD RALPH WILSON, chemist, residing at "Silverlea," Portland Villas, Hove, Brighton, in the county of Sussex, England, subjects of the King of Great Britain, have invented certain new and useful Improvements in Comminuting-Machines, of which the following is a specification.

This invention relates to segregating machines or apparatus for pressing, dividing, and cutting up pulpy or plastic material, such as food substances, or for the like purposes, and while same will be found specially applicable for use in the preparation of food substances in a granular or finely-divided form either for human use or for feeding animals, poultry, game, &c., yet said machine or apparatus may be employed for any other purpose or purposes to which same is or may be applicable, but is preferably used in the preparation of suet. For example, the machine or apparatus according to the present invention may be employed in carrying out the processes set forth in our British Patent No. 9,148 of 1903 or Iveson's British Patent No. 24,849 of 1901 and Iveson's United States Patent No. 716,235, dated December 16, 1902. In the specification and drawings of Iveson's British Patent No. 24,850 of 1901 there is described and illustrated a machine or apparatus in which the piston or plunger operates in a cylinder or compression-chamber, the end of which latter is closed by or provided with a die or perforated plate or cylinder end having a series of holes or apertures, tubes, or nipples or equivalent therein; and part of the present invention has for its object improvements in such machines or analogous apparatus as follows:

In the accompanying drawings we have illustrated (by way of example) a quadruple machine—i. e., a machine having two pairs of compression cylinders or chambers—arranged and mounted and operated in accordance with the present invention.

Referring to the accompanying drawings, in which like references denote like parts, Figure 1 is a side elevation of such a machine. Fig. 2 is a plan, partly in section. Fig. 3 is a sectional end elevation. Fig. 4 is a modification of the construction shown in Fig. 1.

Fig. 5 is a plan of Fig. 4 looking up from beneath.

A A are the compressing cylinders or chambers. A' A' are the plungers mounted on the screwed piston-rods A² A², engaging with and operated by the internally-threaded sleeves A³ A³, which are secured to the gear-wheels A⁴ A⁴. A⁵ is a feather fixed to the framework, on which feather the groove A⁶ in the screw A² travels to prevent rotation of the screwed rod A². B B are the perforated bottom plates of said compression cylinders or chambers, and B' is one of the cutters capable of being rotated around and kept in contact with said bottom plate by means of the spring-arms B² B² and the bevel-gearing B³ B⁴. C C represent the frame supporting the said cylinder, and C' is one of the pivots on which the cylinders A are hung in the frame C.

C² is the shaft connecting together the two cylinders A A and on which are mounted back to back the two bevel-wheels B³ B³.

B⁴ is the bevel-wheel meshing with B³ and carrying and operating the cutter B'.

D is the belt-pulley common to the back-to-back bevel-wheels B³ B³. D' is the belt driving same.

D² is the driving-pulley mounted on the outside driven shaft D³.

E is the collar-ring supporting perforated bottom plate B and screwed onto the cylinder A.

E' is the loose ring screwed to E. E² is the ball-race formed on said ring E'. E³ E³ are the balls running in said race.

F is the double-faced cone-clutch sliding on a feather on the shaft G.

F' and F² are two pulleys running loose on the shaft G and capable of engaging with the clutch F.

F³ and F⁴ are two opposite-direction-running belts imparting power from outside the machine to the loose pulleys F' and F².

G is the main shaft, upon which the clutch F and the pulleys F' and F² are mounted.

G' and G' are a pair of bevel-wheels imparting motion from the shaft G to the vertical shaft G² and so on to the threaded piston-sleeves A³ A³ by means of the train of wheels G³ G³.

H is one of the cross-heads placed across the upward path of the screwed piston-rods. H' and H' are the vertical rods attached to same.

H² is one of the counterweights.

H³ is a stop for cylinder to rest against when in its vertical position.

H⁴ is the rod-coupling the cross-head H to the bell-crank H⁵.

J is one of the vertical rods placed in the path of travel of the piston-rods.

J' is the bell-crank operated by the rod J.

J² is the spring-joint between the bell-crank J' and the sliding rod J³.

