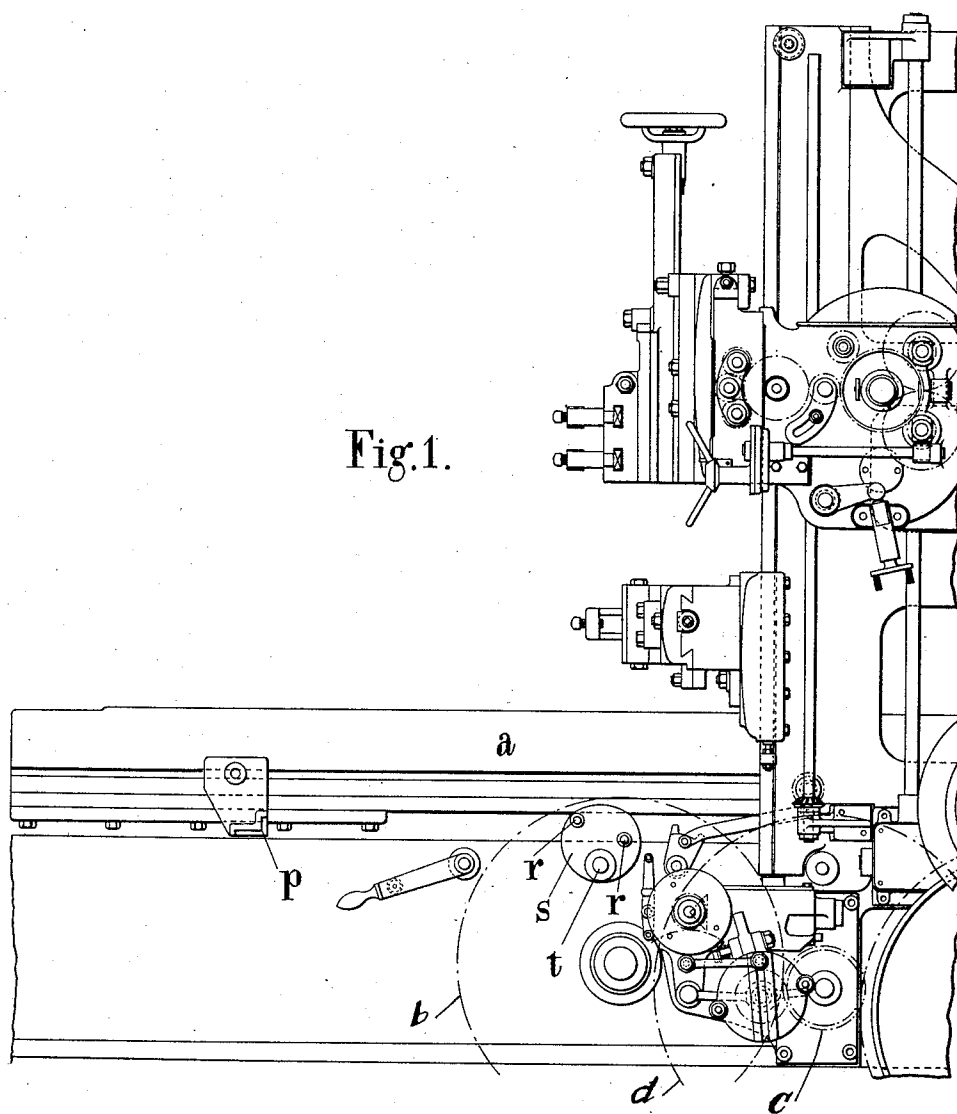


R. W. & L. H. BATEMAN.
DRIVING AND REVERSING GEAR.
APPLICATION FILED NOV. 10, 1911.

10 SHEETS—SHEET 1.

Fig.1.



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By Spear, Wadsworth, Donahoe & Spear Attorneys

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1,063,104.

Patented May 27, 1913.

