S. SNYDER AND L. C. WINEGARDNER.

BOLTING MACHINE.

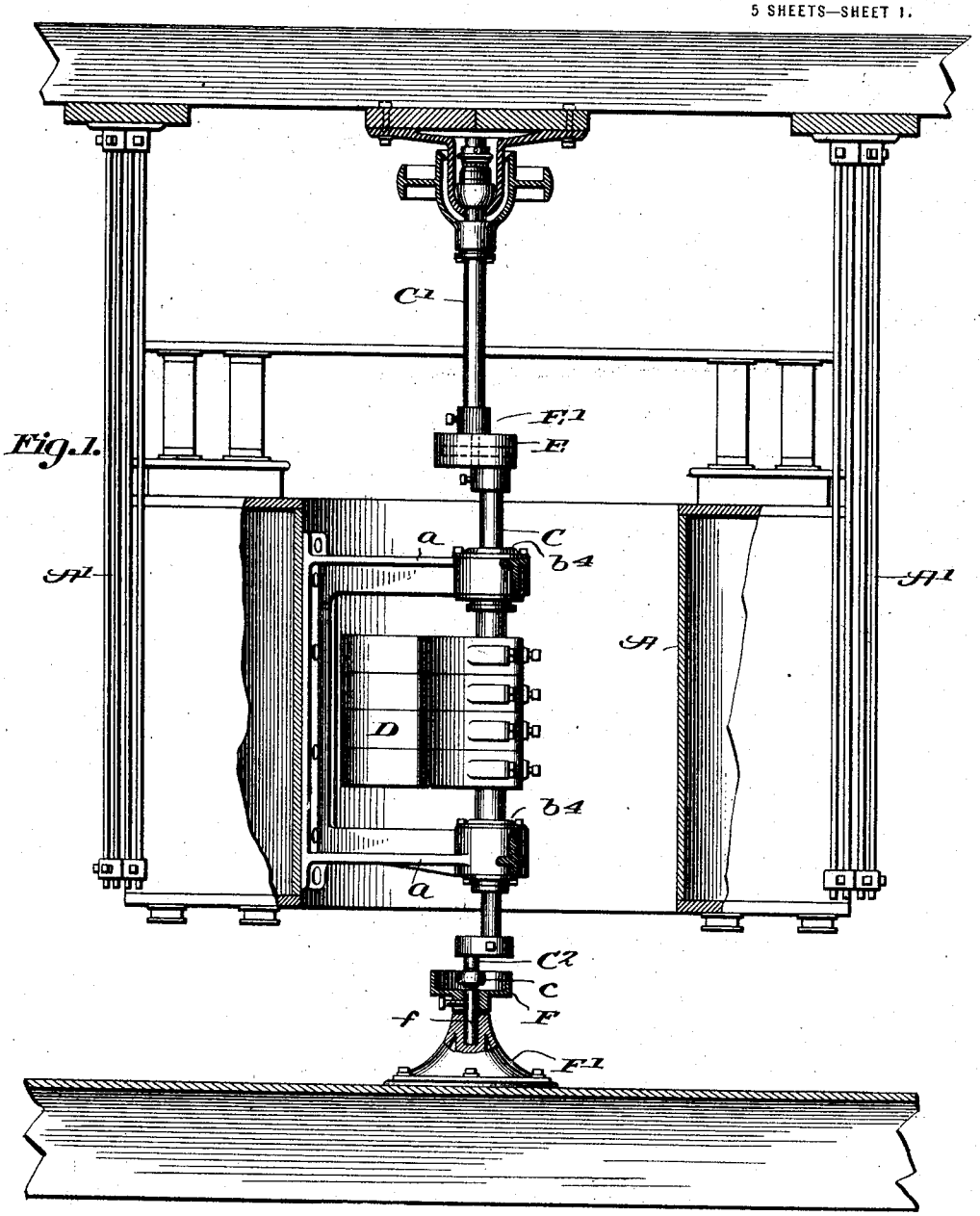
APPLICATION FILED FEB. 21, 1917.

1,327,636.

Patented Jan. 13, 1920.

5 SHEETS—SHEET 1.

Fig. 1.



Witness

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5 SHEETS—SHEET 2.

Fig. 2.

