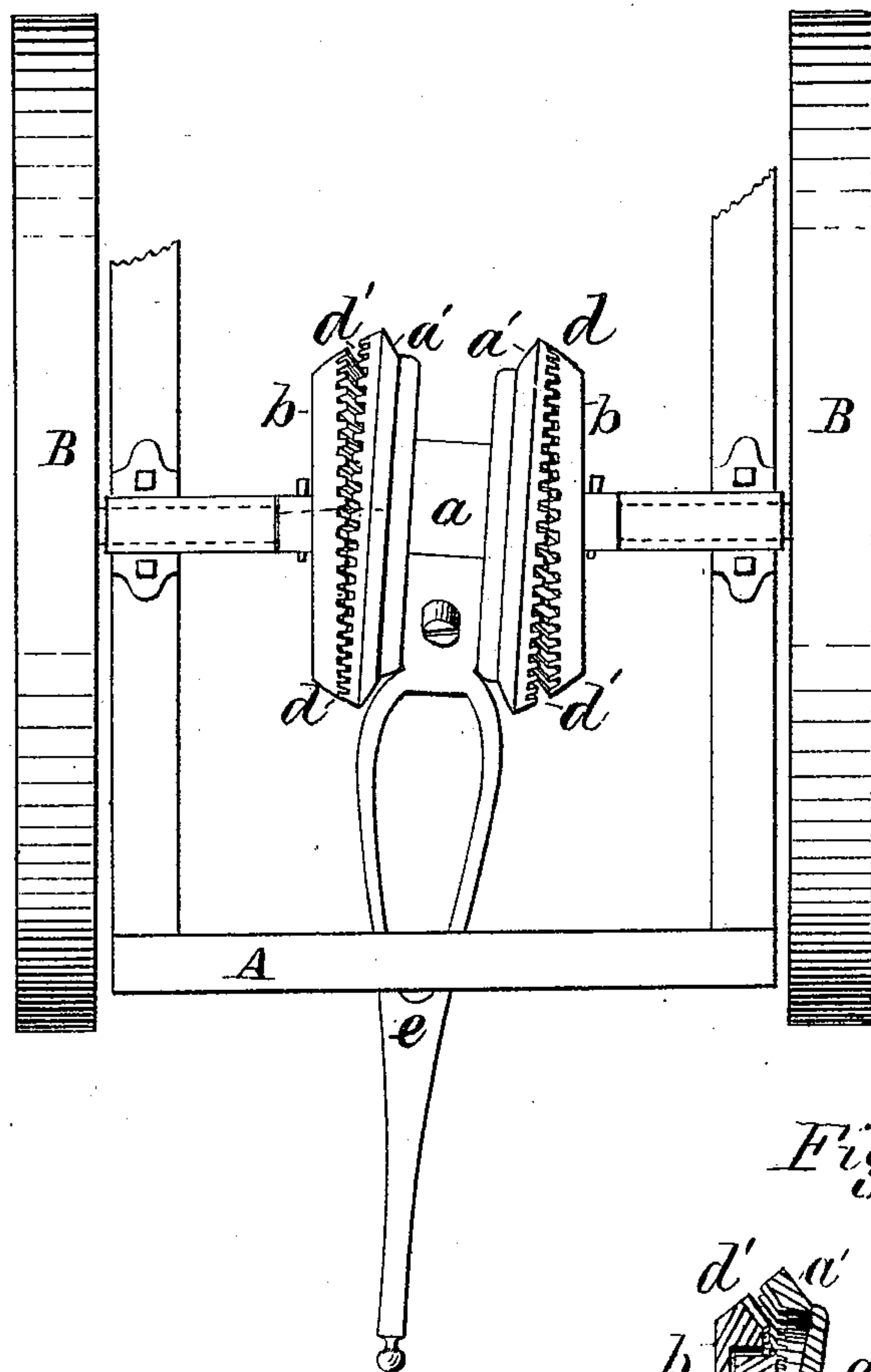


F. M. WATERS & G. H. EARNEST.  
Oscillating Gearing.