10 SHEETS—SHEET 2.

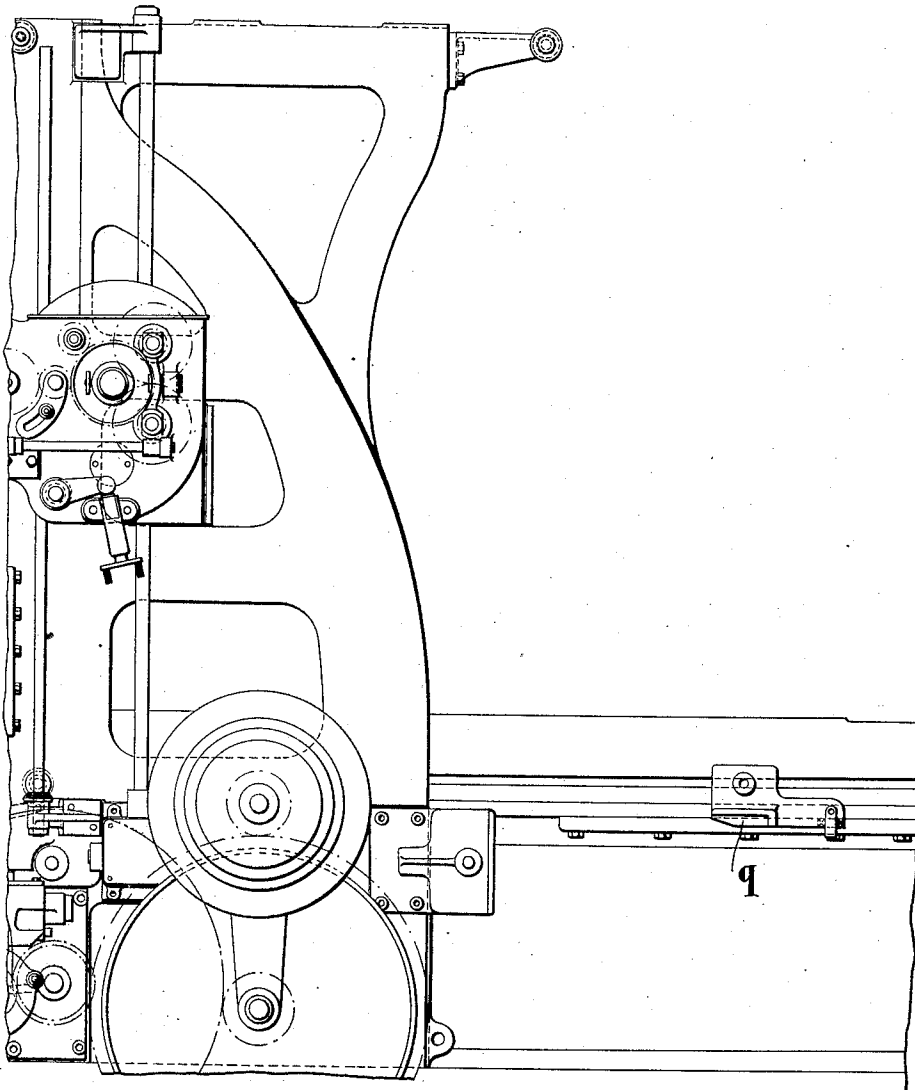


Fig. 1a.

Witnesses.
C. E. Parsons
H. M. Barrett

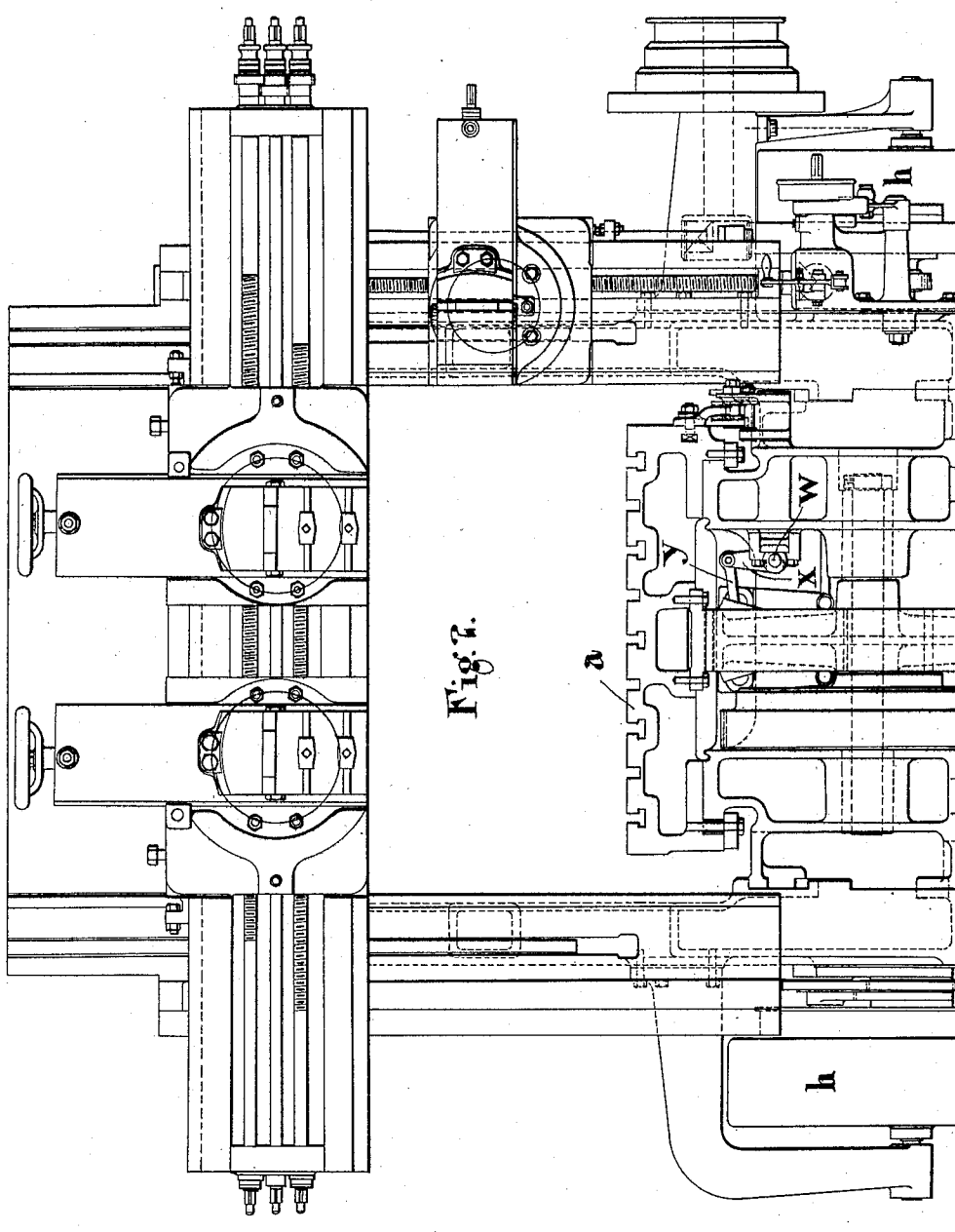
Inventor S.
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10 SHEETS—SHEET 3.



Witnesses.
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10 SHEETS—SHEET 4.