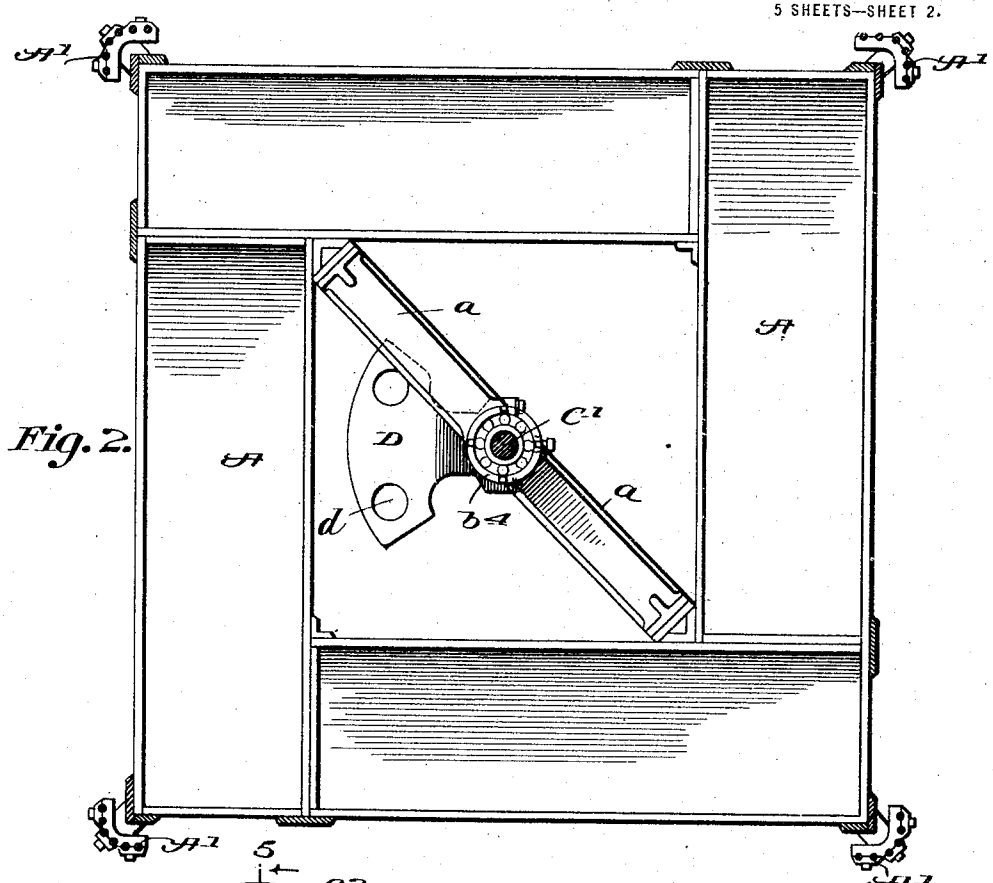


Fig. 3.

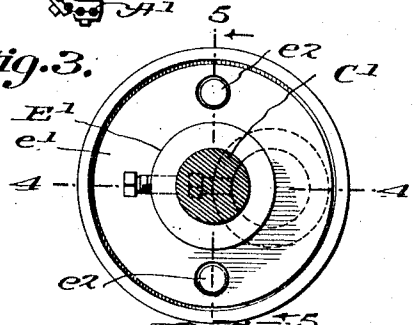


Fig. 6.

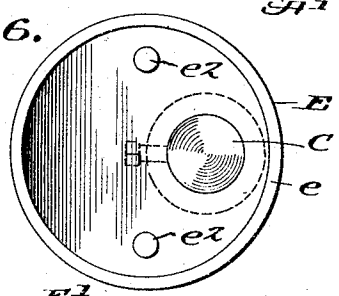


Fig. 4.

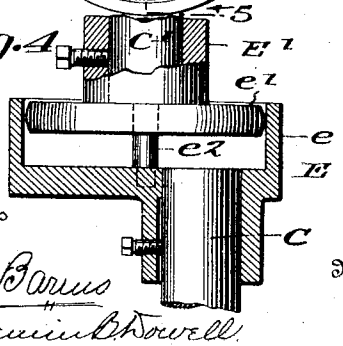
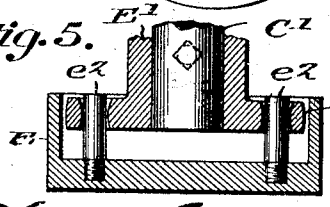


Fig. 5.



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5 SHEETS—SHEET 3.

Fig. 7.

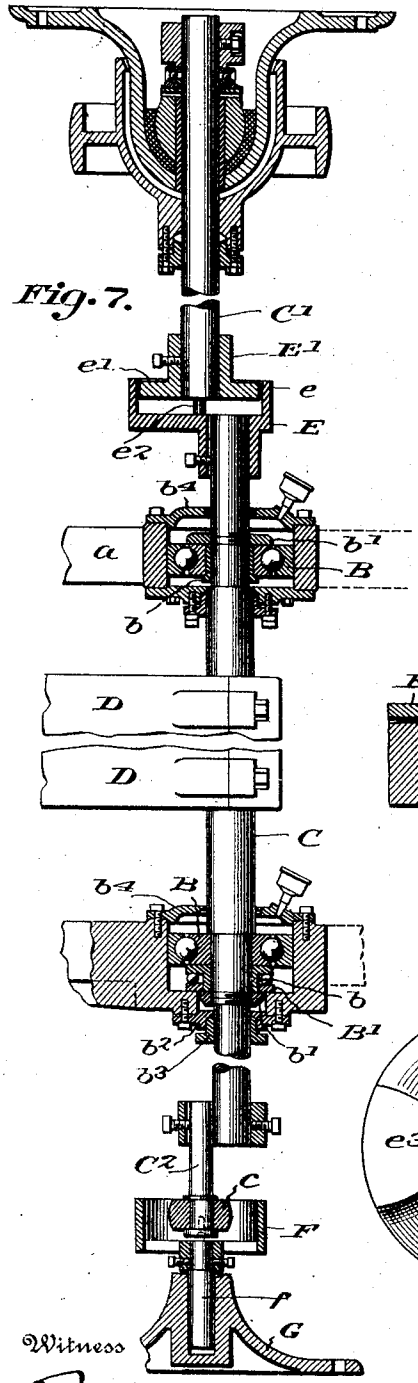


Fig. 8.

