

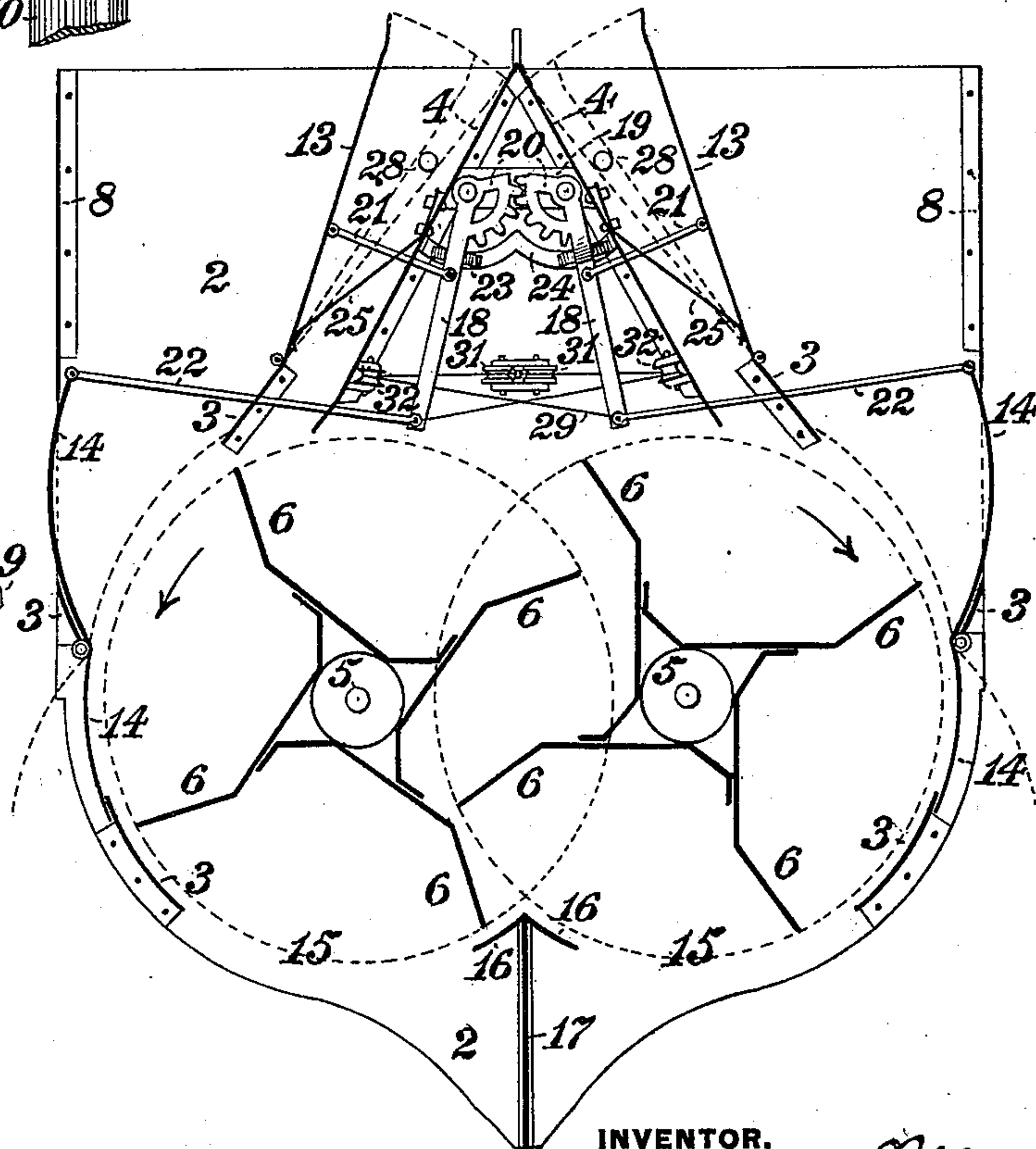