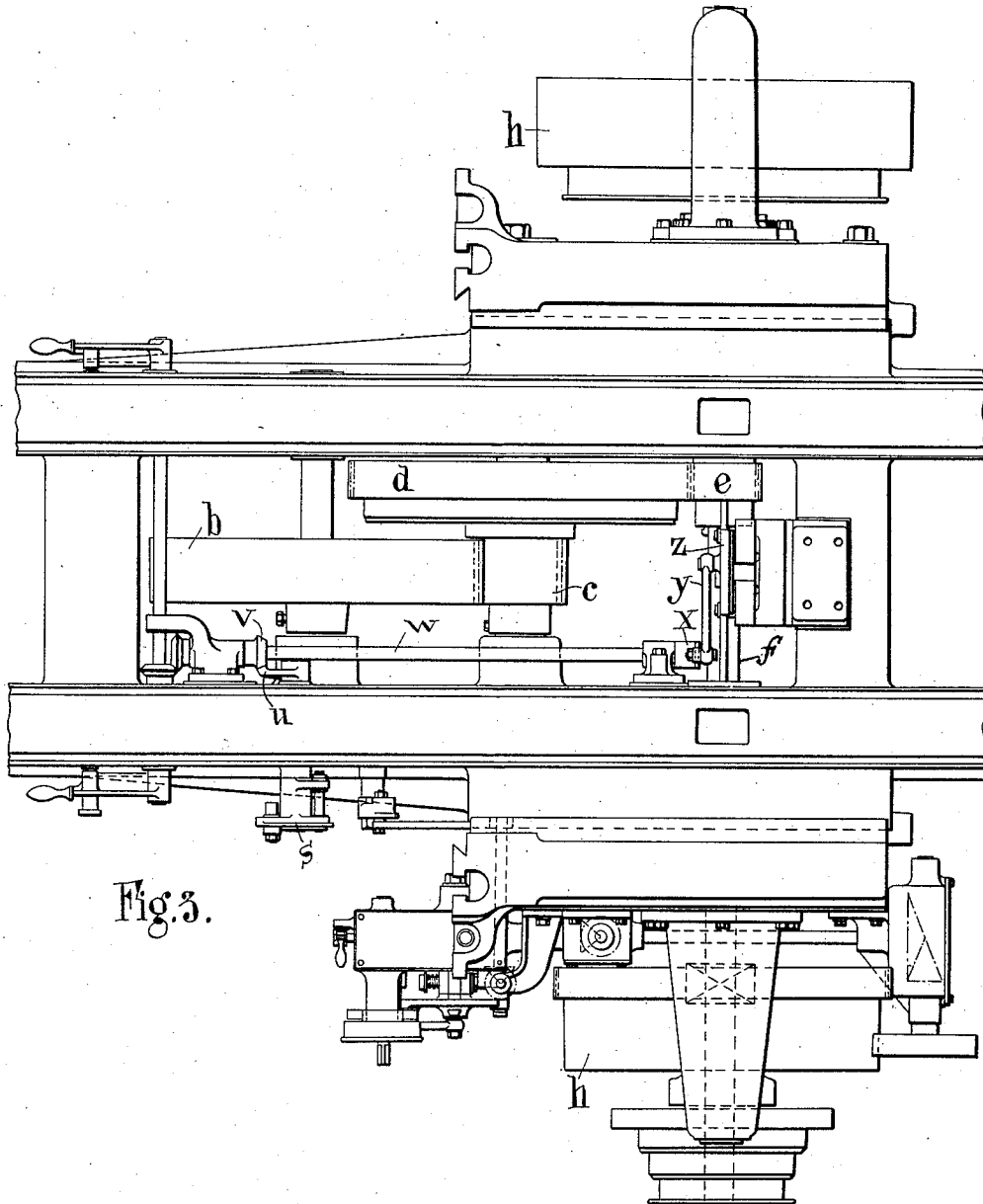


Fig. 3.

Witnesses.
 C. E. Parsons
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10 SHEETS—SHEET 5.

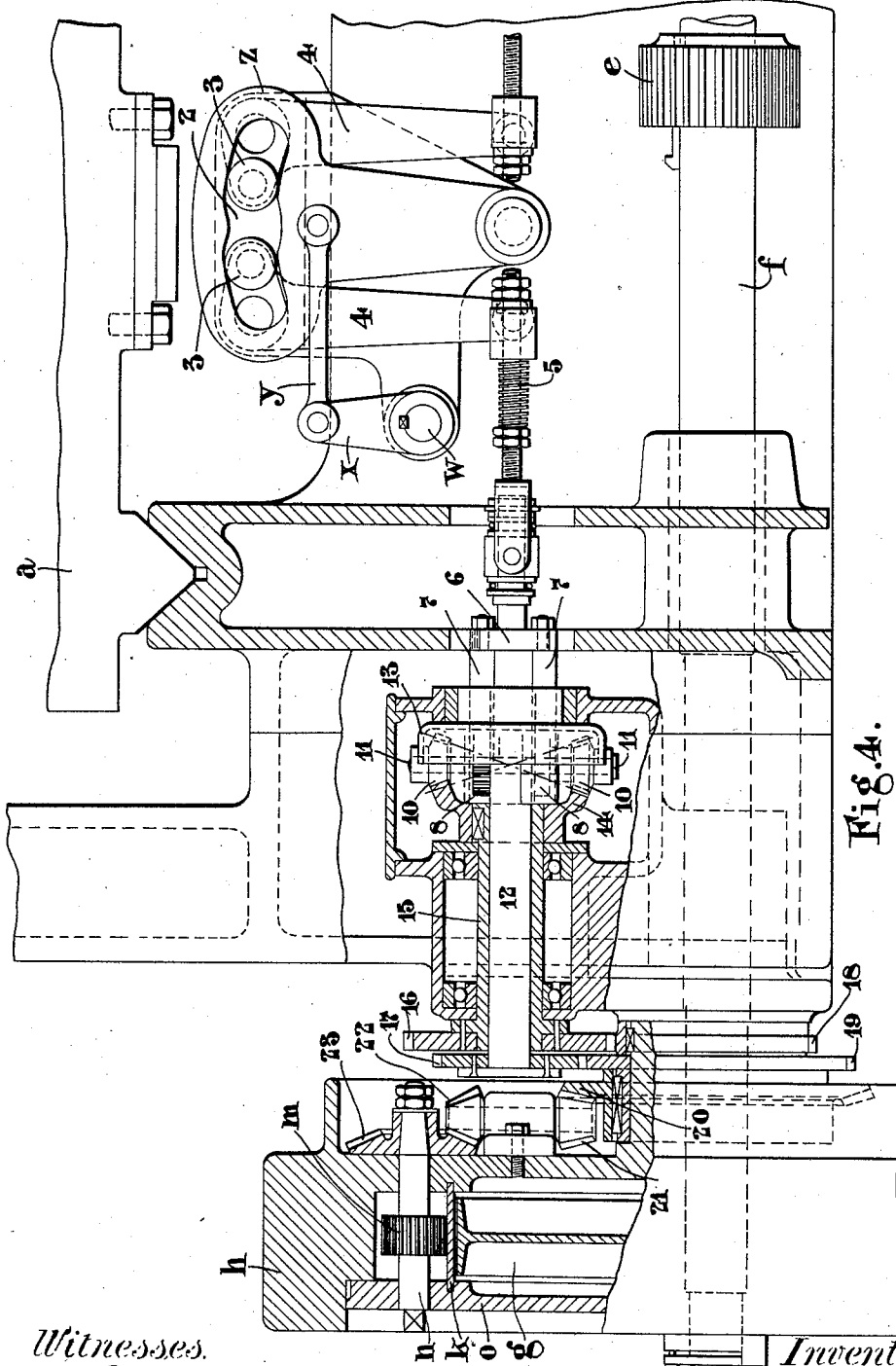


Fig. 4.

