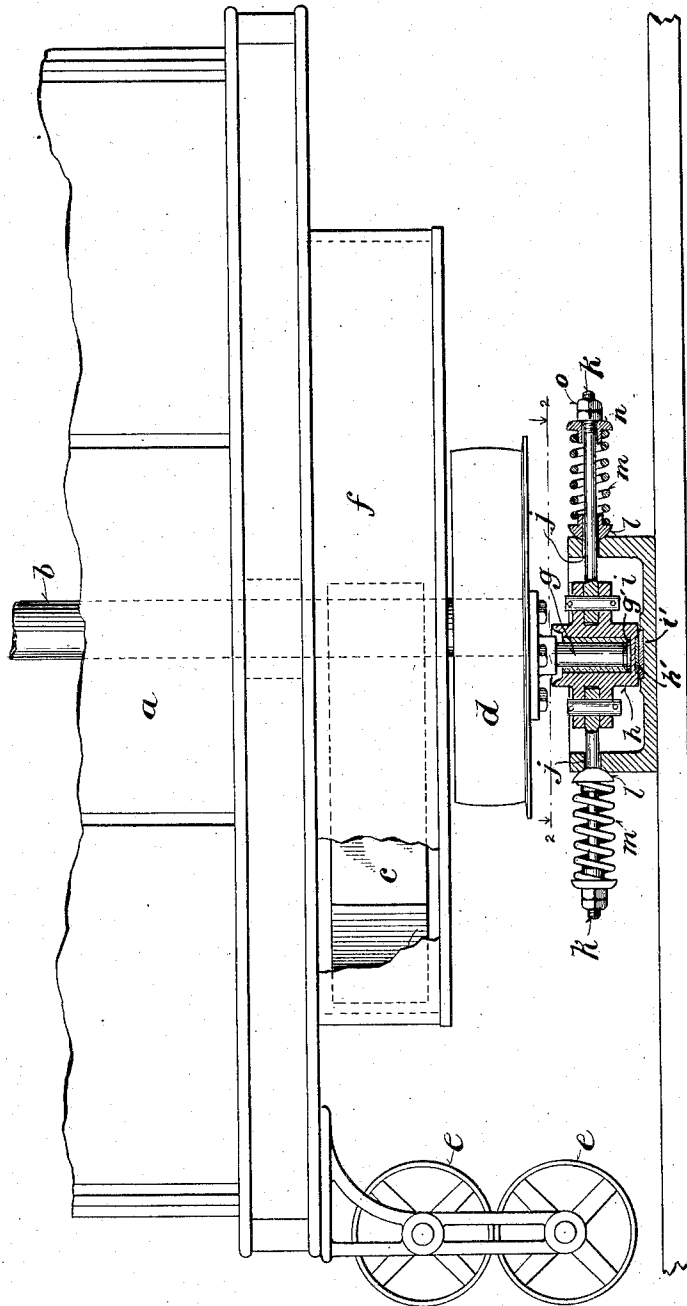


1,015,434.