J⁴ and J⁵ are the belt-forks, and J⁶ and J⁷ are oppositely-running belts driven from any suitable source of power, advantageously from the same source as the belts F³ F⁴.

K, K', K², and K³ are two fast and two loose pulleys driven by the opposite-direction-running belts J⁶ and J⁷.

K⁴ is a screw-threaded sleeve on which the respective fast pulleys of the two aforesaid pairs of pulleys are fixed.

K⁵ is the screwed end of the slide-rod K⁶.

K⁷ is a double-slotted link formed in said slide-rod.

K⁸ is the lever operating the clutch F by means of a pin-and-slot construction. K⁹ is the counterweight on the end of said lever.

The cutter B' is operated in any suitable manner so as to be moved with respect to the aforesaid perforated plate. For instance, said cutter may be reciprocated across the face of said plate or may be revolved with respect to same, and in carrying this part of the invention into practice we have found it advantageous to employ a single cutter, as illustrated, extending across the diameter of the perforated plate and arranged to be revolved close against the exterior face thereof, so that as the material or substance from the inside of the cylinder is squeezed or pressed through the apertures in said cylinder at B the revolving cutter B' will cut said material off as same is compressed and forced through said perforated plate. In carrying out this part of the present invention the said cutter B' may be rotated by means of a revoluble collar or wheel—namely, the bevel toothed wheel B³—adapted to rotate upon and round the cylinder end, and, if desired, the cutter may be mounted on a pin B⁵, located in the center of the bottom part of the cylinder and kept pressed up to its work by means of a spring B² or otherwise suitably arranged and mounted so that same is kept up to its work, the said cutter B' being adapted to be revolved either in actual rubbing contact with the outside face of said perforated plate, as illustrated, or otherwise as desired. The aforesaid bevel toothed wheel or other wheel or collar may be rotated round the cylinder end by any suitable means, such as a belt or toothed gear-wheel B⁴. The cylinder or compression-chamber and means for pressing the material or substance inside said compression-chamber and forcing out said material through said perforations may either

be of the character set forth in the aforesaid Patent No. 24,850 of 1901 or of any other desired and suitable character.

According to the second part of the present invention we mount a plurality of the compression-chambers A A and plungers A' A' and advantageously so as to operate in pairs, and any suitable number of said pairs of compression-chambers may be arranged in each machine, as desired, and for the sake of example we will describe a quadruple machine—i.e., a machine having two pairs of compression-chambers—arranged and mounted and operated according to our present invention, as follows: The four cylinders or compression-chambers A A are mounted in a suitable frame C C, said two pairs of cylinders being arranged either in alinement or back to back. Each pair of cylinders on their adjoining sides are joined together and on their opposite sides are pivoted at C' or otherwise arranged to turn in the frame C supporting same. For example, the said pair of cylinders on their adjoining faces at the upper end are connected by a stout plate, while in alinement with the centers on which said pairs of cylinders turn said pairs are joined by a stout pin or shaft C², on which latter there are journaled two bevel cog-wheels B³ B³, back to back, connected to one another and to a belt-pulley D common to both located between same, each said bevel-wheel, respectively, gearing with a bevel gear-wheel B⁴ or collar carrying and operating the aforesaid cutter B', which is thereby revolved with respect to the perforated cylinder end B, or the perforated plate may be mounted on the cylinder end and the cutter mounted and operated as follows: The perforated plate B is held and locked in position on the cylinder end by means of a collar E of varying diameters, part of which collar is internally screw-threaded and adapted to be screwed on the cylinder end, while said collar is also provided with a shoulder adapted to fit flush against the bottom end of the cylinder and the second shoulder or rabbet adapted to receive and fit over the said perforated plate, and thereby lock and hold the same firmly against the cylinder-body, while round the exterior of said collar same is adapted to receive and form a bearing in which revolves the bevel gear-wheel B³, which actuates the cutter B', a ring E' being screwed onto the exterior of said collar E to hold said bevel gear-wheel in position, and a ball-race E² is advantageously provided with balls E³ therein, so that said bevel gear-wheel can revolve on ball-bearings round the collar, the cutter B' consisting of a single plate or arm extending right across the diameter of the perforated plate forming the cylinder end, this arm being arranged to revolve round a central pin B⁵, provided in the said perforated plate, and motion from the revolving bevel gear-wheel B³ is conveyed to