Witnesses.
 C. E. Parsons
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10 SHEETS—SHEET 6.

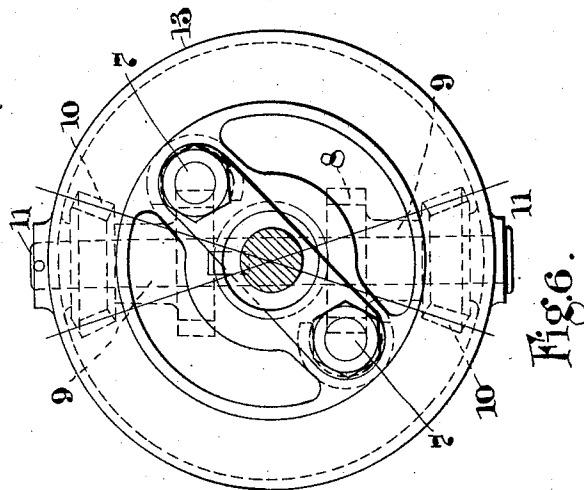


Fig. 6.

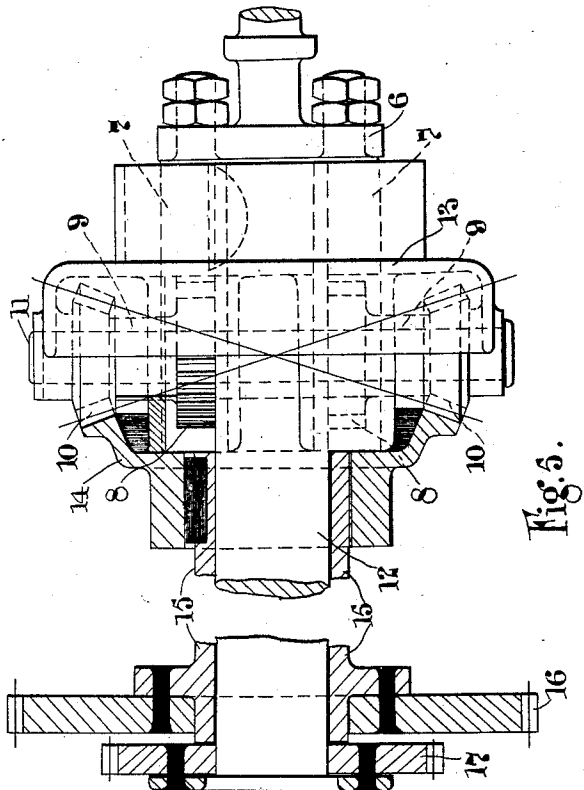


Fig. 5.

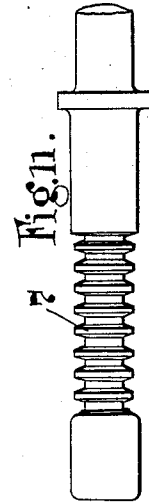


Fig. 11.

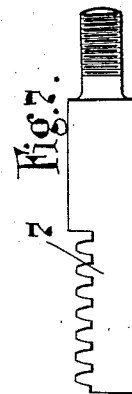


Fig. 7.

Witnesses.
C. E. Parsons
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R. W. & L. H. BATEMAN.
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Patented May 27, 1913.

10 SHEETS—SHEET 7.

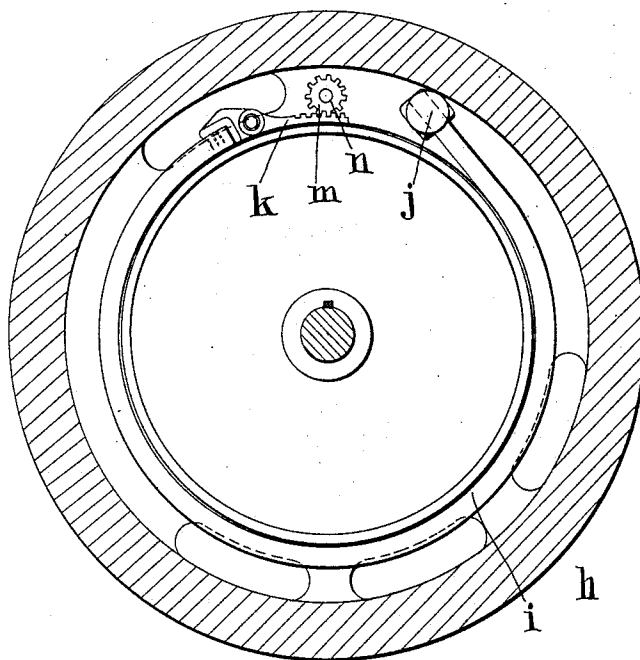


Fig. 8.

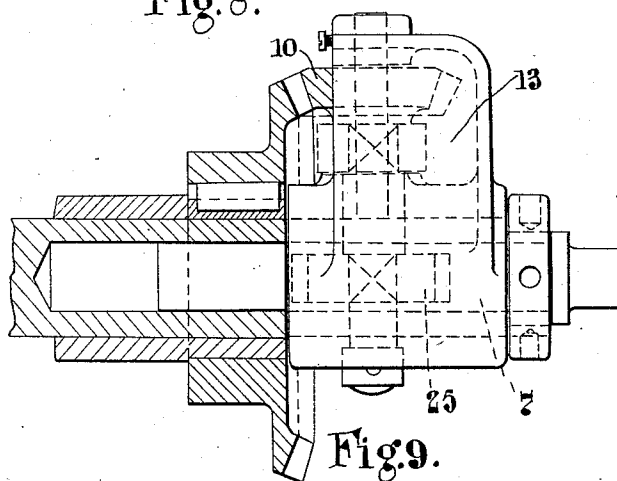


Fig. 9.

