(No Model.) 3 Sheets—Sheet 1.

F. BRANDES.

MACHINE FOR GRINDING BALL AND SOCKET JOINTS.

No. 533,863. Patented Feb. 12, 1895.

Fig. 1.

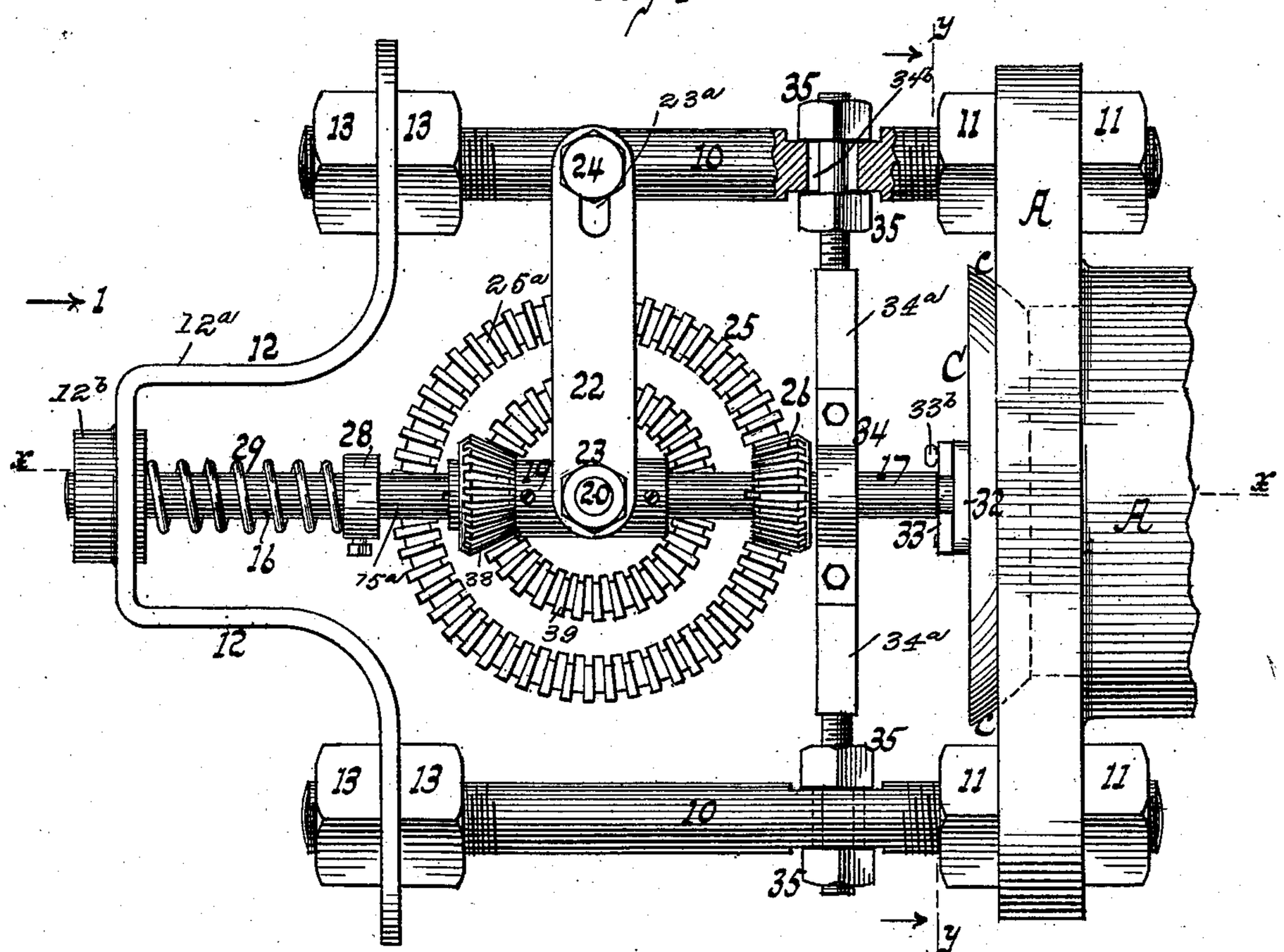
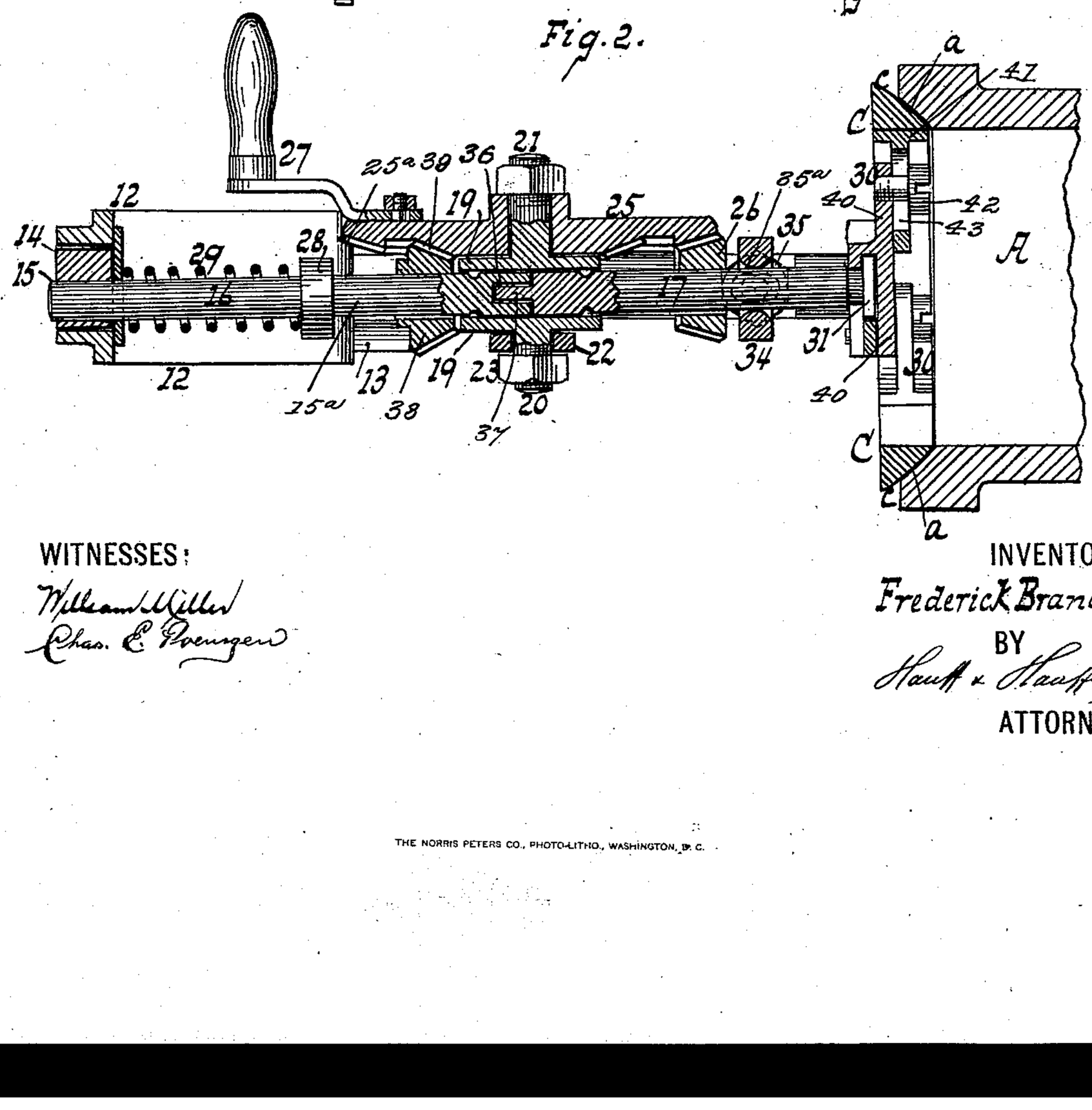