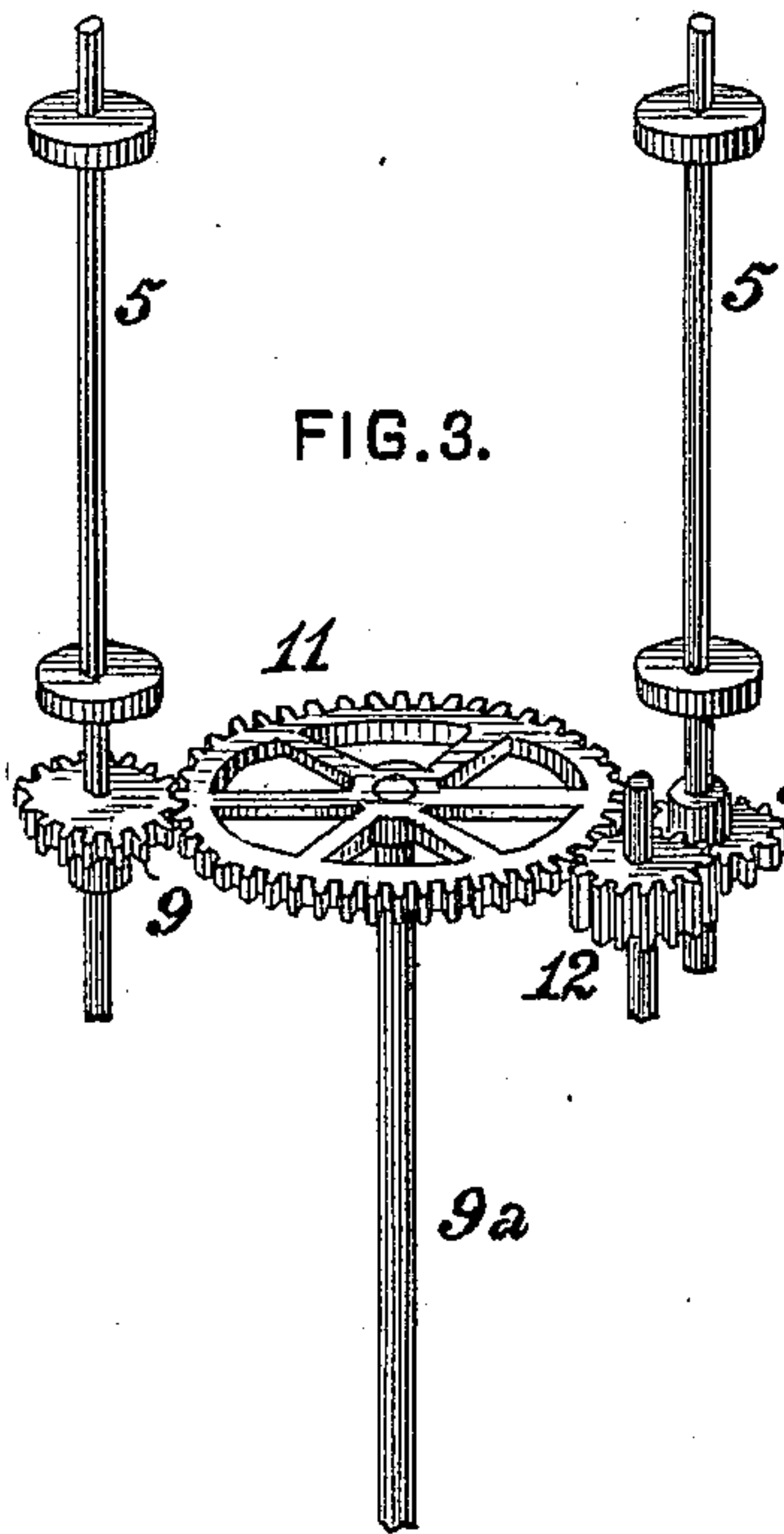