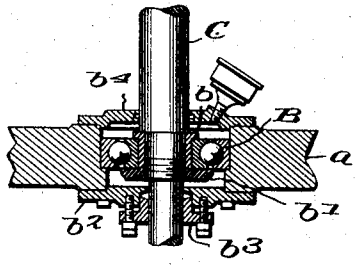


Fig. 9.

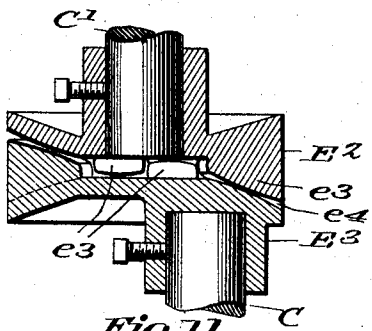


Fig. 10.

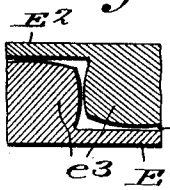


Fig. 11

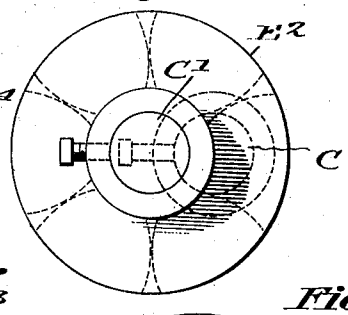


Fig. 12.

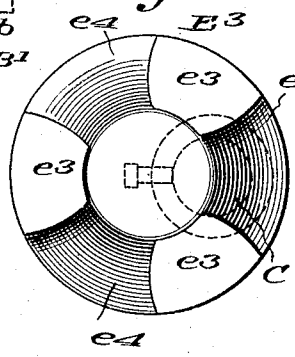
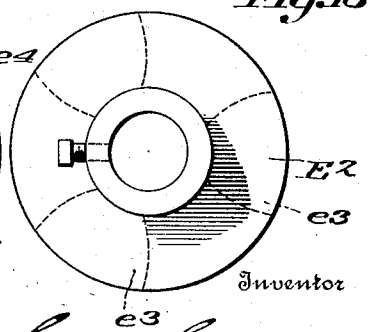


Fig. 13



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5 SHEETS—SHEET 4.

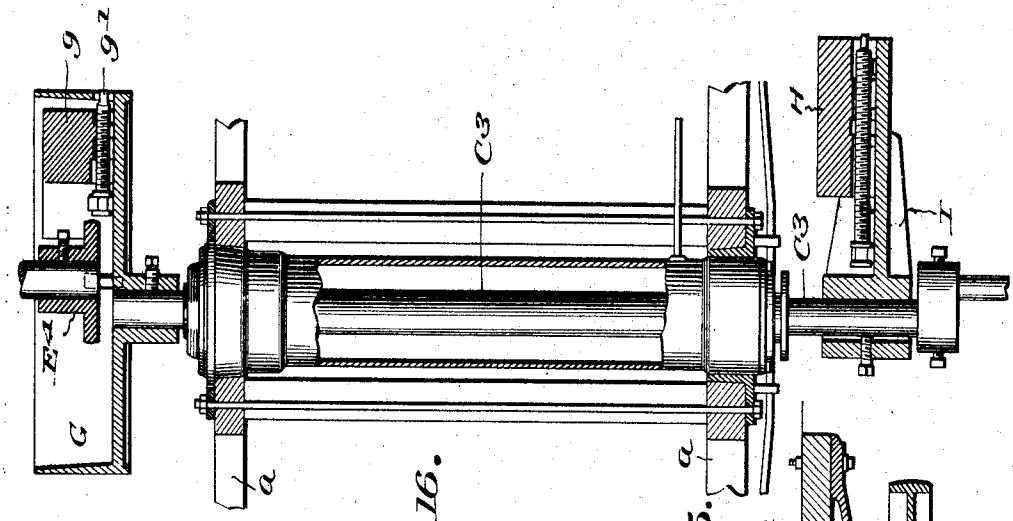


Fig. 16.

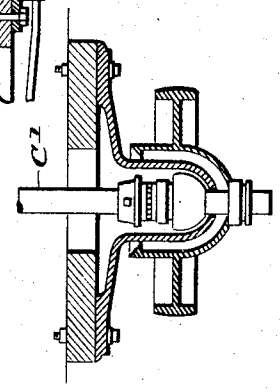


Fig. 15.