said cutter through the medium of two or other suitable number of arms B^2 B^2 , which are fixed to the revolving bevel gear-wheels B^3 and to the aforesaid cutter, respectively, these arms being advantageously spring-arms so constructed and connected to the cutter as to be adapted to keep the latter pressed up to its work, while at the same time revolving said cutter in a positive manner. The said belt-pulley D , located between said pair of bevel-wheels, may either be continuously operated by any suitable belt or same may be operated only during the descent of the plungers A' A' —that is, only while the compression and expulsion of the material from the compression-chamber A is taking place—and on the return stroke of the plungers the rotation of said bevel-wheels B^3 B^3 may be automatically cut off and restarted when the descent of the plungers takes place, and so on. For example, said belt-pulley, located between said pair of bevel-wheels, may be driven in one direction only—namely, by a belt D' from a driving-pulley D^2 on a shaft D^3 , which driving-pulley is mounted on said shaft so as to be rotated by and with the shaft when the shaft is revolved in one direction, while when the shaft is revolved in the opposite direction said driving-pulley will be left idle or free, any suitable mechanism being employed for this purpose, such as a pawl-and-ratchet clutch arrangement or any of the well-known free-wheel devices as employed in the propulsion of cycles, provided same are suitable for our purpose—namely, to drive said driving-pulley in one direction and to leave it free in the opposite direction, the shaft D^3 , on which this driving-pulley is mounted, being operated first in one direction and then in the other by suitable intermediate mechanism from the main clutch, by which each pair of plungers and cylinders in turn are operated, such clutch being of any suitable character adapted to automatically operate so that the shaft mechanism driven by said clutch is alternately driven in one direction and then in the other, and thereby each pair of cylinders and plungers are alternately operated. For example, we may employ a right and left handed cone-clutch F , adapted to move into engagement with either of two pulleys F' F^2 , located on opposite sides thereof and driven in opposite directions, whereby motion from either one or the other of said pulleys (which in turn are driven by belts F^3 F^4 from the main power-shaft or by any other suitable means) is imparted through said double cone-clutch sliding on a feather to the main shaft G , from which latter and suitable intermediate gear, such as bevel-wheels G' G' and a vertical shaft G^2 , thereby motion is imparted to a train of toothed wheels G^3 G^3 , one of which meshes with one of a train of gear-wheels which are fixed or formed on the ro-

tary sleeves A^3 , which are internally screw-threaded and through which pass the screwed piston-rods A^2 , which carry the pistons or plungers A' , which latter are thereby forced into the cylinders A or drawn out of same alternately. Upon the withdrawal of one pair of pistons the upper end of said pair of screwed piston-rods bear against a cross head or bar H placed in the path of travel of said piston-rods, whereby said cross-head is forcibly lifted as the pistons leave the cylinders, and such cross-head by means of vertical rods H' , carried thereby, causes the pair of cylinders to be tilted forward against the action of a heavy counterweight H^2 , carried on said pair of pivoted cylinders, while on the reversal of the direction of rotation of the machinery (by the aforesaid clutch) and the consequent descent of said screwed piston-rods thereby the cylinders are forced back or are free to be brought back by the counterweight H^2 until they are exactly in vertical alinement under the pistons, when they are brought to rest by any suitable means, such as a stop H^3 , and having in the meantime been charged with the desired material the plungers on now descending into the cylinders act on said material as hereinbefore described. Furthermore, we advantageously connect each said cross-head H to a rod H^4 , adapted to operate a bell-crank H^5 , pivoted to the lower part of the frame of the machine, which bell-cranks in turn are adapted to operate the double clutch F F , this arrangement being what we term an "auxiliary or emergency clutch-operating gear," so as to insure the clutch being thrown in and out of action at the proper time in case the principal clutch-operating mechanism to be hereinafter described should from any cause fail to act.