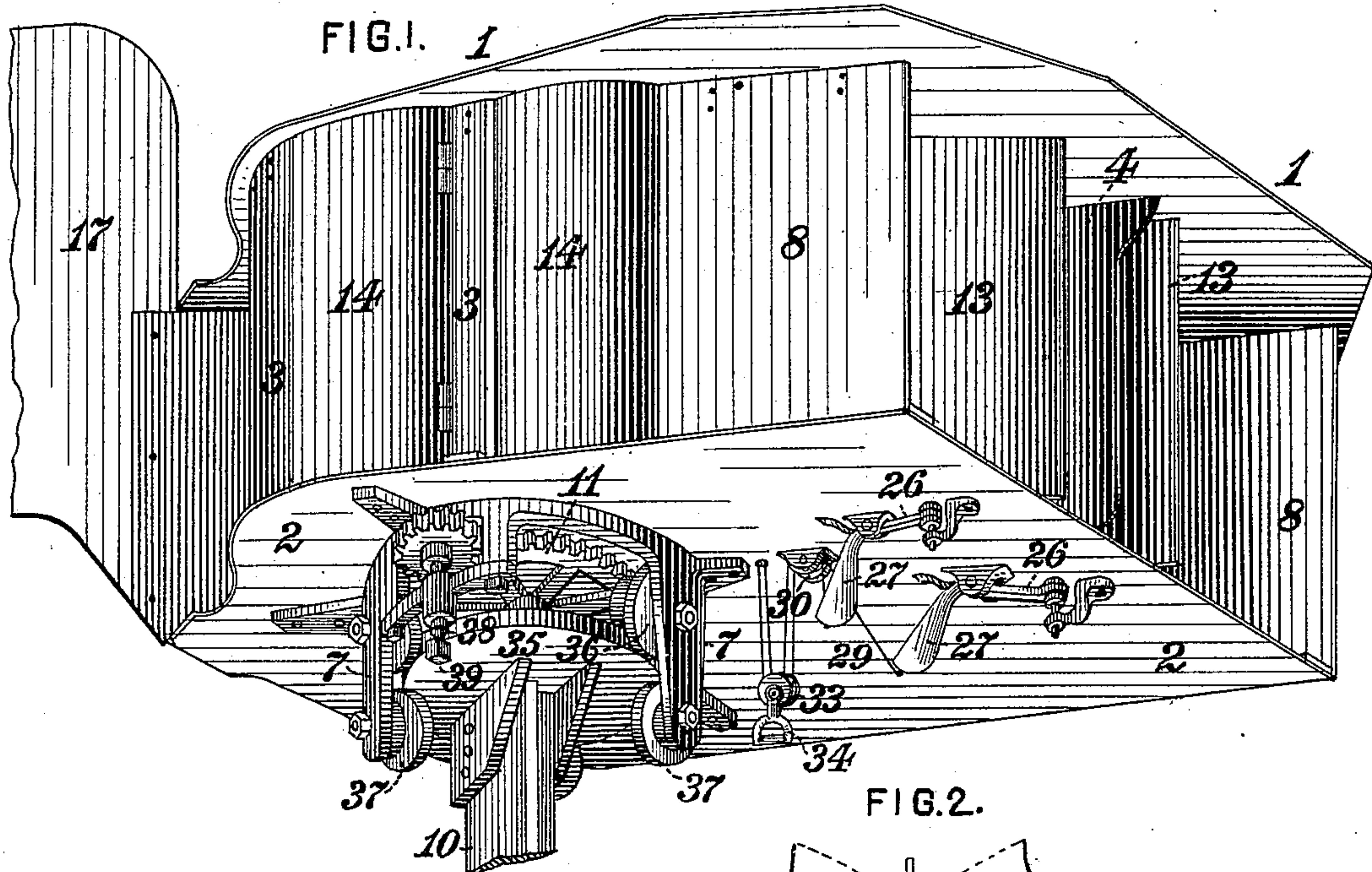
(No Model.)