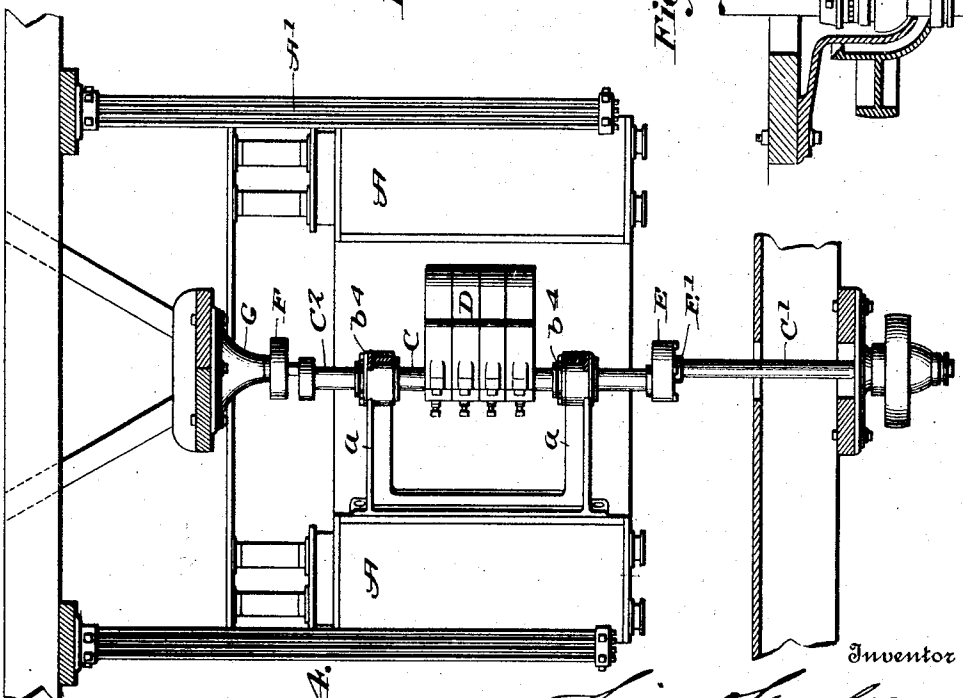


Fig. 14.

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5 SHEETS—SHEET 5.

Fig. 16.

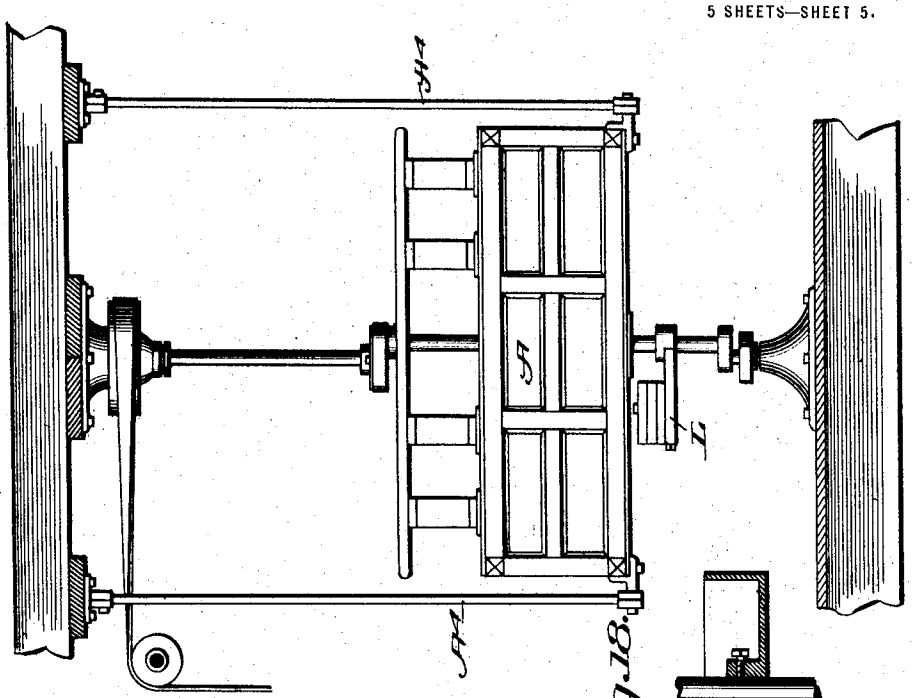
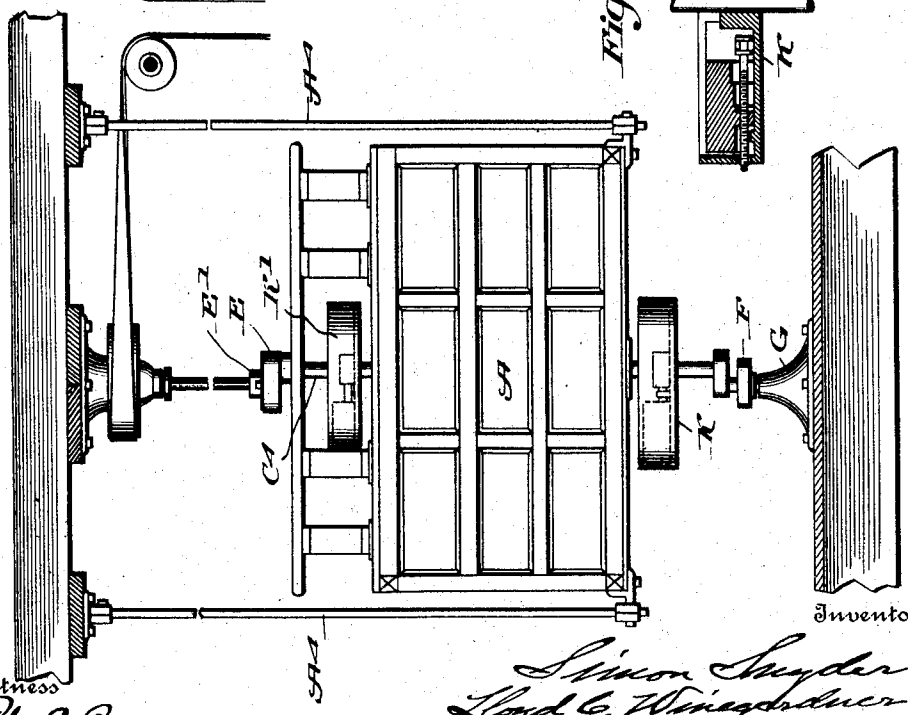