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

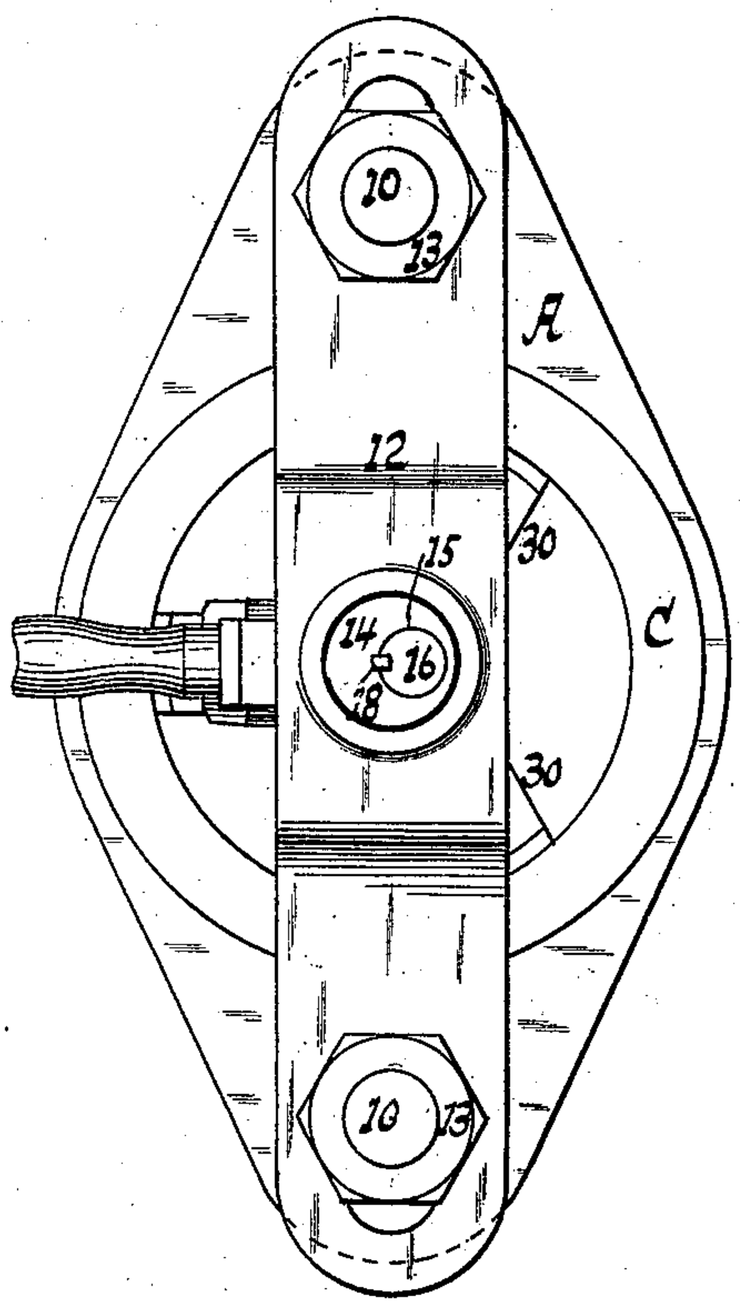

Fig. 4.