2 Sheets—Sheet 1.

H. OTTO.
WIND MOTOR.

No. 419,345.

Patented Jan. 14, 1890.



WITNESSES:

William B. Carlock
Richard L. Carlock

INVENTOR,

Henry Otto
J. Snowden Bell
Att'y.

(No Model.)

2 Sheets—Sheet 2.

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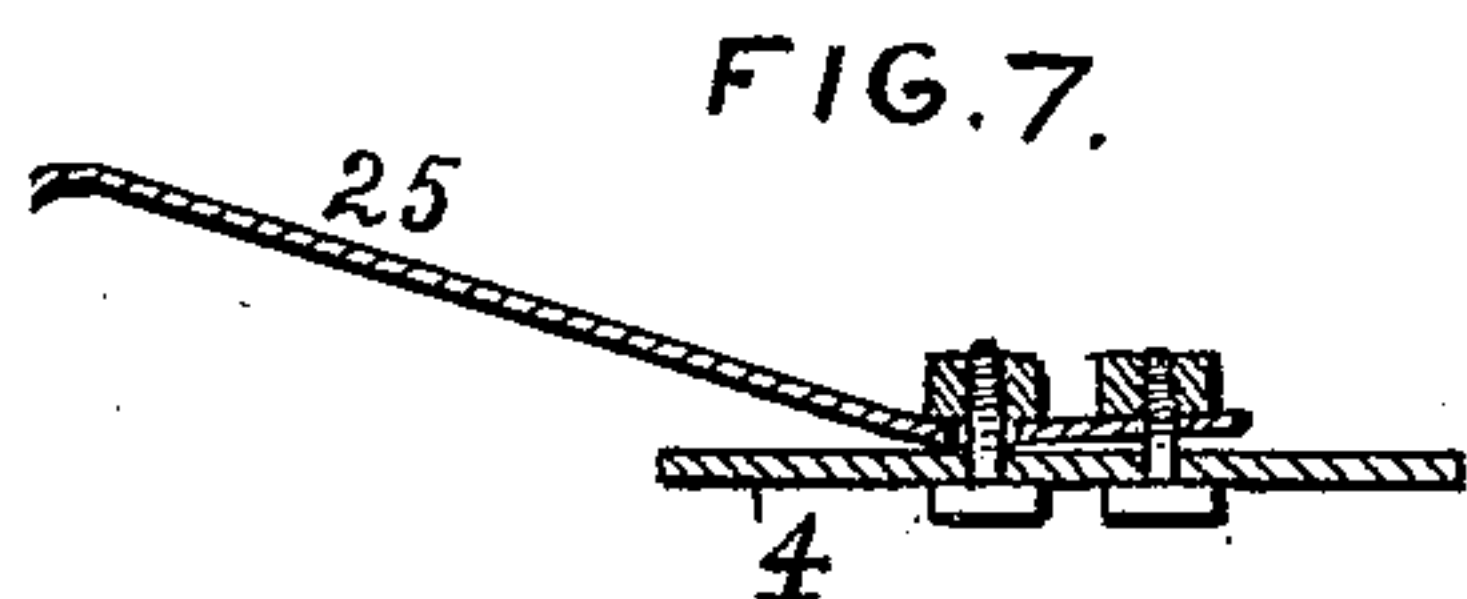
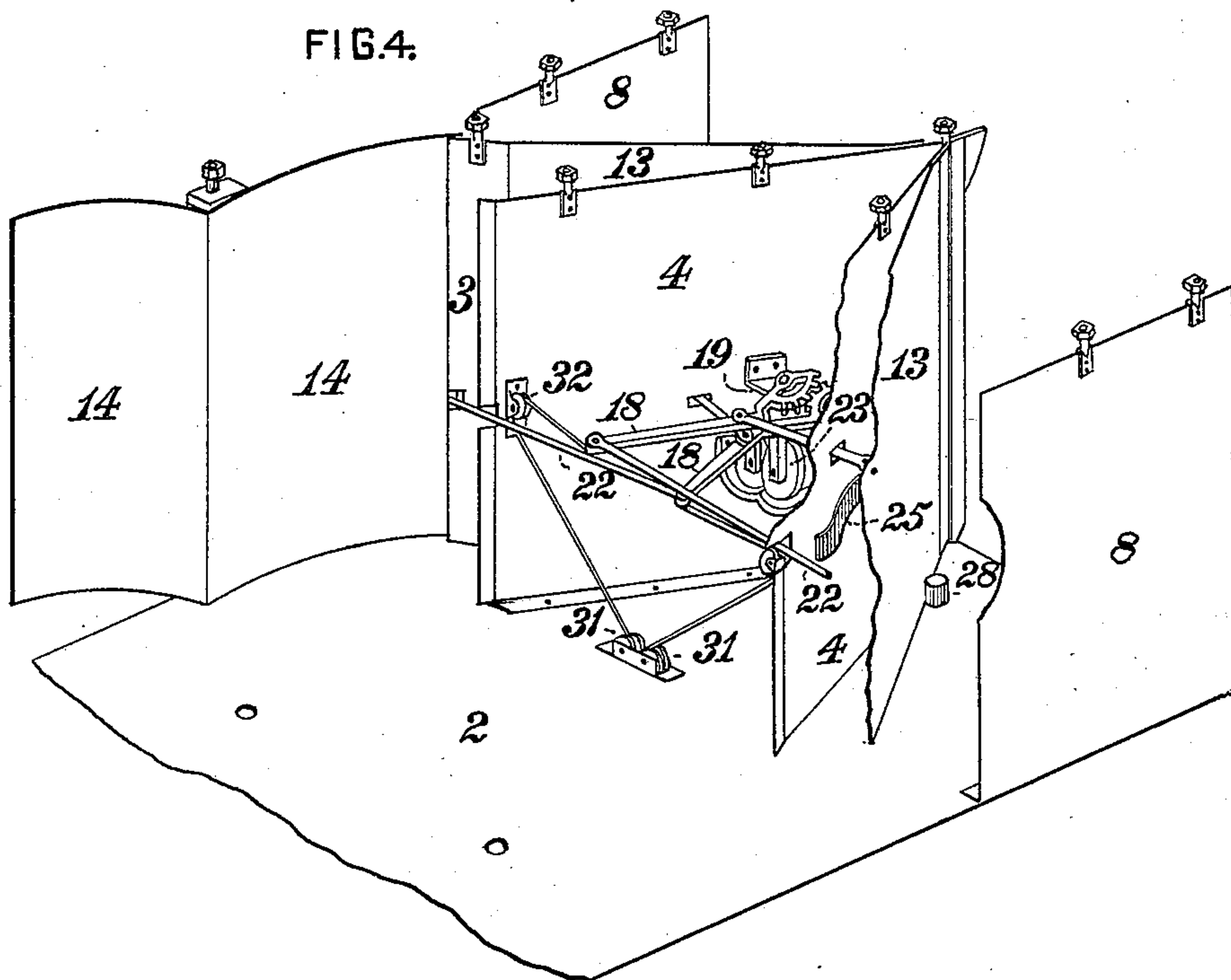