Fig. 17.



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UNITED STATES PATENT OFFICE.

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BOLTING-MACHINE.

1,327,636. Specification of Letters Patent. Patented Jan. 13, 1920.

Application filed February 21, 1917. Serial No. 150,057.

To all whom it may concern:

Be it known that we, SIMON SNYDER and LLOYD C. WINEGARDNER, citizens of the United States, residing at Muncy, in the county of Lycoming and State of Pennsylvania, have invented certain new and useful Improvements in Bolting-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to self-balancing gyrating bolting machines or shaking bolts of that type in which the sieve structure is suspended from the ceiling or other overhead support by means of wooden reeds, rods, or other flexible connections and given the desired movement by means of a centrally-disposed vertical shaft having its bearings in the open center of the sieve-frame. In such machines as heretofore constructed the sieve structure is caused to jerk or jar the building to a greater or less extent, and the shaft bearings are subjected to severe strains and excessive wear, and our invention is designed to overcome these and other disadvantages incident to the use of such machines as heretofore ordinarily constructed and to provide a simple, inexpensive and efficient self-balancing driving mechanism, which will insure a smooth, even running motion, and avoid jerking or jarring the building, together with means for applying power to the main driving shaft either above or below the sieve structure, as desired under varying conditions in practical use.

The invention will first be hereinafter more particularly described, with reference to the accompanying drawings, which form a part of this specification, and then pointed out in the claims at the end of the description.

In said drawings, Figure 1, Sheet 1, is a vertical sectional elevation of a bolting machine embodying our invention, having the driving section of the sectional driving shaft suspended from a ball-and-socket like bearing above the sieve structure;

Fig. 2, Sheet 2, is a plan view of the sieve-box; associated parts being shown in cross-section;

Fig. 3 is a detail plan view, on a slightly enlarged scale, of the eccentric coupling connecting the driving and driven sections of the driving shaft; the relative positions of said shafts being indicated in full and dotted lines;

Fig. 4 is a detail vertical section partly in side elevation of said coupling; the section being taken on the line 4—4 of Fig. 3;

Fig. 5 is a detail vertical sectional view of said coupling taken on the line 5—5 of Fig. 4, looking in the direction of the arrow;

Fig. 6 is a plan view of the lower cup-like member of said coupling;

Fig. 7, Sheet 3, is a vertical sectional elevation of the driving mechanism; associated parts being broken away;

Fig. 8 is a detail sectional view of a form of ball bearing for the lower end of the driven section of the driving shaft omitting the end-thrust bearing shown in Fig. 7;

Figs. 9, 10, 11, 12 and 13 are detail views of a modification of the eccentric coupling; Fig. 9 being a vertical section; Fig. 10 a fragmentary detail section; Fig. 11 a plan view; and Figs. 12 and 13 plan views of the lower and upper members, respectively, of said modified form of coupling;

Fig. 14, Sheet 4, is a side elevation, partly in section, of the bolting machine shown in Fig. 1, with the driving section of the sectional driving shaft arranged below the sieve structure; the ball-and-socket like supporting bearing being arranged in a reverse position to that shown in Fig. 1;

Fig. 15 is a detail sectional view of the aforesaid ball-and-socket like bearing in said reversed position;

Fig. 16 is a fragmentary sectional side elevation of a modified form of our invention applied to a different form of sieve from that shown in the other figures;

Fig. 17, Sheet 5, is a side elevation of a bolting machine embodying our invention showing balance weights on the driving shaft arranged partly above and partly below the sieve-box;

Fig. 18 is a detail sectional view of one of the balance weights shown in Fig. 17; and

Fig. 19 is a side elevation of another modification showing the balance weight entirely below the sieve-box.

