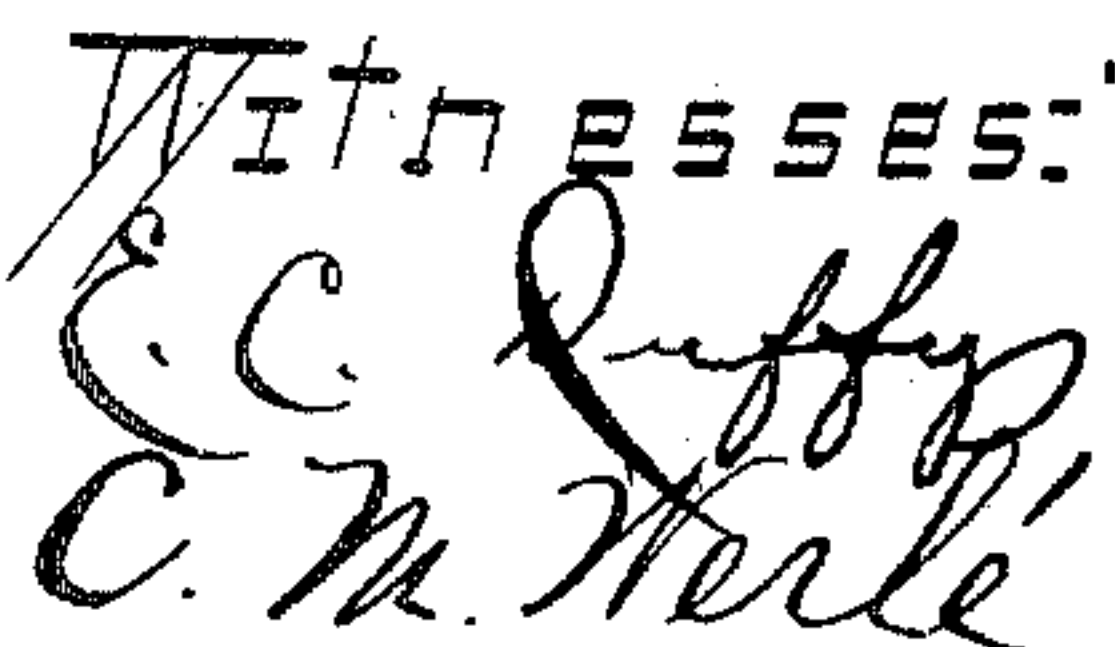


4 Sheets—Sheet 1.

No. 445,113.

Patented Jan. 20, 1891.



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(No Model.)

4 Sheets—Sheet 2.

F. O. HÖRENZ.
AUTOMATIC DAMPER.

No. 445,113.

Patented Jan. 20, 1891.