The reversing-gear or, as we have just previously termed it, the "principal gear" for operating the aforesaid double clutch may advantageously be as follows: We arrange a vertical rod or arm J in the path of travel of one or both of the pistons in each pair of pistons, this rod being advantageously acted on by the piston-rods A^2 just before the latter come to the end of the outstroke, whereupon, through the medium of said rod J and a bell-crank J' , which is spring-jointed at J^2 to a slide-rod J^3 , said rod J^3 operates belt-forks J^4 and J^5 to thereby move one of the belts J^6 and J^7 (driven from the power-shaft outside the machine) from a loose pulley to a fast pulley, which latter is fixed on an internally-screw-threaded sleeve K^4 , within which is inserted the screwed end K^5 of a slide-rod K^6 , provided with a double-slotted link or other suitable device K^7 , by which latter said slide-rod K^6 when moved operates upon a clutch-lever K^8 , which is advantageously provided with a heavy weight K^9 , so as to render same dead-beat when at rest, and which when said

clutch-lever is moved from the vertical center will then rapidly throw the clutch F across into engagement to reverse the machine, whereby the pistons are then forced
 5 down. The reversing mechanism is released by moving the belt from the fast back to the loose pulley, and the descent of said pair of pistons continues while the other pair are now being withdrawn, and these latter in
 10 turn operate corresponding reversing devices, bell-crank J', spring J², and belt-forks J⁴, with intermediate rod J³ connecting same, whereby an oppositely-driven belt J⁶ from
 15 moved from its idle pulley onto a fast pulley fixed also on the aforesaid internally-screw-threaded sleeve K⁴, which latter is consequently revolved in the opposite direction and causes the screw K⁵ in same to move the
 20 clutch-lever K⁸, and thereby throw the clutch F over and drive the machine in the opposite direction, and so on. By this arrangement the reversal of the machine is entirely automatic, and by reason of the emergency or
 25 auxiliary reversing mechanism it is practically impossible for an accident to happen in the automatic reversing of the machine.

By reason of the arrangement of the compression-chambers in pairs and arranging said
 30 pairs to operate alternately we are thereby enabled to work the machine with less power and attendance. Furthermore, if desired, means may be provided to withdraw the plungers out of the compression-chambers at
 35 a greatly-accelerated speed over that at which they are forced into the compression-chambers, any suitable means being employed for this quickened return movement.

What we claim is—

40 1. In a comminuting-machine, the combination of a series of compression-cylinders open at the top, a perforated bottom-plate on each of said cylinders, means for alternately and automatically tilting said cylinders at any desired angle, means for return-

ing said cylinders to their upright position, a series of plungers adapted to fit into and be entirely withdrawn from the open end of their corresponding cylinders, and cutting means adapted to move in contact with the
 50 outside face of each of said perforated bottom-plates, substantially as shown and described.

2. In a comminuting-machine, the combination of tilting compression-cylinders, plungers, means for tilting said cylinders, means for returning said cylinders to their upright position, screw-threaded piston-rods, internally-threaded sleeves in which said piston-rods work, auxiliary means for reversing the
 60 machine, a double-slotted link, an automatic clutch-lever working in said double-slotted link, a double-headed coned clutch on the main shaft, operated by said clutch-lever, oppositely-moving pulleys on said main
 65 shaft adapted to be engaged by said clutch-lever, and a series of gear-wheels connecting the reversing and operating parts of the mechanism, substantially as shown and described.
 70

3. In a comminuting-machine, the combination of a series of compression-cylinders, open at the top, a perforated bottom-plate attached to each cylinder, plungers for corresponding cylinders, means for tilting and
 75 means for returning said cylinders to an upright position, rotary cutting means, gear-wheels, an automatic clutch-lever, a double-slotted link, a double-headed coned clutch, a main shaft and oppositely-moving pulleys
 80 on said main shaft, substantially as shown and described.

In witness whereof we have hereunto set our hands in the presence of two witnesses.

ALBERT E. IVESON.

ARCHIBALD RALPH WILSON.

Witnesses:

HENRY BERKBEET,

H. D. JUNECSO.