FIG. 5.

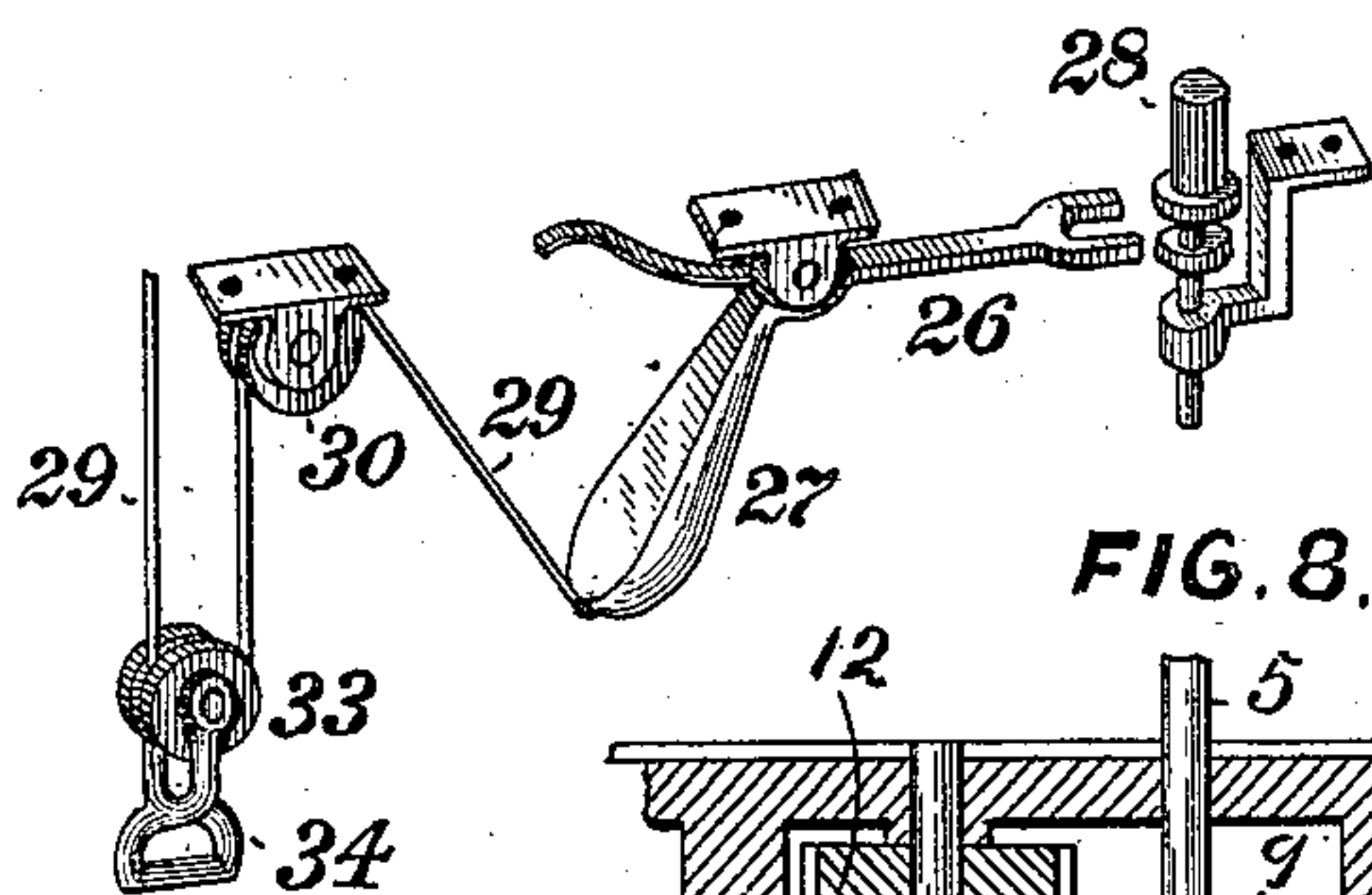


FIG. 8.