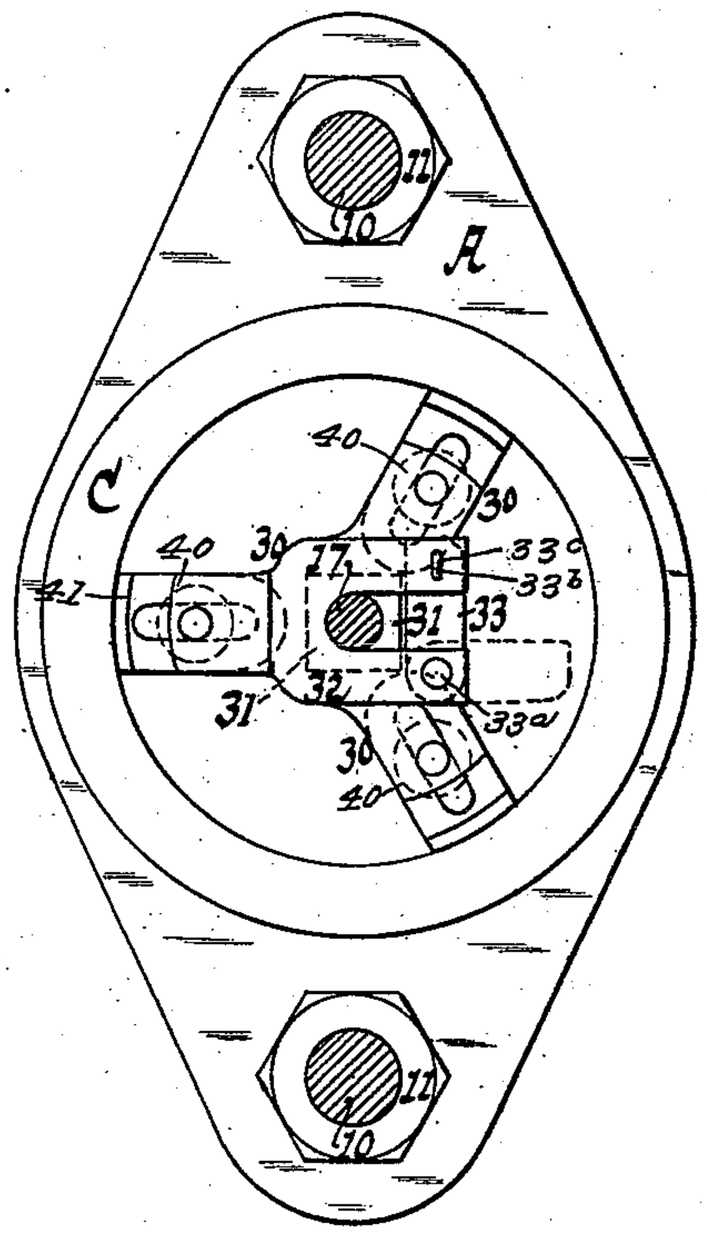

Fig. 5.

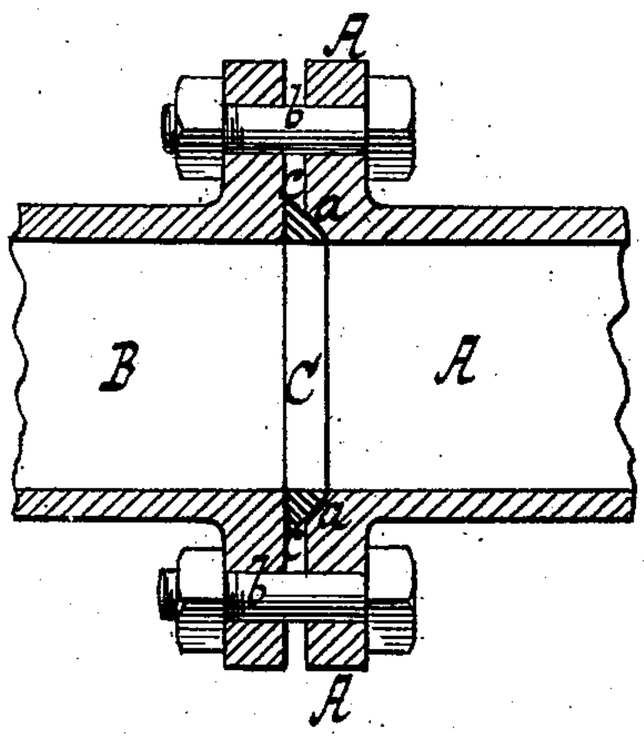

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FIG. 6.