Patented Jan. 23, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



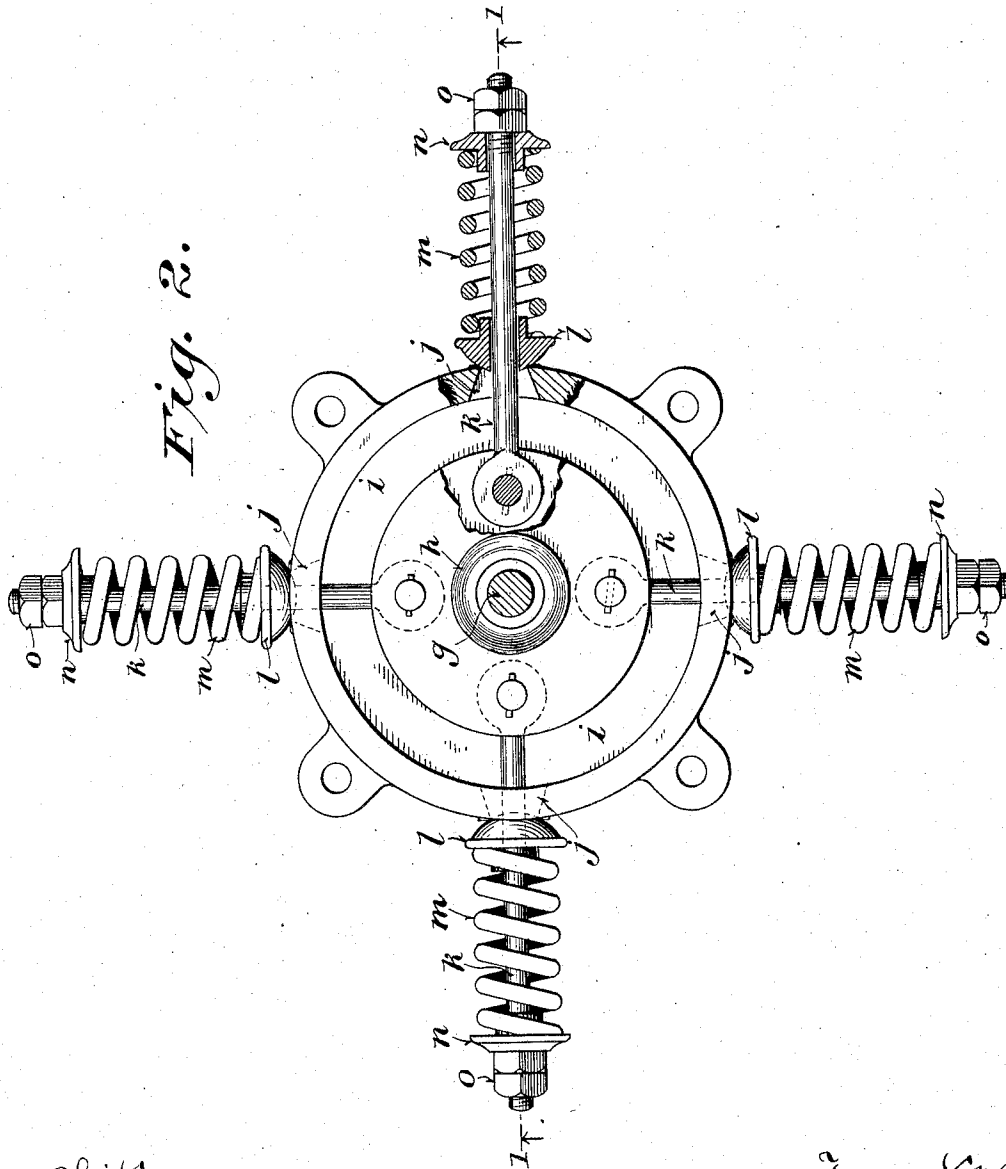
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W. D. GRAY.
GYRATORY MACHINE.
APPLICATION FILED MAR. 11, 1907.

Patented Jan. 23, 1912.
2 SHEETS—SHEET 2.

1,015,434.



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UNITED STATES PATENT OFFICE.

WILLIAM D. GRAY, OF MILWAUKEE, WISCONSIN.

GYRATORY MACHINE.

1,015,434.

Specification of Letters Patent.

Patented Jan. 23, 1912.

Application filed March 11, 1907. Serial No. 361,670.

To all whom it may concern:

Be it known that I, WILLIAM D. GRAY, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Gyratory Machines, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

10 This invention relates to machines such as flour bolters, which are provided with eccentrically weighted rotary shafts arranged to impart a gyratory movement thereto.

15 The main objects of the present invention are to avoid erratic movements, shock and jar in starting and stopping such a machine; to insure a smooth and steady gyratory movement of the machine about its 20 neutral axis while it is running at its normal or critical speed; to provide a support for the rotating shaft and weights independent of the jointed or flexible hangers or supports which sustain the machine itself; and generally to improve the construction and operation of machines of this class.

25 It consists in certain novel features of construction and in the peculiar arrangement and combinations of parts as hereinafter particularly described and pointed out in the claims.

In the accompanying drawing like characters designate the same parts in both figures.

35 Figure 1 is a side elevation of the lower portion of a gyratory bolting machine and a central vertical section on the line 1 1, Fig. 2 of the yielding bearing constituting the main feature of the present invention; 40 and Fig. 2 is a horizontal section on the line 2 2, Fig. 1 and a plan view on an enlarged scale of said bearing, parts of which are broken away.

45 *a* designates the lower part of the body or case of a gyratory bolting machine, which is provided with a central vertical shaft *b* journaled therein and provided with one or more eccentric weights *c*, preferably one at each end of the machine.

50 Any suitable means may be employed for rotating the shaft *b* with its weights in the body or case *a*, which is suspended or supported by hangers or other means (not shown) so as to admit of a gyratory movement thereof around a vertical line called 55 the neutral axis, parallel with the axis of

the shaft *b*. As suitable for this purpose a pulley *d* is shown fixed on the lower end of the shaft *b* in position to receive a belt passing around guide pulleys *e* carried by and 60 movable with the body or case *a*.

Each weight *c* is preferably inclosed in a box or case *f*, in the usual manner.