Referring to said drawings, in which the same reference letters are used to denote corresponding parts in different views, the sieve-frame A may be of the form shown, or any suitable construction, such as ordinarily employed in this class of machines. In the form shown in Figs. 1 and 2 it has four

quadrangular sections arranged to provide an open center with bridge-trees *a*, *a*, having intermediate their ends suitable boxes to receive annular ball bearings B in which the driven section C of the driving shaft is journaled eccentrically to the driving section C^1 arranged either above or below the sieve-frame; the shafts C and C^1 being out of alinement and having their adjacent ends connected by an eccentric coupling device whereby they are caused to rotate together while relative movement in the direction of their length is permitted as hereinafter described. The sieve-frame may be suspended from the ceiling or an overhead support by means of flexible rods A^1, preferably arranged at the four corners thereof so as to support the sieve in such manner that it may be free to move in any direction within certain limits for imparting the desired gyratory or whirling movement thereto.

The shaft section C has attached thereto within the open center of the sieve-frame, as shown in Fig. 1, a number of balance weights D, which are preferably constructed with suitable pockets, as at *d*, to receive removable weights for increasing or decreasing the balance weight or load on the shaft as desired; said balance weights having sockets or eyes adjustably fitted on the shaft and secured in a fixed position by set screws as shown, or by other means such as ordinarily employed in this class of machines. These balance weights may be secured on the shaft within the open center of the sieve-frame, as shown in Figs. 1 and 2, or placed one above and another below the sieve-frame, as shown in Fig. 17 of the drawings; or all below the sieve-frame, as shown in Fig. 19; the position thereof being determined by the operator as desired under different conditions or requirements in practical use, as in using sieve-boxes of different heights.

The shaft section C is preferably constructed with reduced end portions or extensions, one of which extends above the upper bridge-tree and the other below the lower bridge-tree, as clearly shown in Figs. 1 and 7, leaving a shoulder at the junction of the larger and smaller portions, and said reduced extensions are screw threaded, as shown, for the attachment of a sleeve or collar *b* having an end flange between which and a nut b^1 screwed on such extension the annular ball bearing B may be fitted, as shown; said nut serving to force the collar against the shoulder on the shaft and prevent endwise movement of the annular ball bearing. Said bearings are preferably of the well known type adapted to resist both radial and end thrust and consisting of concentric rings having annular grooves in their confronting surfaces with balls running in said grooves; the outer ring being arranged in slidable contact with the inner wall of the socket or annular opening in the bridge-tree in which said bearings are fitted. The socket or opening in the lower bridge-tree may have an annular shoulder on which the outer member of the annular ball bearing may rest, as shown in Fig. 8, and thus support the shaft section C and connected parts within the sieve-frame so that it may move therewith in both lateral and vertical directions. But preferably the lower shaft bearing has an end-thrust bearing B^1, Fig. 7, interposed between the bottom of the box and the annular radial and end-thrust bearing B, with the inner ring of the latter abutting the shoulder on the shaft and forced thereagainst by the sleeve and nut *b*, b^1; the shaft section C being revolubly supported on said end-thrust bearing, so as to prevent excessive wear and reduce friction to a minimum. A stuffing box of any suitable construction may also be provided below each of said ball bearings, to prevent the escape of oil or other lubricant, and may consist of a bottom plate b^2 closing the opening through the bridge-tree and having an opening therein to receive the reduced extension of the shaft C and a sleeve b^3 underneath screwed or otherwise fastened on the shaft and entering the enlarged lower portion of the opening in said plate; the latter being secured to the bridge-tree by set screws, as shown. A top plate or cover b^4 for the opening through the bridge-tree is also provided, having an opening therein to receive the larger diameter of the shaft and an oil cup thereon to introduce oil in the receptacle thus provided between said bottom plate and cover, so that the annular ball bearings may be submerged in oil or other lubricant.

The shaft section C^1 is suspended from the ceiling or overhead support in such manner as to permit a universal pivotal or swinging motion of said shaft section through which motion is imparted to the shaft section C and therethrough to the sieve structure. To this end we preferably employ a ball-and-socket like bearing such as shown in Patent No. 961,814, granted Simon Snyder June 21, 1910, in or on which the driving shaft section is supported; said bearing consisting essentially of a semi-globular member seated in a socket or cup-like member which is bolted or otherwise secured to the ceiling or other support; the shaft section C^1 passing through said semi-globular member from which it may be suspended above the sieve structure, as shown in Figs. 1 and 7, or supported below the sieve structure, as shown in Figs. 14 and 15, being so supported in either case that it may rotate freely and at the same time swing about its axis at an angle to the other shaft section C. Whether supported above or below the sieve structure the weight of the