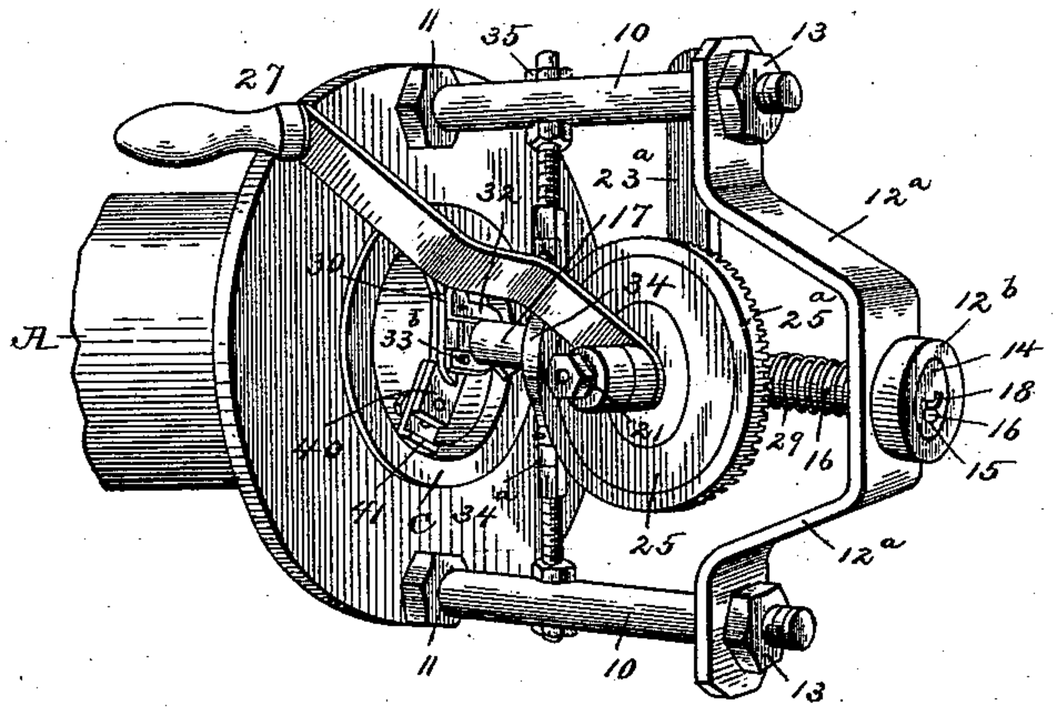
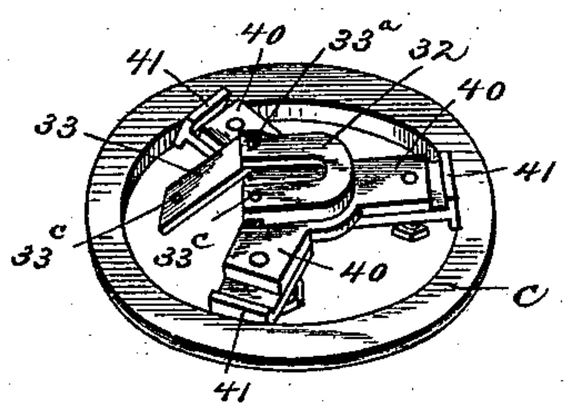


FIG. 7.



Inventor

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UNITED STATES PATENT OFFICE.

FREDERICK BRANDES, OF RONDOUT, NEW YORK.

MACHINE FOR GRINDING BALL-AND-SOCKET JOINTS.

SPECIFICATION forming part of Letters Patent No. 533,863, dated February 12, 1895.

Application filed May 10, 1894. Serial No. 510,747. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK BRANDES, a citizen of the United States, residing at Rondout, in the county of Ulster and State of New York, have invented new and useful Improvements in Machines for Grinding Ball-and-Socket Joints, of which the following is a specification.