Witnesses.
C. E. Parsons
H. M. Barrett

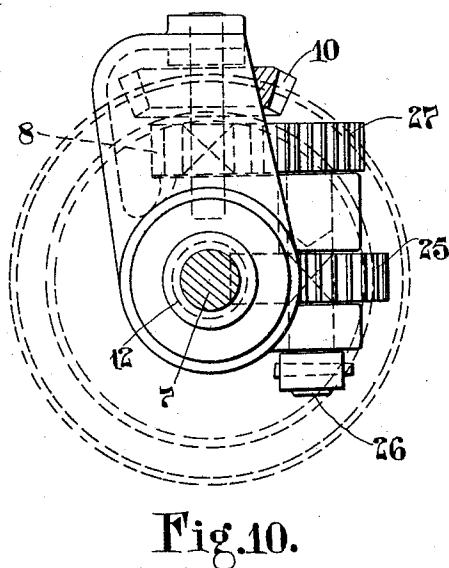
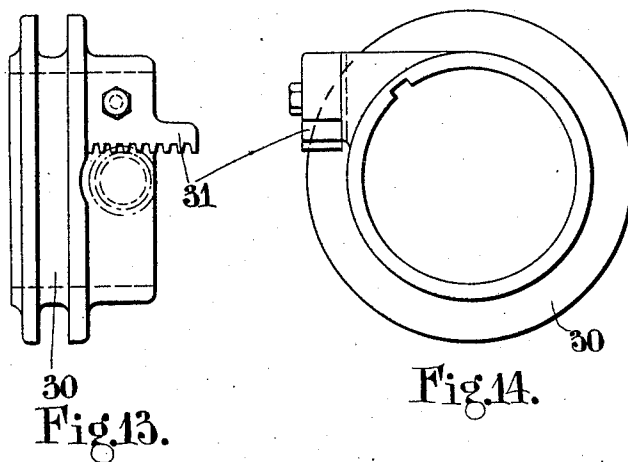
Inventors
R. W. & L. H. Bateman

by Spear, Waddelet, Donaldson & Spear Attorneys

1,063,104.

R. W. & L. H. BATEMAN.
DRIVING AND REVERSING GEAR.
APPLICATION FILED NOV. 10, 1911.

Patented May 27, 1913.
10 SHEETS—SHEET 8.



Witnesses.
C. E. Parsons
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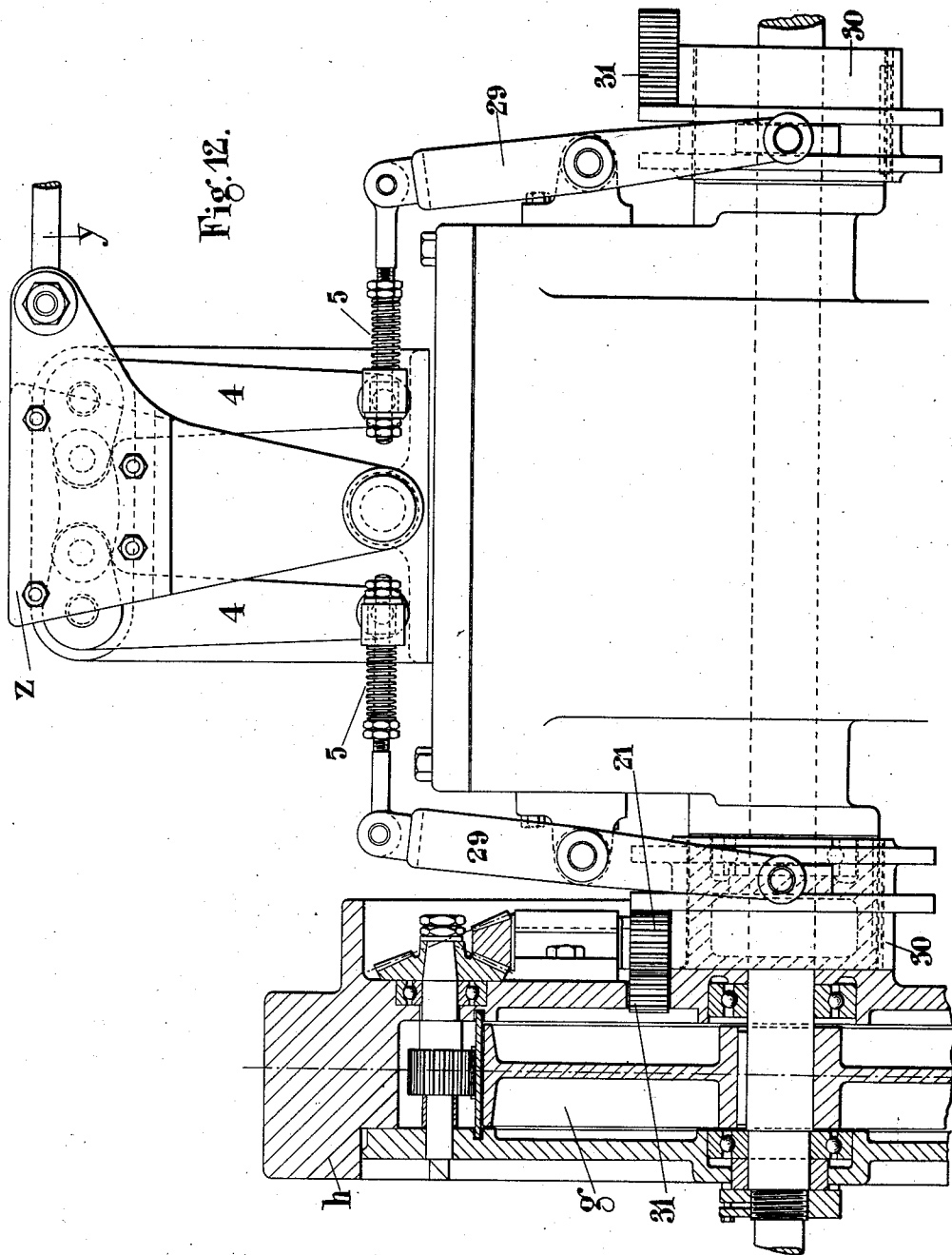
by *Spear, Thiele, & Davidson* Attorneys.