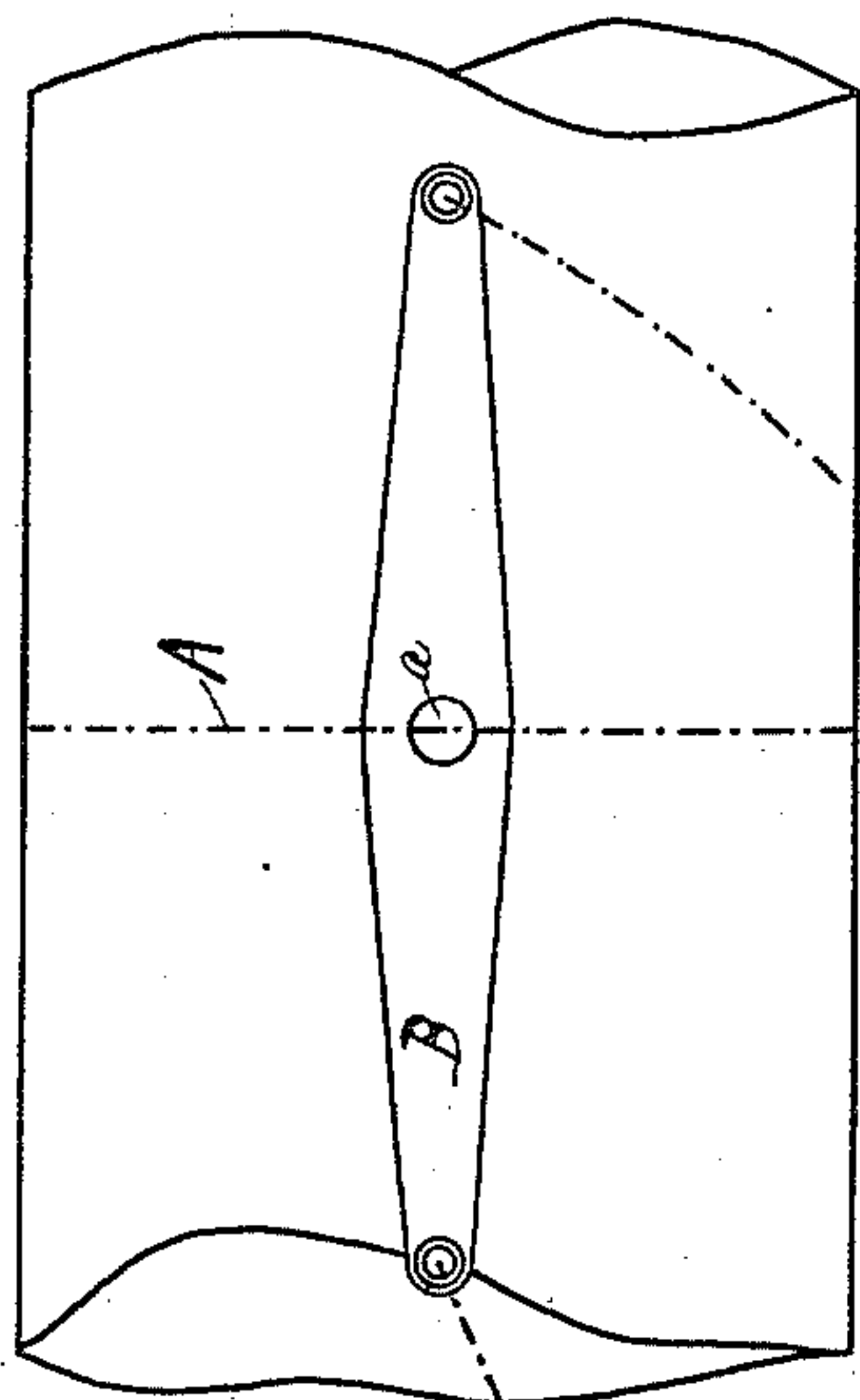


Fig. 2.