This invention relates to grinding machines for pipe-joints; and it has for its object to provide a new and useful machine of this character especially adapted for grinding steam-pipe joints for locomotives, and other systems of piping.

To this end therefore, the main and primary object of the invention is to render effective, and to facilitate, the operation of grinding the convex surface of a ball or segment of a ball into the corresponding concave surface of a socket receiving the same.

With these and other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

In the drawings:—Figure 1 is a side elevation of a grinding machine constructed in accordance with this invention. Fig. 2 is a horizontal sectional view on the line *x*—*x* of Fig. 1. Fig. 3 is an end view of the machine, the view being taken in the direction of the arrow 1, in Fig. 1. Fig. 4 is a transverse vertical sectional view on the line *y*—*y* of Fig. 1. Fig. 5 is a detail sectional view showing the construction of steam pipe joint in connection with which the machine is especially adapted to be used. Fig. 6 is a perspective view of the machine in its applied position. Fig. 7 is a detail in perspective of the chuck or holder for the joint ring.

Similar reference characters designate corresponding parts in the several figures of the drawings.

While the herein described machine is adapted for use in grinding pipe joints having registering concave and convex or beveled surfaces, still the same is intended more particularly for such joints as illustrated in Fig. 5, of the drawings, in which, A, designates the steam pipe that usually extends from the interior of the dome of a locomotive boiler to and through the rear end of the boiler, where it connects with a pipe B, and the joints between these two pipes are usually produced by forming in the outer end of the pipe A a beveled or concave ring seat *a*, that receives the convex or beveled surface *c*, of the joint ring C, said convex surface of the ring being held in the seat by means of the bolts *b*, connecting the adjacent flanges at the meeting ends of the pipes A and B. By reason of the concave seat *a*, and the ring with the convex surface registering therein, it will be obvious that the pipes A and B, will accommodate themselves to any unequal expansion and contraction, and with the pipe A being held perfectly firm, the inner end of the pipe B, can assume a slight rolling or rocking motion without affecting the joint between the two pipes. It is necessary in order to preserve the tight joint between the pipes A and B, that the convex surface of the ring C, should be ground into the concave seat of the pipe A, and heretofore, this operation has been performed entirely by hand, while by means of the herein described machine the same operation is accomplished quickly and accurately.

In connection with the pipe end having the concave seat and the joint ring with the convex surface, the herein described machine is adapted to be employed, and the frame of the machine essentially comprises the opposite parallel bolt rods 10, and the end bearing bar 12, the opposite extremities of which bar are adjustably secured to one of the threaded ends of the bolt rods by means of the oppositely located clamp nuts 13, mounted on the bolt rods at both sides of the ends of the frame bar 12. The opposite threaded ends of the bolt rods 10, project through the bolt openings in the flange of the pipe A, and are secured firmly therein by means of the clamp nuts 11, mounted on the threaded ends of said bolt rods at both sides of the pipe A, thereby providing an attachment for clamping the frame of the machine directly to the flange of the pipe being operated upon.

The end frame bar 12, connecting the bolt rods 10, at one end, is provided with an intermediate offstanding U-shaped portion 12^a, having a central bearing collar 12^b, in which turns a bearing bushing 14. The bearing

bushing 14, that turns within the bearing collar 12^b, of the frame bar 12, is provided with an eccentric bearing opening or perforation 15, therein, to loosely receive the outer end of the sectional grinding shaft 15^a. The sectional grinding shaft 15^a is supported horizontally within the frame of the machine between the opposite parallel bolt rods 10, and said shaft consists of the separate aligned shaft sections 16 and 17, the shaft section 16, being provided at its inner end with a socket 36, and the adjacent outer end of the shaft section 17 being provided with a projecting pin or stud 37, that loosely fits in the socket 36, of the shaft section 16 to complete a loose connection between the two aligned shaft sections.