At its lower end the shaft *b* is provided with an offset journal *g*, which is adjusted 65 to or set in the neutral axis around which the machine is designed to gyrate when running at its normal or critical speed, the distance of this axis from the axis of the shaft *b* being determined mainly by the relative 70 mass and distance of the eccentric weights from the center of the shaft *b*, the mass of the gyratory body and load of the machine, and the rotary speed of the shaft and weights. 75

In starting and stopping a machine of this kind, its movement unless restrained, is wild and erratic and liable to result in accidents or injury to the machine itself or surrounding objects. To avoid such wild 80 or erratic movements and accidents or injury resulting therefrom, without shock or jar to the machine, its driving connections and the structure which supports it, and to relieve the gyratory body of the machine 85 from the weight of the rotating parts by which the gyratory movement is imparted thereto, a laterally movable yielding end thrust bearing is provided. This bearing comprises a journal box *h*, fitting the journal 90 *g* and forming at its lower end a step or end thrust bearing therefor, a fixed plate or support *i*, on which the lower end of the box *h* bears and is movable transversely to its axis, and fixed guides or bearings *j* arranged around and at a distance from said 95 box, which is yieldingly connected therewith. These guides or bearings *j* may be conveniently formed as shown, with the plate or support *i* in or as a part of a continuous upwardly projecting circular rim 100 or flange.

Radially disposed rods *k* are pivoted at their inner ends to the box *h* and pass loosely through openings in the bearings *j* and 105 through oscillatory spring seats *l* which have spherical faces fitting in corresponding sockets in the outer sides of the bearings *j*. Spiral springs *m* are mounted on the rods *k* between the seats *l* and opposing seats *n* adjus- 110 tably secured on said rods by nuts *o* threaded on their outer ends.

The box *h* is preferably babbitted to form a close fitting smooth working bearing for the journal *g*, and is provided in its lower end with a disk or wearing plate *g'* of hard metal. The adjoining faces of the box and bearing plate or support *i* are also preferably provided as shown in Fig. 1, with wearing plates *h'* and *i'* of hard metal or suitable material.

- 10 The bearing plate or support *i* is firmly secured to the floor or other foundation, centrally below the machine, and the box *h* is adjusted to rest normally approximately on the center of the bearing plate or support *i* 15 and in line with the neutral axis of gyration.

In operation, when the machine is started and until it attains its normal or critical speed, the offset journal *g* tends to gyrate around a line parallel with and between its 20 axis and the axis of the shaft *b*, and the box *h* yields to this tendency and describes a diminishing gyratory circuit until it comes to rest in line with the neutral axis of gyration when the machine has attained its critical speed. The rotating shaft with its eccentric weights and the gyrating body of the machine are thus yieldingly restrained and quickly brought to the critical axis of gyration in starting, and in stopping the parts 30 are brought to rest without shock or jar. Wild or erratic movements of the machine resulting from stopping and starting and from other causes, such as variations in the load and in the speed of the eccentrically 35 weighted shaft *b* are also avoided, and the machine is caused to run true and smooth without jar or vibration when the box *h* is properly adjusted.

By providing a step or end thrust bearing 40 for the journal *g* and an end support for the box *h* in which it turns, the weight of the rotating parts of the machine is taken off from the hangers or supports of the gyrating body, and the tendency of the machine to sag 45 at the center is thus counteracted.

By means of the adjustable seats *n* and the nuts *o* on the outer ends of the rods *k*, the box *h* may be adjusted with relation to the

bearings *j*, so that it will normally rest in line with the neutral axis of the machine, 50 and the tension of the springs *m* may be adjusted so as to restrict the gyratory movement of the box *h* more or less as may be desired under different conditions.

I claim: 55

1. In a gyratory machine the combination of an eccentrically weighted shaft journaled therein and having an offset journal approximately in line with the neutral axis of gyration, a box fitting said journal without play 60 and movable transversely to its axis, fixed bearings arranged at intervals around said box at a distance therefrom and provided with oscillatory spring seats, radially disposed rods pivoted at their inner ends to said 65 box, passing loosely through said spring seats and provided on their outer ends with adjustable spring seats, and springs interposed between the opposing spring seats and arranged to yieldingly hold said box normally in line with said neutral axis, substantially as described. 70

2. In a gyratory machine the combination of an eccentrically weighted shaft journaled therein and having an offset journal approximately in line with the neutral axis of gyration, an end bearing box fitting said journal and movable transversely to its axis, a fixed bearing plate arranged to support said box endwise and provided at intervals around it 80 with bearings, radially disposed rods pivoted at their inner ends to said box and loosely guided in said bearings, spring seats on the outer ends of said rods and springs interposed between said bearings and seats 85 on the outer ends of said rods and adapted to yieldingly hold said box normally in line with said neutral axis, substantially as described.

In witness whereof I hereto affix my signature in presence of two witnesses. 90

WILLIAM D. GRAY.

Witnesses:

CHAS. L. GOSS,
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