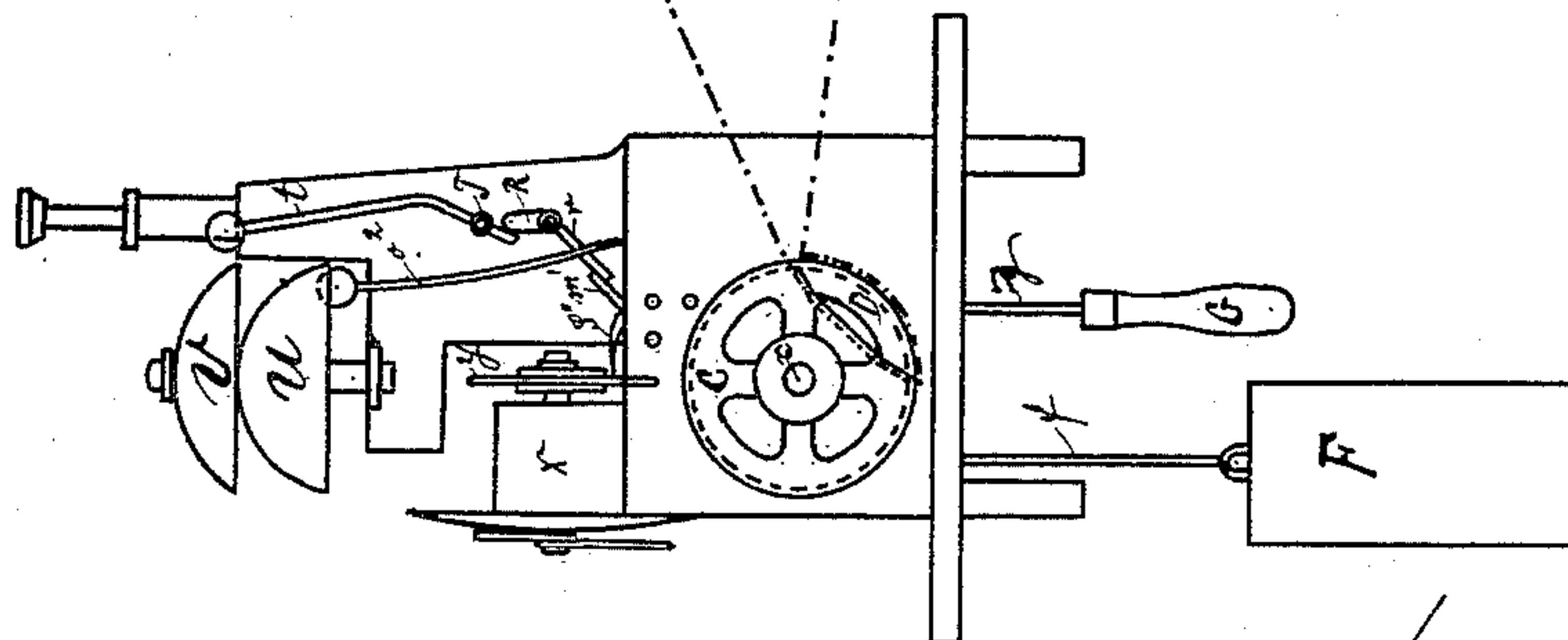
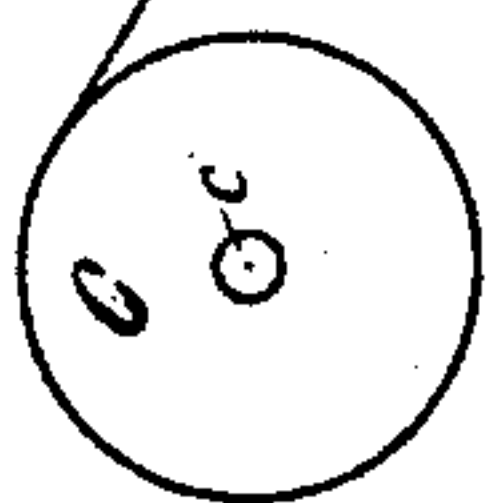
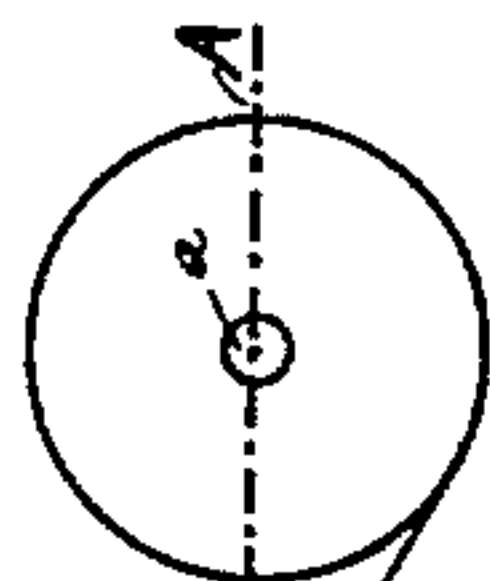
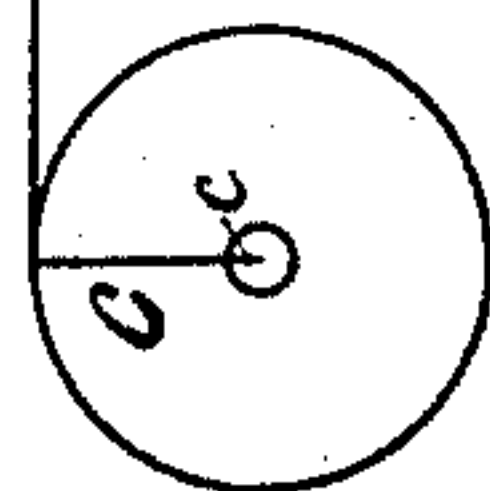
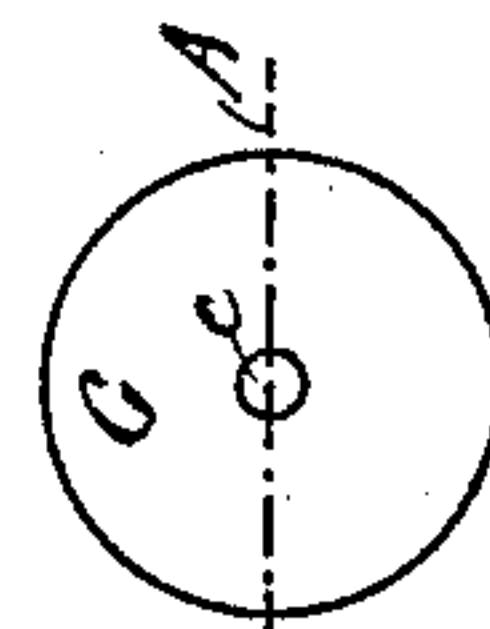