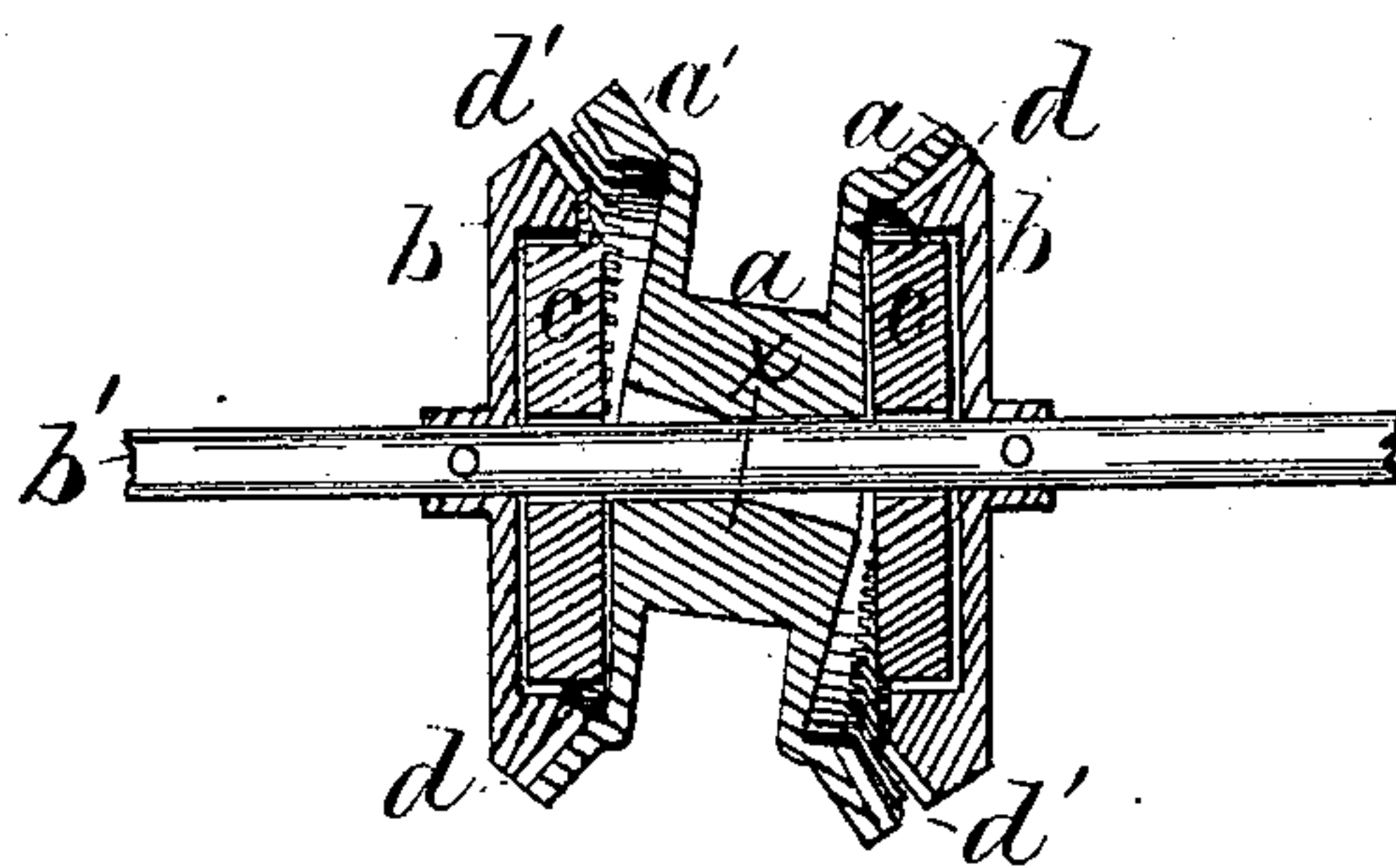
No. 230,092.

Patented July 13, 1880.