shaft is borne by an end-thrust ball bearing interposed between the semi-globular member and a collar fixed on the shaft. The socket member of the bearing projects into a cup-like receptacle fixed on the shaft and carrying a pulley for the application of power; said receptacle being adapted to contain oil and having a stuffing-box connection with the shaft to prevent leakage. This shaft-supporting ball bearing is merely a preferred form adapted for the purposes of our invention and any other suitable form may be employed, which will permit free rotation of the shaft and also a gyrating or swinging motion about its own axis. The adjacent ends of the shaft sections C and C^1 are connected so as to cause them to rotate together while permitting relative movement in the direction of the length of the shaft, and for this purpose we employ an eccentric coupling device which in the form shown consists of interengaging members E and E^1 each formed with a tubular projection or boss to receive the end of the shaft to which it is secured by a set screw, as shown in Figs. 4 to 7. One of said members, or the part E, has an annular flange *e* thereon, and the other, or the part E^1, an end flange or disk e^1 fitted within said annular flange; said disk having apertures therein to receive upstanding projections or pins e^2 carried by the member E whereby the two members are caused to rotate together while permitting relative movement of the shaft sections in the direction of their length, so as to compensate for any difference in length of the driving shaft due to shifting of the position of the two sections from a vertical position parallel with the axis of the sieve structure to an inclined position or at a greater or less angle to each other, as when the sieve structure is at the limit of its throw in starting and stopping. At the lower or free end of the shaft section C^1 there is a controlling device such as shown in said Patent No. 961,814, consisting essentially of an eccentrically attached stub shaft or pin C^2 on which there is preferably a loose disk or weight *c* encircled by a thrust-limiting flange F mounted on a short shaft or stud *f* which is revolubly fitted in a socket provided therefor in a fixed bracket or pedestal G secured to the floor or a fixture above or below the sieve-frame so that the thrust-limiting flange can turn freely with the loose disk or revoluble weight when engaged thereby and thus avoid or reduce friction to a minimum. The short shaft or stud *f* is in exact alinement with the shaft section C^1 and the stub shaft C^2 concentric with the axis of revolution, though eccentric to the shaft section C. The thrust-limiting flange may be provided with a lining of leather or other suitable material and a protuberance on the inner side thereof with which the loose disk or weight *c* may contact to facilitate rotation and reduce friction.

In Fig. 14 of the drawings, the arrangement of the driving shaft and controlling device is the reverse of that shown in Fig. 1, the driving section of the driving shaft being located below the sieve-frame and the controlling device above said frame. Otherwise the two constructions are substantially identical. In both cases the desired rotary and swinging motion of the driving section of the driving shaft is permitted by means of a ball-and-socket like shaft bearing, which in one instance is at the upper end and in the other instance at the lower end of the driving section of the driving shaft; said bearing having a pulley thereon around which a belt may pass for the application of power, such belt running over suitable idlers from a drive shaft overhead or below the mill floor, as may be most convenient and desirable in practical use. In other words, in Fig. 14, instead of being suspended with capacity for universal pivotal or swinging motion, the driving section of the shaft is supported from below the sieve-frame with capacity for such movement in a ball-and-socket like bearing substantially the same as the bearing shown in Fig. 1, and the operation is substantially the same in both cases, so that further description of Fig. 14 is deemed unnecessary.

In Figs. 9 to 13 of the drawings is shown a modification of the eccentric coupling, which in this instance consists of upper and lower members E^2 and E^3, respectively, one part or member E^2 having teeth or cogs e^3 thereon and the other part or member E^3 having spaced sockets e^4 therein to receive the cogs e^3, whereby the two shaft sections are caused to rotate together; the contacting surfaces of said cogs and the inner walls of said sockets being rounded to permit the desired rocking or universal movement necessary to allow the driving and driven shaft sections to assume a position at an angle to each other and also of sufficient depth to permit relative movement of the shaft sections in the direction of their length without separating the two members by withdrawal of the cogs from the sockets.

In Fig. 16 is shown a fragment of a sieve structure of a different form from that shown in the other figures of the drawings, and a different form of eccentric coupling; the coupling in this instance being combined with a balance weight in the form of a balance wheel G fixed on the projecting end of the driven section C^3 of the driving shaft and taking the place of the lower member E of the coupling shown in Figs. 1 and 3 to 6. The coupling member E^4 on the driving section of the shaft is the same as the coupling member E^1, above described, while the balance wheel G carries studs or pins en-

gaging the apertures in said member E^4 as hereinbefore described. These apertures in both instances are enlarged toward opposite ends so as to present rounded surfaces with which the pins on the other coupling member contact, as more clearly shown in Fig. 5. Within or on the balance wheel G is placed an adjustable weight g having a threaded portion or eye screwed on a threaded bolt g^1 for accomplishing such adjustment. A similar adjustable balance weight H is mounted on a bracket I secured on the lower end of the shaft section C^3 below the sieve structure, by socket and set screw connection, as shown.

In Fig. 17 is shown a sieve structure differing in height from that shown in Fig. 1 and a different form of balance weight or weights, differently arranged but with driving mechanism of the same construction. The balance weight in Fig. 17 is distributed partly above and partly below the sieve-frame. These weights are of the same general form and are adjustable in the same manner as the weights shown in Fig. 16, and are mounted upon balance wheels K and K^1 similar to and secured upon the driven shaft section C^4 in the same manner as the balance wheel G, Fig. 16.

In Fig. 19 is shown a sieve structure with driving mechanism and associated parts substantially identical with Fig. 1, except a different form and arrangement of the balance weight, which in this instance consists of a single weight or load adjustably secured on the driven shaft section below the sieve-frame; there being several small weights or removable sections mounted on a bracket L having a socket or eye and set screw connection with the shaft.