Fig. 1.

Fig. 3.



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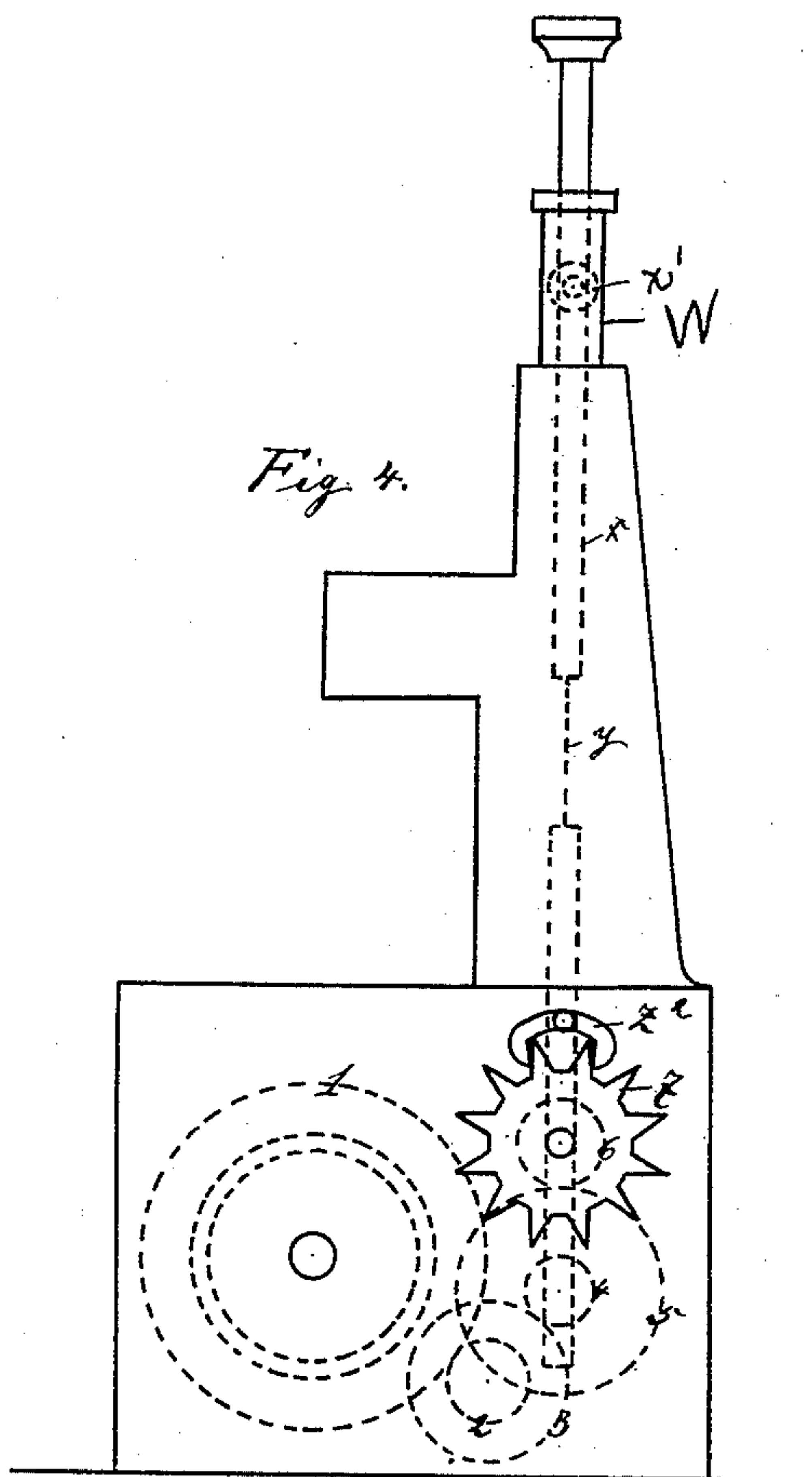