*Fig. 1.*



*Fig. 2.*



*Attest.*  
*Chas. C. Sawyer*  
*Joseph Harrison*

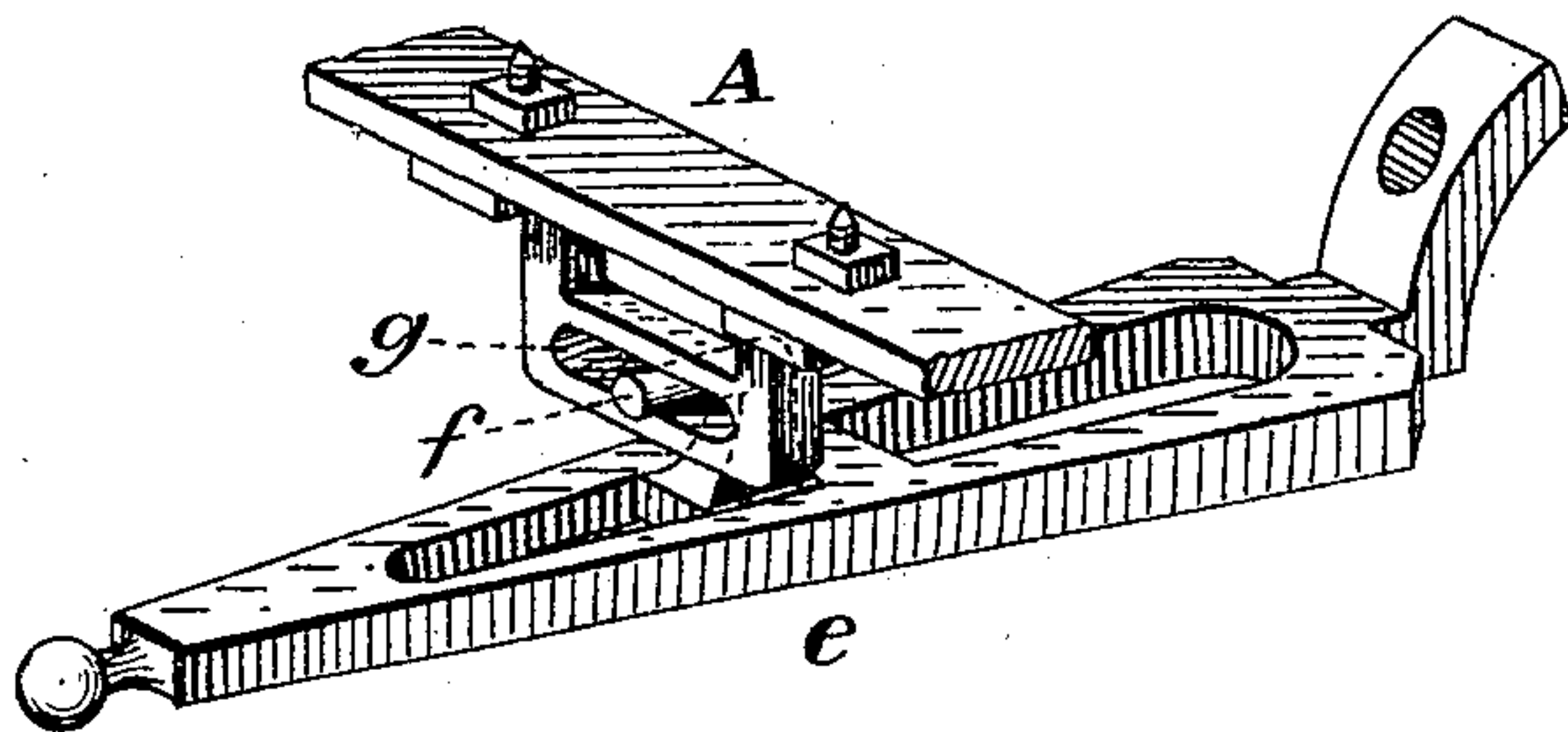
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*Frank M. Waters.*  
*George H. Earnest.*  
*B. C. Converse, Atty.*

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*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

FRANK M. WATERS AND GEORGE H. EARNEST, OF SPRINGFIELD, OHIO.

## OSCILLATING GEARING.

SPECIFICATION forming part of Letters Patent No. 230,092, dated July 13, 1880.

Application filed November 11, 1879.

*To all whom it may concern:*

Be it known that we, FRANK M. WATERS and GEORGE H. EARNEST, both of the city of Springfield, in the county of Clarke and State of Ohio, have jointly invented certain new and useful Improvements in Oscillating Gearing, of which the following is a specification.

Our invention relates to that class of "oscillating gearing," so called, in which a gyratory movement is imparted to a member called the "oscillator" by a pair of rigidly connected bevel-wheels intermeshing therewith, and our said movement, while applicable to a variety of uses, is more particularly designed for converting the slow rotary motion of the ground-wheel of a harvesting-machine into the rapid reciprocating movement required for the sickle. In such gearing it is essential that the oscillator be so supported relatively to the drivers as to maintain a center of gyration coincident with a point on the driving-axis midway between the drive-wheels and a uniform angle of gyration, so as to secure the proper relief and engagement of the consecutive cogs without such deep intermeshing as to consume power unnecessarily or cause rapid wear and destruction of the cog-work.

It is further desirable that the parts should be few and not exposed, so as to avoid the pounding and lost motion inseparable from numerous joints or wearing-surfaces, and so as to reduce to a minimum the liability to clog and the endangerment of life and limb.

It is further desirable to overcome the constant severe side strain to which oscillators driven on one face only are subject.

In devices of this class as heretofore constructed it has been customary to support the oscillator upon more or less complicated and expensive exterior mechanism, consisting of numerous members liable to become clogged, and by the multiplicity of their wearing-joints to be subject to slack or ineffective motion, pounding, &c.

In addition to the supporting devices, other complex devices have been employed to guide the oscillator in its proper conical or gyratory path, thus increasing the evils above cited.