R. W. & L. H. BATEMAN.
DRIVING AND REVERSING GEAR.
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1,063,104.

Patented May 27, 1913.

10 SHEETS—SHEET 9.



Witnesses.
C. E. Parsons
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APPLICATION FILED NOV. 10, 1911.

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Patented May 27, 1913.

10 SHEETS—SHEET 10.

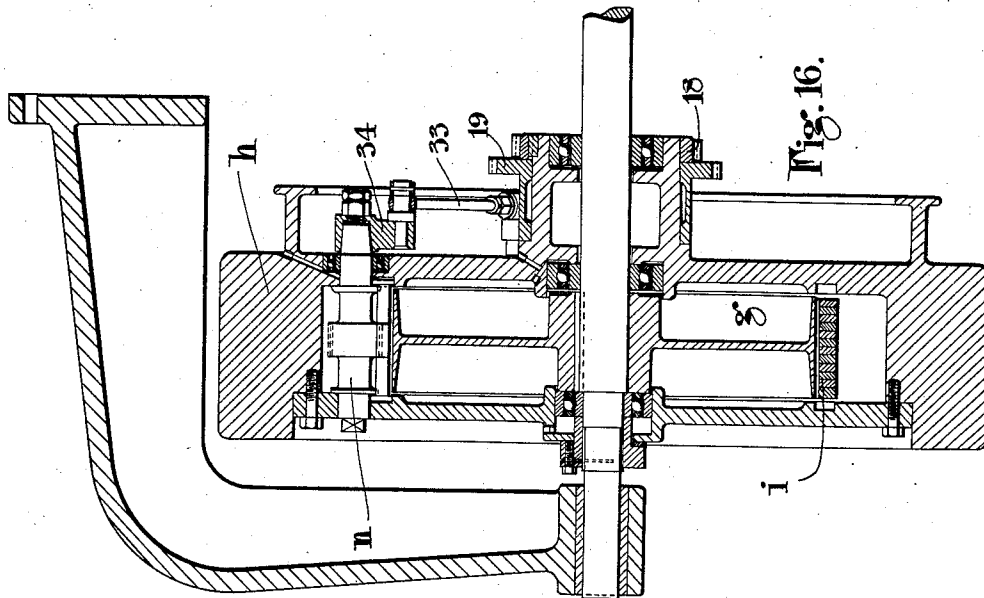


Fig. 16.

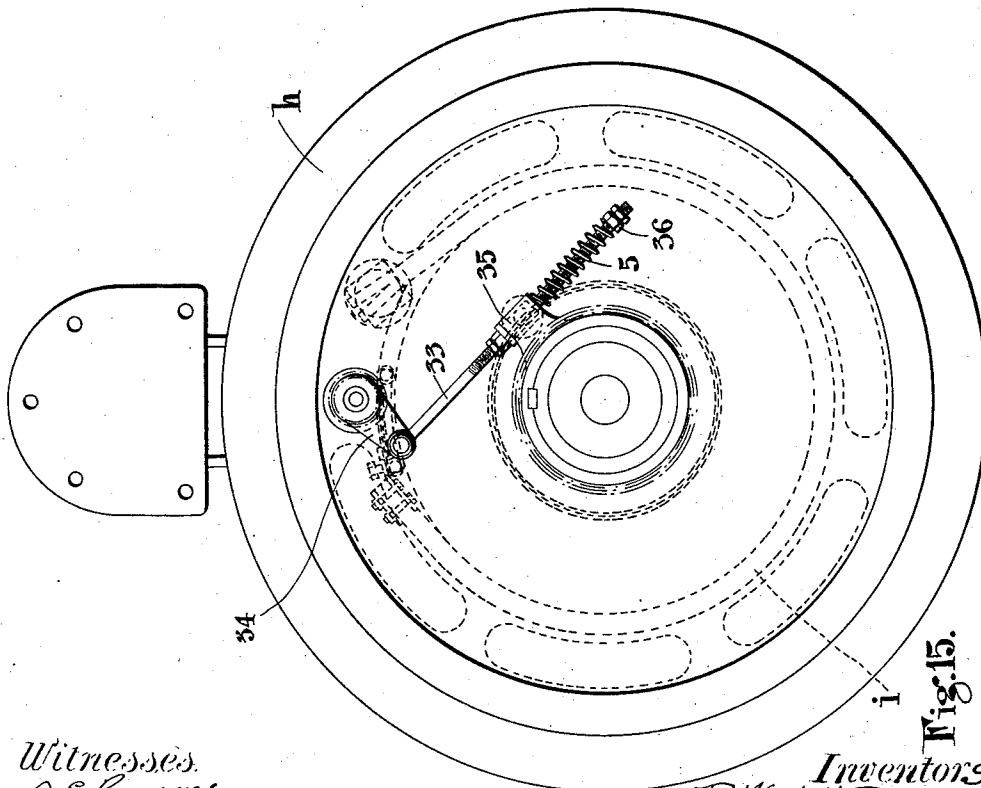


Fig. 15.

Witnesses
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Inventors
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by Spear, Middleton, Davidson & Spear Attorneys

UNITED STATES PATENT OFFICE.

RICHARD WILKINSON BATEMAN AND LOFTUS HANSON BATEMAN, OF LEEDS,
ENGLAND.

DRIVING AND REVERSING GEAR.

1,063,104.

Specification of Letters Patent.

Patented May 27, 1913.

Application filed November 10, 1911. Serial No. 659,582.

To all whom it may concern:

Be it known that we, RICHARD WILKINSON BATEMAN, of 35 Hill Crest avenue, and LOFTUS HANSON BATEMAN, of 4 Kearsley Place, Hunslet Carr, both in Leeds, in the county of York, England, have invented certain new and useful Improvements in Driving and Reversing Gear, of which the following is a specification.