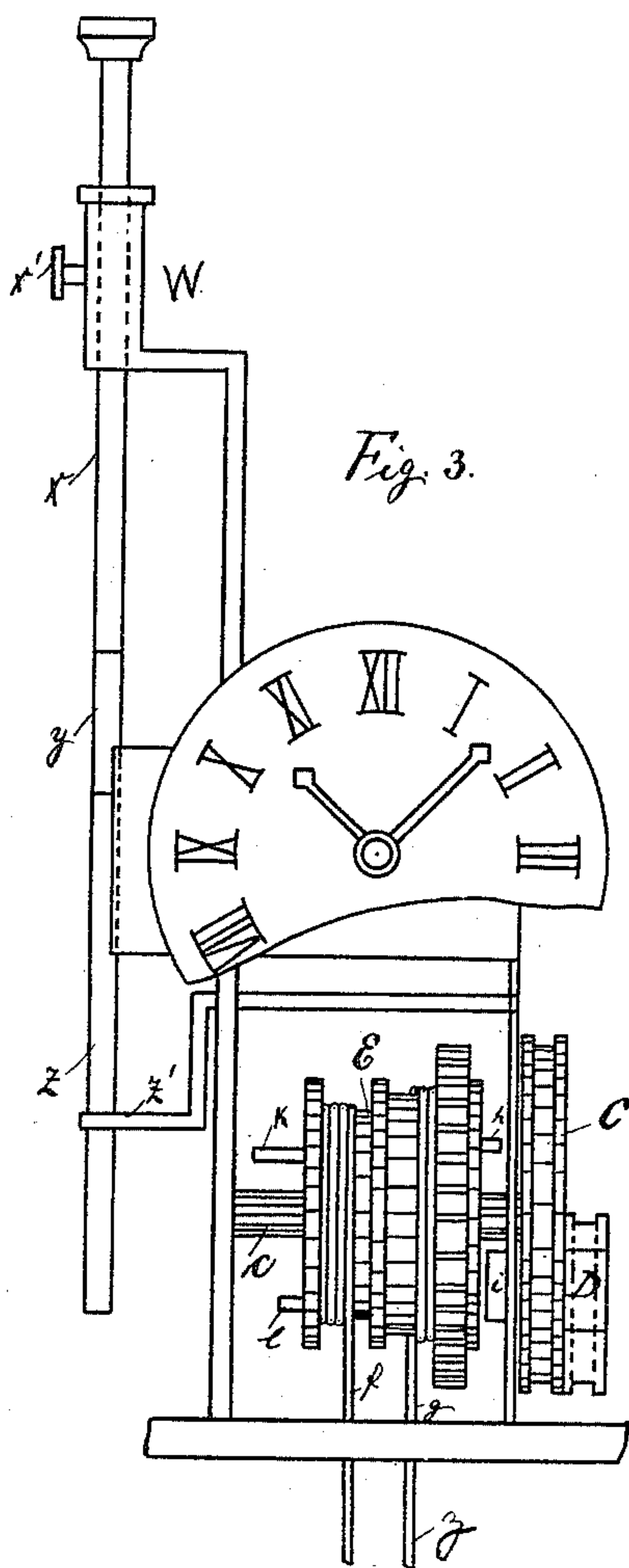
(No Model.)

4 Sheets—Sheet 3.

F. O. HÖRENZ.
AUTOMATIC DAMPER.

No. 445,113.

Patented Jan. 20, 1891.