The jointed ends of the shaft sections 16 and 17 of the sectional shaft are supported to turn in an intermediate bearing sleeve or collar 19, that is provided on diametrically opposite sides with the offstanding bolt studs 20 and 21, respectively, the bolt stud 20, being fitted loosely in the lower end of the hanger bar or link 22, that is held on the stud 20 by means of a suitable nut 23, engaging the threads of said stud, and the upper end of said hanger bar or link 22, is provided with a slot 23^a, that receives the screw 24, that engages in a threaded opening in one of the bolt rods 10, to provide for adjustably connecting the hanger bar or link 22, thereto, so that the bearing sleeve or collar 19, can be maintained adjusted in a proper position for holding the adjacent ends of the shaft sections loosely jointed.

The bolt stud 21 projected from the side of the sleeve or collar 19, opposite the bolt stud 20, has journaled thereon a beveled gear wheel 25, provided with an operating handle 27, whereby the same can be easily turned by hand, and upon one face with the separate concentric gear portions 25^a and 39, respectively, the outer gear portion 25^a meshing with a beveled gear pinion 26, mounted on the shaft section 17, intermediate of its ends, and the other smaller gear section 39, meshing with a beveled gear pinion 38, mounted on the shaft section 16, adjacent to the inner end thereof. By reason of the gearing described, it will be obvious that the inner shaft section 17 will be rotated at a faster speed than the outer shaft section 16, for the purpose of insuring a more rapid and accurate grinding of the surface than can otherwise be secured, as will be more particularly referred to.

The shaft section 16, has adjustably secured thereon adjacent to the beveled gear pinion 38, a collar 28, against which presses one end of a spring 29, coiled on the shaft 16, between the collar 28 and the frame bar 12, to provide means for firmly moving the sectional shaft in a longitudinal direction toward the pipe end being operated upon, and the inner end of the said sectional shaft 15^a, that is normally pressed by the spring toward the pipe end, is provided with a squared attaching head or plate 31, to which is detachably connected the chuck or holder 30, that is adapted to be clamped inside of the joint ring C, for the purpose of holding the same while the grinding operation is carried on.

The chuck or holder 30, is provided at one side with a bifurcated hook plate 32, that is adapted to be removably engaged over the squared attaching head or plate 31, at the inner end of the sectional shaft 15^a. At the open side of the hook plate 32, a swinging latch plate 33, is pivoted at one end as at 33^a, at one side of the bifurcation of the hook plate 32, and is adapted to have the other free end thereof removably engaged by the latch pin 33^b, fitted in aligned openings 33^c, formed in the hook plate 32 at one side of its bifurcation and in the swinging end of said latch plate. With the latch plate thus secured within the open end of the hook plate 32, the squared head or plate 31, of the shaft will be locked within said hook plate so as to hold the chuck or holder firmly attached on the inner end of the sectional shaft.

The chuck or holder 30 is provided with a series of radial sectional chuck arms 40, provided at their outer ends with the curved chuck plates 41, adapted to fit against the inner sides of the ring C, and said sectional chuck arms 40, are adjusted against the inner sides of the ring C, and are held in their adjusted position by means of the adjusting screw 42, fitted to the fixed members of said sectional arms and engaging in the longitudinally disposed slots 43, in the movable members of said sectional arms.

At a point intermediate of its ends the shaft section 17, turns in a supplemental bearing box 34 having the opposite bolt arms or extensions 34^a, that are adjustably secured in the slots 34^b, of the bolt rods 10, by means of the clamping nuts 35, engaging the threaded ends of said bolt arms at both sides of said bolt rods, and by reason of this connection of the threaded ends of the bolt arms carrying the box 34, to the bolt rods 10, said box 34 may be adjusted longitudinally of the shaft as may be found necessary for the proper support of the end of the shaft section 17, carrying the chuck or holder, and the bearing opening 35^a, of the box 34, is convexed or enlarged at its opposite sides so that the same allows the shaft section 17, to freely oscillate as such motion is imparted thereto from the shaft section 16, that is given an eccentric rotation or oscillation by reason of the outer end thereof fitting in the bearing bushing 14.