Our invention consists, primarily, in a device for supporting and guiding the oscillator, and comprises a construction, hereinafter de-

scribed, of the oscillator itself whereby it is centered directly upon the shaft of its driving-gears, and is by the same means held to its proper conical path or gyratory rolling movement. This is done by providing in the oscillator a double conical bore flaring outwardly, which causes the oscillator to rest and roll at the proper obliquity for effective action of the driving-gears.

Associated with this device is one whereby the projection from the oscillator, which constitutes the sickle-driving arm, is made available to prevent rotation of the oscillator.

Further, associated with the above features, is a relative form of the ends of the oscillator and the contiguous faces of the drivers that insures a positive gage or limit to the depth of intermeshing.

Our preferred form of movement comprises a provision, in conjunction with said faces and the conical ends of the oscillator, of washers, whereby the depth of intermeshing may be regulated to any desired nicety and be restored after it has become impaired by wear.

In order that our invention may be fully understood, we will proceed to describe the same with reference to the accompanying drawings, in which—

Figure 1 is a plan of our improved gearing as applied to a mower. Fig. 2 is an axial section of the same. Fig. 3 is a perspective view of the reciprocating arm for transmitting the motion from the oscillator to the pitman of the sickle-bar.

A may represent a portion of the frame of a mowing or harvesting machine, supported upon the shaft  $b'$ , rigidly secured to the drive-wheels B. Rigidly keyed to the shaft  $b'$  are two bevel-wheels,  $b b$ , the teeth of which diverge from a point in the axis of the shaft midway between them. Between these two wheels is placed our improved oscillator  $a$ , which consists of a two-faced bevel-wheel adapted to intermesh at diagonally-opposite points with the bevel-wheels  $b b$ , as more fully described hereinafter.

Each face of the oscillator has two more teeth than the bevel-wheel meshing with it, as is customary with gearing of this class.

The hub of the oscillator is bored conically in the line of its axis, the interior walls of the



bore flaring outwardly from the center, as shown in Fig. 2, thus permitting, and at the same time limiting, the gyratory motion imparted to it by the rotating bevel-wheels *b b*.  
 5 The end faces, *h*, of the hub are also made conical, so as to meet the interior surface of the bore at right angles, and to bear or roll against the interior faces of the hubs of the bevel-wheels *b b* at diagonally opposite portions, for  
 10 the purpose of limiting the depth of the mesh. Said conical ends *h* may fall somewhat short of actual contact with the hubs of the wheels *b b*, and one or more washers, *c*, may be interposed between the bevel-wheels *b b* and the  
 15 oscillator *a*, as shown in Fig. 2, for the purpose of regulating the depth of the mesh.

An arm, *e*, rigidly attached to the oscillator, and having a hook or stud, *f*, sliding in the horizontal slot *g*, in a projection from the  
 20 frame *A*, serves to transmit motion from the oscillator to the sickle-bar pitman, and at the same time prevents the rotation of the oscillator.

When in motion the bevel-wheels *b b*, acting  
 25 on diagonally-opposite teeth of the oscillator *a*, cause the same to assume a wobbling motion, comparable to that of a coin when settling down upon a table after being spun, so that the axis of the oscillator describes a cone  
 30 the angle of which is the same as the angle of oscillation and of the angle of the cones forming the bore, and hence it will be seen that the hub will roll on the shaft as the latter rotates without sensible friction.

35 There being no gimbals, cranks, or other exterior mechanism than that required to transmit the power, a great reduction is effected of liability to clog or to get out of order, and an important economization in weight, material,  
 40 and draft, with greater safety, are secured.

Having thus described our invention, the following is what we claim as new therein and desire to secure by Letters Patent—

1. The double-faced oscillator *a*, having its hub bored conically flaring both ways from its center, in combination with the drive-gear shaft *b'*, on which it bears, and the driving-gears *b b*, substantially as set forth. 45

2. The double-faced oscillator *a*, having the doubly-flaring hole through its hub, and having its hub ends also conical and rectangular to the conical walls of said hole, substantially as set forth. 50

3. The combination of the double-faced oscillator *a*, pierced in the line of its axis with a double-flaring bore, of which two diagonally-opposite surfaces bears simultaneously upon the shaft of the driving-gears, substantially as set forth. 55

4. In combination with the oscillator *a* and the drive-gear shaft on which it bears, a rigid frame in which said shaft is journaled, slotted hanger *g*, an arm rigidly attached to said gear and having curved projection or hook *f*, and so hung or pivoted to said frame as to permit a horizontal and prevent a vertical oscillation, substantially as set forth. 60 65

5. The combination of the double-faced oscillator *a*, having a two-way conically-flaring hole through its hub, and conical faces *i*, with the duplex driving-gear *b*, and with the loose collars or washers *c* between the oscillator and its said driving-gear, substantially as described. 70

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