10 This invention relates to driving and reversing gear or mechanism such as described in the specification accompanying our application No. 599344, and particularly to the class of gear employed upon planing, shaping and slotting machines for reciprocating the work carrying table, its object being to provide improved means for effecting the reversal of the said table, which shall be efficient and reliable in action and will insure the said table running at maximum speed throughout its traverse without the necessity for any preliminary speeding up period as at present usual before the cutting operation commences, and without setting up excessive stresses or strains in the working parts which would result in rapid deterioration or wear of the same.

Our invention comprises the improved combinations and arrangements of parts hereinafter described and claimed.

Referring to the accompanying sheets of explanatory drawings:—Figures 1 and 1^a constitute an end elevation, Fig. 2 a front elevation, and Fig. 3 a plan view with the table removed, showing a planing machine having our invention applied thereto. Fig. 4 is a detail view showing the mechanism for operating the driving and reversing gear. Figs. 5, 6, 7, and 8 are views of portions of the mechanism illustrated at Fig. 4. Figs. 9, 10 and 11 show modified forms of the mechanism illustrated at Figs. 5, 6 and 7. Fig. 12 is a view corresponding to Fig. 4, but showing a modified form of operating mechanism. Figs. 13 and 14 are views at right angles to one another of portions of the mechanism shown at Fig. 12. Figs. 15 and 16 are views at right angles to one another of a modification to be hereinafter referred to.

The same reference letters in the different views indicate the same or similar parts.

In the arrangements illustrated at Figs. 1 to 8, the table *a* which is to be alternately

driven in opposite directions, is by means of the spur wheels *b*, *c*, *d* and *e* placed in operative connection with the shaft *f* (Fig. 4) having pulleys as *g* secured thereon at its respective ends. One pulley only is shown in Fig. 4. The said pulleys are adapted to be alternately actuated by flywheels *h*, *h* (free upon the shaft *f*) continuously rotated in opposite directions by suitable gearing. Each of the pulleys *g* is encircled by a band or strap *i*, see Fig. 8, which is connected to the flywheel at one end *j* and at the other end has a rack *k* secured thereon with which engages a pinion *m* upon the spindle *n* carried by the flywheel. The sides of the racked portion *k* run in grooves or channels cut in the flywheel and in the cover plate *o*, the latter of which also serves to support one end of the spindle *n*. When the pinion *m* is rotated in one or other direction, the strap or band *i* is brought into or released from engagement with the pulley *g*.

For the operation of the pinion *m* and strap or band *g*, we provide dogs or tappets *p*, *q* upon the table *a* (see Fig. 1). The said parts are adapted to engage bowls or rollers *r* on a cam plate *s* secured upon a spindle *t* journaled in the framework of the machine. The said spindle carries a bevel wheel sector *u* (see Fig. 3) which engages a bevel pinion *v* upon the shaft *w*. The said shaft carries a crank *x* which by means of the connecting link *y* operates a rocking arm *z* having a double cam groove 2 (see Fig. 4) formed therein to receive bowls or like parts 3 carried by the short arms of bell crank levers 4. The latter through the medium of the compression coil springs 5 operate crossheads as 6 carrying racks 7 (see Fig. 7) which engage pinions 8 upon sleeve like parts 9 having the bevel wheels 10, 10 formed or secured thereon. The sleeves 9, pinions 8 and bevel wheels 10 are supported upon a transverse stud 11 which passes through the slotted end of the spindle 12 and is supported in a carrier 13 keyed on said spindle 12. The bevel wheels 10 engage the bevel wheel 14 keyed upon the sleeve 15 carrying the spur wheel 16. The spindle 12 has a spur wheel 17 keyed thereon. The wheel 16 meshes with a wheel 18 keyed upon an extension of the flywheel *h* (see Fig. 4) while the wheel 17 meshes with

a wheel 19 free upon said extension but having keyed thereto a bevel wheel 20 gearing with a similar wheel 21 keyed upon a spindle carrying a further wheel 22 meshing with the wheel 23 upon the spindle *n* before referred to. The spindle carrying the wheels or pinions 21, 22 is mounted in a bracket secured upon the flywheels as shown.

The operation of the mechanism is as follows: When the table *a*, Fig. 1, is reciprocating, the dogs *p*, *q* alternately move the cam plate *s* in opposite directions. Each movement of said plate causes, by means of the parts *u*, *v*, *w*, *x*, *y* and *z*, a movement of one crosshead 6 in one direction and of the other crosshead in an opposite direction. When the flywheels *h* are rotating in opposite directions and the racks 7 are stationary, the bevel wheel 14 of the mechanism shown at Fig. 4, is rotated by the wheels 18, 16 and sleeve 15, and rotates the carrier 13, the wheels 10 and 8 being held stationary upon their own axes by the racks 7. The said carrier rotates the shaft 12 and wheels 17, 19 and 20 so that the latter wheel 20 travels at the same rate as the flywheel. The wheel 23 is therefore prevented from rotating on its own axis and the band *i* is held either in its operative or inoperative position. In practice one band is held in its operative and one in its inoperative position so that one pulley *g* is rotated by its flywheel and the other pulley *g* is free from its flywheel. When, however, the table *a* operates the part *z*, and traverses the rack 7, the wheels 8 and 10 are rotated about their own axes and so impart to the carrier 13 an accelerating or supplementary movement modifying the uniform movement which would be imparted by the bevel wheel 14, the accelerating movement being either positive or negative according to the direction of motion of the racks 7. Such supplementary or additional movement of the carrier 13 by means of the shaft 12 and its connected gearing varies the rate of rotation of the wheel 20 from that of the flywheel and therefore causes rotation of the wheel 23 and spindle *n* about their own axis in one or other direction. Such rotation of the spindle *n* results in the actuation of the band *i*, to bring the same into or remove it from operative connection with its pulley *g*. After the traverse of the racks 7 in one direction is completed, the wheel 23 will again be rotated at the same speed as the flywheel so that the band will be held either in its operative or inoperative position. The racks are operated once at the end of each traverse of the table *a*.