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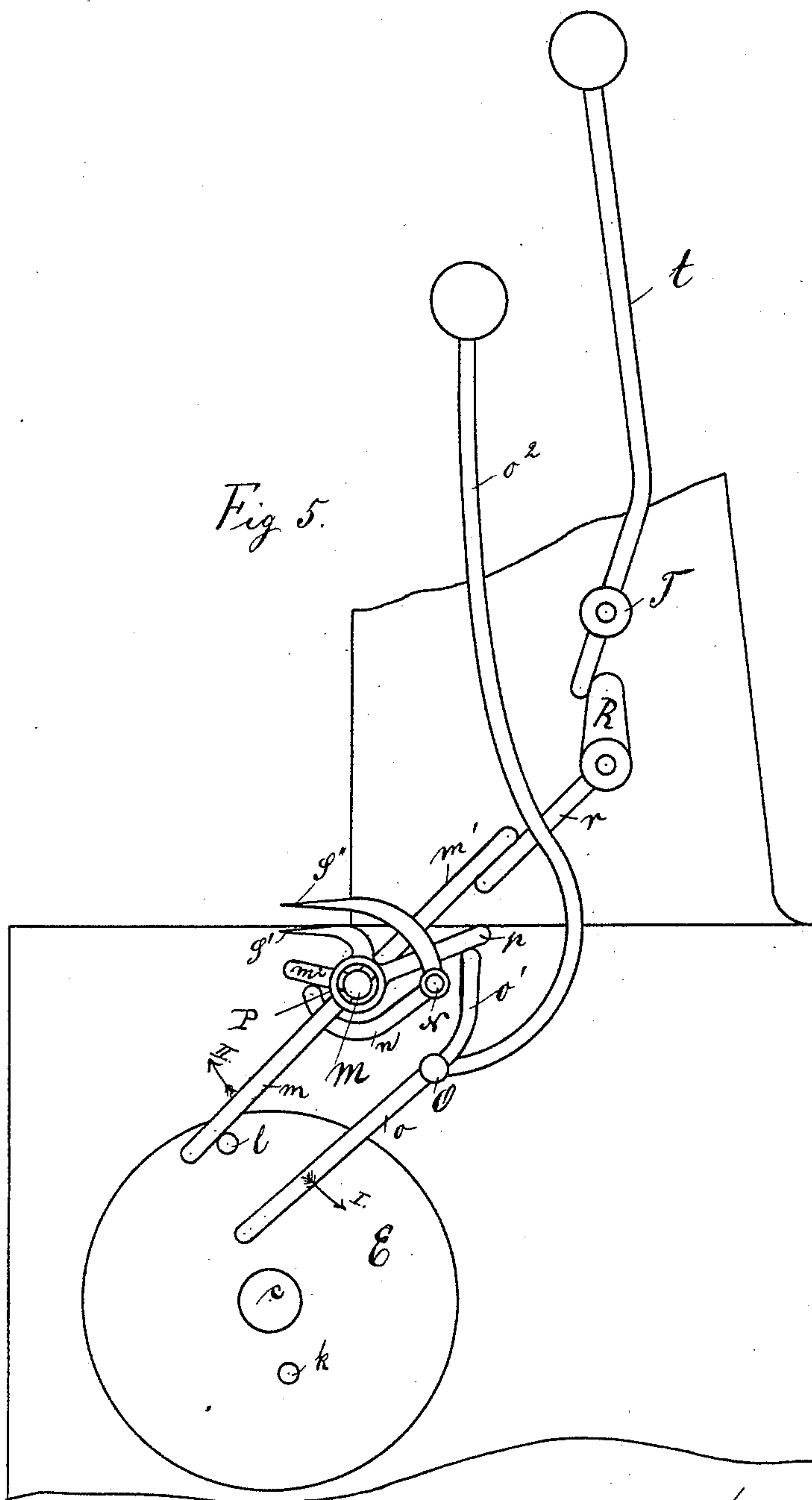
(No Model.)

4. Sheets—Sheet 4.

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AUTOMATIC DAMPER.

No. 445,113.

Patented Jan. 20, 1891.



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UNITED STATES PATENT OFFICE.

FRIEDRICH OTTO HÖRENZ, OF RADEBEUL-DRESDEN, SAXONY, GERMANY.

AUTOMATIC DAMPER.

SPECIFICATION forming part of Letters Patent No. 445,113, dated January 20, 1891.

Application filed April 23, 1890. Serial No. 349,202. (No model.)