The operation of our invention and its advantages will be understood from the foregoing description, taken in connection with the accompanying drawings. The described driving mechanism insures a silent easy running machine that cannot impart any of its motion to or cause vibrations of the building in which it is used, and it is automatic and adapted to impart the gyrating or circular throw with an easy running motion and may be started and stopped without requiring any attention on the part of the operator. The drive is also simple in construction and inexpensive in manufacture. In starting free inclination of the shaft sections is permitted, though the throw of the sieve-box is restricted by the thrust-limiting flange, and the driving shaft quickly assumes a vertical position and settles down to an approximately true rotary motion while the sieve-box is whirled about the axis of rotation without jerking, pushing or pulling the rods by which it is suspended; and the eccentrically arranged driven shaft is adapted to move with the sieve-box in every direction and relatively to the driving section in the direction of its length, so that no vibrations are imparted to the building. The sieve-box may swing freely in any direction without affecting the shaft bearings or subjecting the same to severe strains or excessive wear, while the shaft sections rotate freely at an angle to each other as required in stopping and starting or before settling down to an approximately true rotary motion, and perfect adjustment and self-balance is secured by proper arrangement and adjustment of the balance weights arranged either partly above and partly below the sieve-frame, or entirely above or below the sieve-frame, or entirely within the sieve-frame as desired to meet different requirements in practical use. The driving mechanism being also reversible, permits the application of power either above or below the sieve-frame, to suit the convenience of the user or as may be best adapted for the building in which the machine is used.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States is:

1. In combination, a sieve structure freely suspended for gyration, a sectional driving shaft having a driven section journaled in bearings within said structure and a driving section journaled in a universal bearing secured to a fixed support, and means for connecting the adjacent ends of said shaft sections so as to permit a swinging movement of said driving section and relative movement of both sections in the direction of their length, said means comprising a coupling member on one shaft section having projections thereon protruding into interengaging means on an adjacent coupling member on the other shaft section, whereby the two members are caused to rotate together while permitting a rocking and sliding movement of one member within or upon the other.

2. In combination, a sieve structure freely suspended for gyration, a sectional driving shaft having a driven section journaled in bearings within said structure and a driving section journaled in a universal bearing secured to a fixed support, and means for connecting the adjacent ends of said shaft sections so as to permit a swinging movement of said driving section and relative movement of both sections in the direction of their length, said means comprising a disk-like member on one shaft section arranged within a cup-like member on the other shaft section, said cup-like member carrying a pin which protrudes through an aperture in said disk-like member, whereby the two members are caused to rotate together while permitting a rocking and sliding movement of one member within or upon the other.

3. A gyratory bolter comprising a flexibly suspended sieve structure, a driving shaft section revolubly supported in a bearing adapted to permit a universal swinging motion thereof, a driven shaft section supported in bearings within the sieve structure eccentric to said driving section, and a coupling device by which the adjacent ends of said shaft sections are slidably and eccentrically connected, said device comprising opposed slidably connected members one rockingly supported within or upon the other adapted to cause said shaft sections to rotate together while permitting relative movement thereof in the direction of their length.

4. In combination with a flexibly suspended sieve structure, means for imparting thereto a gyratory movement, said means comprising a sectional driving shaft having a driven section journaled in said structure and a driving section journaled in a bearing adapted to permit a universal rotary and swinging movement thereof, and a coupling device eccentrically connecting said shaft sections, said coupling device having opposed members fixed on the adjacent ends of the eccentrically arranged shaft sections and said members having interengaging means on their confronting surfaces whereby they are caused to rotate together and adapted to permit a rocking and also sliding movement toward and from each other, so as to permit relative movement of the two shaft sections in the direction of their length.

5. In combination, a flexibly suspended sieve-frame, a sectional driving shaft having one section journaled within the sieve-frame in anti-friction bearings adapted to resist both radial and end thrust, the lowermost bearing including an end-thrust anti-friction bearing supporting said shaft section within the sieve-frame, another shaft section supported in bearings which permit both a rotary and a swinging movement thereof; said sections carrying interengaging coupling members whereby they are caused to rotate together while relative movement in the direction of their length is permitted.

6. In a gyratory bolting machine, a self-balancing driving mechanism comprising a shaft journaled in bearings within the sieve structure and movable therewith bodily in all directions; an eccentrically disposed driving shaft, and an eccentric coupling device connecting the driving and driven shafts; said coupling device comprising opposed members on the adjacent ends of the two shafts interconnected to adapt them to rotate together, one member being rockingly and slidably supported within or upon the other to permit relative movement of the shafts in the direction of their length and also adapted to permit the shafts to rotate at an angle to each other.

7. In a bolting machine, a sectional driving shaft comprising a driven section journaled within the sieve structure and movable therewith in all directions, a driving section supported in a bearing which permits both a rotary and a swinging movement thereof about its own axis, an eccentric coupling connecting the adjacent ends of said shaft sections so as to cause them to rotate together while permitting relative movement thereof in the direction of their length, said coupling consisting of a cup-like member on one shaft and a disk-like member on the other shaft rockingly and slidably fitted within the cup-like member and adapted to rotate therewith.

In testimony whereof we affix our signatures in the presence of two witnesses.

SIMON SNYDER.
LLOYD CALVIN WINEGARDNER.

Witnesses:
STEPHEN SOARS,
C. C. PFLEEGOR.