With the parts of the machine adjusted as described, and the joint ring C, carried by the chuck or holder 30, and working on the seat *a*, of the pipe A, it is simply necessary to rotate the wheel 25, to impart a rotary motion to the jointed shaft sections 16 and 17, and by reason of the gear connection described the shaft section 16 will revolve or rotate at a slower speed than the shaft section 17, thereby increasing the speed of the

rotary motion imparted to the joint ring C, relative to the oscillating or rocking motion imparted thereto through the medium of the bearing bushing 14, thereby providing an operation for more rapidly grinding the joint than can be effected where both motions are imparted to the joint ring at a uniform speed.

From the above, it is thought that the construction, operation and many advantages of the herein described grinding machine will be readily apparent without further description, and changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a grinding machine of the class described, a stationary frame having an eccentric bearing, a sectional loosely jointed grinding shaft, one section of which is mounted at one end in said eccentric bearing and the other section of which carries a chuck or holder, and means for rotating the two sections of the shaft at different velocities, substantially as set forth.

2. In a grinding machine of the class described, the combination of a sectional grinding shaft carrying a chuck or holder at one extremity, means for rotating the separate sections of the shaft at different velocities, and separate means for imparting to the sectional shaft an oscillating motion, substantially as set forth.

3. In a grinding machine of the class described, the frame having an eccentric bearing, a bearing sleeve or collar supported within said frame, a longitudinally movable grinding shaft mounted intermediately in said bearing sleeve or collar and fitted at one end in said eccentric bearing, a chuck or holder mounted on the end of the shaft opposite the eccentric bearing therefor, a spring arranged on the shaft to normally and yieldingly move the same in one direction, and means for rotating and oscillating said shaft, substantially as set forth.

4. In a grinding machine of the class described, a stationary frame provided at one end with a bearing collar, a rotary bearing bushing turning in said collar and provided with an eccentric bearing opening, an intermediately arranged bearing sleeve or collar supported within said frame, a sectional loosely jointed grinding shaft mounted to turn within said bearing sleeve or collar and having the extremity of one section fitted in the eccentric bearing opening of said rotary bearing bushing, a holder or chuck mounted on one end of one of the shaft sections, a spring arranged on one of the shaft sections to normally move the shaft longitudinally in one direction, and means for rotating the separate shaft sections at different velocities, substantially as set forth.

5. In a grinding machine of the class described, a stationary frame comprising opposite parallel bolt rods, and a frame bar connecting one end of said rods and provided with a central bearing collar, a rotary bearing bushing turning in said collar and provided with an eccentric bearing opening therein, an intermediate bearing sleeve or collar provided with diametrically opposite bolt studs, a hanger bar or link loosely connected at one end to one of said bolt studs and adjustably at its other end to one of the frame bolt rods, a beveled gear wheel journaled on the other of said bolt studs, and provided at one side with separate concentric gear portions, a sectional grinding shaft loosely jointed at an intermediate point and turning in said sleeve or collar, one end of said sectional shaft fitting in said rotary bushing and the other end carrying a chuck or holder, beveled gear pinions mounted on each of the shaft sections and meshing with the separate gear portions of said gear wheel, a spring arranged on one of the shaft sections to move the shaft in one direction, and a supplemental bearing box provided with an enlarged convexed bearing opening receiving one of the shaft sections and with opposite bolt arms adjustably connected to said bolt rods, substantially as set forth.

6. In a grinding machine of the class described, the combination with the shaft having a squared head or plate at one end; of a chuck or holder having a bifurcated hook plate at one side adapted to engage over said squared head or plate, and with a series of radially disposed adjustable chuck arms having chuck plates at their outer ends, and a swinging latch plate pivotally mounted within the open side of said bifurcated hook plate to provide for detachably locking said hook plate on said squared head or plate of the shaft, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FREDERICK BRANDES.

Witnesses:
J. H. JONES,
JOHN M. NEWKIRK.