To all whom it may concern:

Be it known that I, FRIEDRICH OTTO HÖRENZ, a subject of the Emperor of Germany, residing at Radebeul-Dresden, in Saxony, Germany, have invented certain new and useful Improvements in Apparatus for Regulating and Controlling the Admission of Air to Flues and Passages of Boilers or other like Heating Apparatus, of which the following is a specification.

The regulating apparatus consists in a clock-work, the movement of which effects a gradual automatic closing of the draft-damper during the period from one charging to the other. This regulating apparatus is combined with a controlling device which warns the stoker at the end of each combustion period and yields an automatic record both as to the end of each combustion period and when the fireman has again wound up the regulating device.

This invention is represented on the annexed drawings, in which—

Figure 1 shows a front view of the clock-work. Fig. 2 illustrates a way of transmitting the motion from the clock-work to a throttle-valve arranged in the flue. Fig. 3 shows a side view, and Fig. 4 a front view, of the clock-work. Fig. 5 represents the controlling device in a larger scale, and Figs. 6 to 8 represent various means of transmitting the motion from the clock-work to the draft-damper.

A wheel C is fixed on the axis *c* of a clock-work, Fig. 1. The latter is driven by means of the weight F, the string or chain *f* of which is wound on the drum E of the axle *c*. (See Fig. 3.) The clock-work may be of an ordinary kind, such as is, for example, represented in Figs. 3 and 4.

The axis *a* of the throttle-valve A, Fig. 2, is provided with a double armed lever B. Two chains *b* and *b'* engage at the ends of said lever. The chain *b'* is fixed to the wheel C and the chain *b* is fixed to a segment D, arranged on the side of said wheel C. At the running down of the clock-work the chain *b* is wound upon the segment D. In this manner the throttle-valve A is gradually closed. By means of the segment D, as will be easily perceived, the result is attained that the throt-

tle-valve remains closed for a time, even when the clock-work moves farther on. In this manner a person may allow the burnt-through fire to remain with the throttle-valve almost fully closed for some time before restoking. If the clock-work be run down, it is wound up again by means of the handle G, the string or chain *g* of which is wound on the drum E in another direction than the string *f*. By this winding up of the clock-work the chain *b'* is wound up the circumference of the wheel C, and in this manner the throttle-valve is immediately again opened.

In order to be able to easily alter as may be desired the lengths of time during which the clock-work is running down—that is, the period from one stoking to the other—the following arrangement is made use of: The main driving-wheel 1, Fig. 4, works by means of the wheels 2, 3, 4, 5, and 6 on the escapement-wheel 7. The verge *Z* is movable on its pivot, on which a forked arm *z'* or crutch-wire hangs downward and is fitted to catch the lower part *z* of the pendulum. The pendulum consists of the well-known rod *z*, forming the lower part, and a rod *x*, forming the upper part, connected with it by means of a spring-plate *y*. The latter rod *x* is inserted in the sheath W, and may be fixed at any required height by means of the screw *x'*. In this way the duration of the swing of the pendulum, and therewith the time for the running down of the clock-work, may be very easily and simply varied. Any stoker can bring this about by a few simple turns of the handle as soon as a stronger or weaker firing is required.

In order that the stoker may be notified each time that the throttle-valve is entirely opened or entirely shut, an arrangement is attached by which an alarm sounds when the clock-work is quite wound up and when, consequently, the throttle-valve is entirely opened, and by which another signal sounds when the clock-work has entirely run down, and consequently the throttle-valve is entirely closed. For this purpose two pins *l* and *k* are fitted on the drum E, Fig. 5, of which pin *k* acts on the arm *o* on the winding up of the clock-work and pin *l* on the arm *m* on the

running down of the clock-work. The arm o is attached to the axle O , on which the arm o^2 of the clapper of the bell U is fitted.

If the clock-work be wound up by means of the handle G , the pin k takes a position behind the arm o and presses the same back in the direction of the arrow I , whereby the clapper of the bell U is moved to the left. The pin k is arranged on the drum E in such a manner that it slips from off the arm o shortly before the weight F is quite drawn up. The clapper then strikes on the bell U and gives the stoker the signal that the clock-work is wound up and the throttle-valve is quite opened. On the running down of the clock-work, on the other hand, the pin l comes into action, catches behind the arm m of the axle M , and pushes the same to the left, as shown by the arrow I . The arm m' is thereby pressed downward and works by means of the arm r , fixed on the cam R , in such a manner on the shank of the clapper t , movable on shaft T of the bell V , that the clapper is moved away from the above-named bell. When by the continued motion of the drum E the pin l slips away from the arm m , the latter swings back by reason of the action of a spring seated on the axle, and the bell V is struck by the clapper as a signal that the throttle-valve is closed. In order to prevent a further revolution of the drum, a pin h , Fig. 3, is provided on the same, which comes against the projection i as soon as the bell has been struck.