With the arrangement aforesaid which is particularly adapted for large size machines, we provide for the correct amount of movement being positively given to the pinions *m* to insure a good driving connection be-

tween each band *i* and its pulley *g*, and by the interposition of springs 5 in the clutch actuating mechanism insure resiliency in such mechanism and perfect smoothness of working notwithstanding any expansion or contraction of the parts or any slackness of fit or backlash in the joints and connections. Further, by the employment of bands as *i* which encircle the peripheral edge of the part to be driven, we obviate the necessity for metallic supporting members for said bands which are necessary when bands are arranged to operate upon the internal periphery of the driven element, and so insure that the said bands shall not be brought or forced into such hard of firm contact with the said pulleys at the instant of reversal as will cause shock and rapid wear of the bands and also set up destructive stresses in the machine, but shall at first yield or act as brakes before finally establishing a firm or positive drive between flywheels and pulleys. We thus insure a rapid but smooth stoppage and reversal of the table *a*. The employment of the flywheels *h* provides for such a reserve of energy at the instant of reversal as will immediately overcome the inertia of the part being reversed without placing undue strain upon the means by which the flywheels are driven. In some cases, the parts for traversing the table during the cutting or slow speed stroke may be so arranged that a portion of the weight giving the flywheel effect is provided in the gear wheels by which said wheel is positively driven. Thus in the arrangement shown at the top of Fig. 3, the wheel *h* is positively driven from the spindle carrying the change speed cones. The latter may then supply a portion of the weight necessary to give the flywheel effect before described.

In some cases, instead of employing two racks as 7, we may as shown at Figs. 9, 10 and 11 employ but one rack adapted to slide in the hollow spindle 12 slotted for the entrance of a wheel 25 which gears with such rack and imparts the supplementary movement to the carrier 13 through the stud 26 and wheels 27, 8 and 10 in a manner similar to that previously described. This form of mechanism is lighter in construction and adapted for smaller machines than that illustrated in the previous figures.

For very light machines we prefer to employ the arrangement of mechanism shown at Figs. 12, 13 and 14. In this the parts 4 act through springs 5 upon forked levers 29 whereby slides 30, mounted upon boss like extensions of the flywheels and rotating therewith, are traversed away from or toward the latter. The said slides carry rack like portions 31 which engage pinions 21 corresponding to the similar pinions shown at Fig. 4. A rack carrying slide is shown

separately at Figs. 13 and 14. The operation of this form of mechanism will be readily understood.

Instead of placing the springs 5 in the positions shown at Figs. 4 and 12, where they have to transmit the clutch controlling motion from the table *a* through a considerable number of parts, so necessitating the use of heavy springs, we may place same directly upon the part whereby the spindle *n* is actuated. Such arrangement is shown in Figs. 15 and 16. The rod 33 operates a crank arm 34 upon the spindle *n* and is itself carried by a projection 35 upon an extension of the wheel 19 which coöperates with the wheel 18 in the manner described with reference to Fig. 4. The spindle 5 is placed between the nuts 36 and the part 35 and transmits the movement of said projection to the crank for putting the band *i* into operation. The band is rendered inoperative by the direct thrust of the part 35.

By the employment of our invention, we are enabled to provide an efficient and reliable driving and reversing mechanism which does not become overheated when in operation in the manner of reversing mechanisms usually employed upon planing machines, is not dependent upon climatic or other external conditions for obtaining an efficient drive, and is able without imposing any severe stress or strain upon its parts to bring the planing machine table to rest and to restart the same in either direction at practically its maximum or normal speed with the result that a gain in time is effected at the commencement of each traverse of the table and a very high degree of efficiency is attained.

Having now described our invention, what we claim as new and desire to secure by Letters Patent is:—

1. In combination, a wheel continuously rotated in one direction, a reversible part, a pulley in operative connection with said reversible part, a band surrounding the peripheral edge of said pulley for providing an operative connection between said wheel and pulley, and means positively operated by said reversible part for actuating said band, as set forth.

2. In combination, a fly wheel continuously rotated in one direction, a reversible part, a shaft in operative connection with said part, a pulley on said shaft and concentric with said fly wheel, a band carried by said fly wheel and surrounding said pulley, means positively operated by said reversible part for actuating said band, and

a spring for transmitting the motion of said means to the band, as set forth.

3. In combination, a reversible part, a shaft in operative connection with said reversible part, a fly wheel loose upon said shaft and continuously rotated in one direction, a pulley fast upon said shaft and concentric with said fly wheel, a band carried by said fly wheel and surrounding said pulley, a rack upon said band, a pinion engaging said rack, means positively operated by said reversible part for actuating said band, and a spring for transmitting the motion of said means to the pinion for operating said band, as set forth.

4. In combination, a reversible part, a shaft in operative connection with said reversible part, a fly wheel loose upon said shaft and continuously rotated in one direction, a pulley fast upon said shaft and concentric with said fly wheel, a band carried by said fly wheel and surrounding said pulley, a rack upon said band, a pinion engaging said rack, a wheel loosely mounted upon said fly wheel and in operative connection with said pinion, a wheel keyed upon said fly wheel and means operated by the reversible part for varying the rate of rotation of said loose wheel relatively to the fast wheel for operating said pinion, as set forth.

5. In combination, a reversible part, a shaft in operative connection with said reversible part, a fly wheel loose upon said shaft and continuously rotated in one direction, a cover plate secured to the said fly wheel, said fly wheel and cover plate forming a chamber and each having a hub journaled on said shaft, a driving pulley arranged in the said chamber and secured on the driving shaft between the two hubs, a flexible band carried by the fly wheel and surrounding the pulley, a rack upon said band, a pinion engaging said rack, a wheel loosely mounted upon said fly wheel and in operative connection with said pinion, a wheel keyed upon said fly wheel, and means operated by the reversible part for varying the rate of rotation of said loose wheel relatively to the fast wheel for operating said pinion, as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

RICHARD WILKINSON BATEMAN.
LOFTUS HANSON BATEMAN.

Witnesses:

ARTHUR HUGHES,
HILDA HUGHES.