In order to always keep an exact check on the fireman, an arrangement is attached which is set in action on the striking of the bells and which makes corresponding holes on a paper disk connected with an ordinary clock and set in motion by the same.

The two prickers S' and S^2 , Fig. 5, are arranged one above the other. The pricker S' , which works on the winding of the clock-work, is set in action in the following manner: The pricker S' is fastened on a sleeve P , which is loosely movable on the axle M and is provided with an arm p . An arm o' , attached to the axle O , strikes against this arm p . If now by the winding of the clock-work the arm o is pushed away by the pin k to the right, the arm o' raises the arm p of the sleeve P , and the pricker S' sticks into the paper disk. The other pricker S^2 , which must stick into the disk on the running down of the clock-work, is fixed on the axle N , which is provided with an arm n , projecting forward. A short arm m^2 , attached to the axle M , works on this arm n , which arm m^2 on the slipping away of the pin l from the arm m presses downward. The axle N makes then a slight revolving movement and the pricker S^2 sticks into a paper disk.

Of course several of the methods of constructing the various parts can be altered or replaced by others.

The clock-work driven by a weight may be

replaced by one driven by a spring. Further, the recording and alarm devices may be actuated in other ways and sound-signals may be replaced by sight ones.

The connection of the drum C , especially with the throttle-valve A or with any desired slide, may be altered in numerous ways. In Fig. 6 this connection is brought about by a single chain, which can be partially wound on both rollers. In Fig. 7 the axle c and the axle a are each provided with an arm, and both arms are connected by a rigid rod. When a chain, which is wound upon the roller C and attached to an arm of the axle a , is used in this case equally with the arrangement depicted in Fig. 6, counter-weights must be made to work on the throttle-valves' axles. Finally, as depicted in Fig. 8, the clock-work could be made to act direct on the throttle-valve.

I claim—

1. In apparatus for automatically regulating the supply of air to boiler and other furnaces, the combination, with a damper-closing device arranged in the flue or air-passage, of clock-work mechanism comprising a pendulum x y z , a sheave W , in which the upper part x is contained, a flat spring y for connecting the upper part x with the lower part z , whereby the latter engages with a forked arm or crutch z' , connected with the pallet or anchor of an escapement-wheel, and connections from the clock-work to said closing device, substantially as and for the purpose set forth.

2. In an apparatus for the purpose described, the combination of a damper-closing device, a clock-work mechanism, a drum c , operated by said mechanism, a segment D on said drum, and a chain b , connecting said closing device and segment and so arranged as to gradually operate said closing device, as set forth.

3. In combination, in a device for the purpose mentioned, the lever B , drum C , segment D thereon, connections b b' between said lever and drum and segment, as set forth, and clock-work mechanism, for the purpose set forth.

4. In apparatus for automatically regulating the supply of air to boilers and other furnaces, the combination, with a damper or valve closing device arranged in the flue or air-passage, of clock-work mechanism for operating the same and a signaling apparatus operated by said clock-work and comprising an audible alarm and mechanism, substantially as described, to operate said alarm on the running down and on the winding of the clock-work, substantially as and for the purpose set forth.

5. In apparatus for automatically regulating the supply of air to boiler and other furnaces, the combination, with a damper or valve closing device arranged in the flue or air-passage, of clock-work mechanism operat-

ing said device and a recording apparatus
adapted to record both the termination of
the combustion period herein referred to as
well as the reopening of the damper operated
5 by said clock-work and comprising pivoted
prickers and levers or arms for turning the
same, substantially as and for the purpose
set forth.

In witness whereof I have hereunto set my
hand in presence of two witnesses.

FRIEDRICH OTTO HÖRENZ.

Witnesses:

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WILHELM GRUK,
DR. HÄBERLEIN.