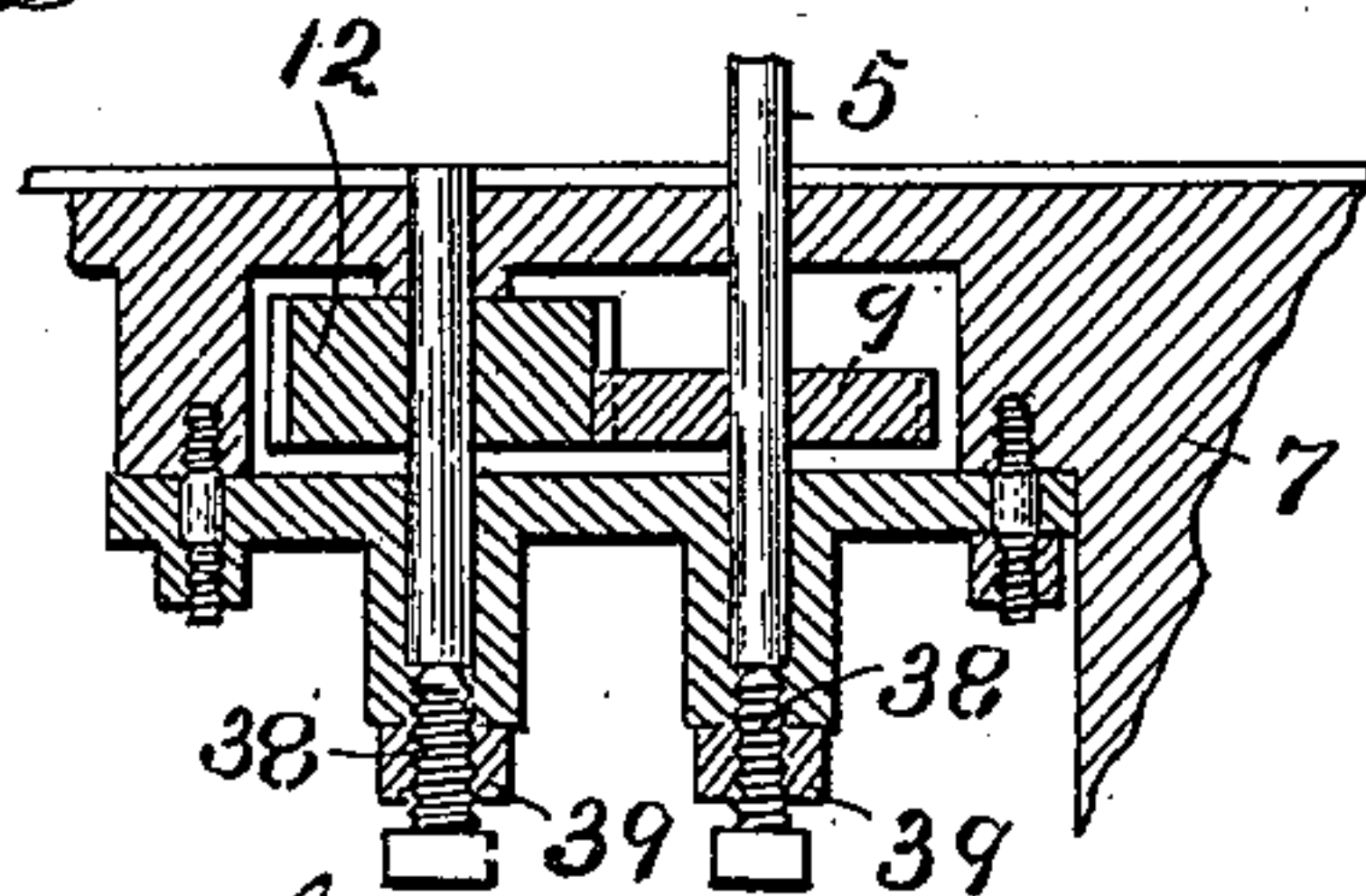
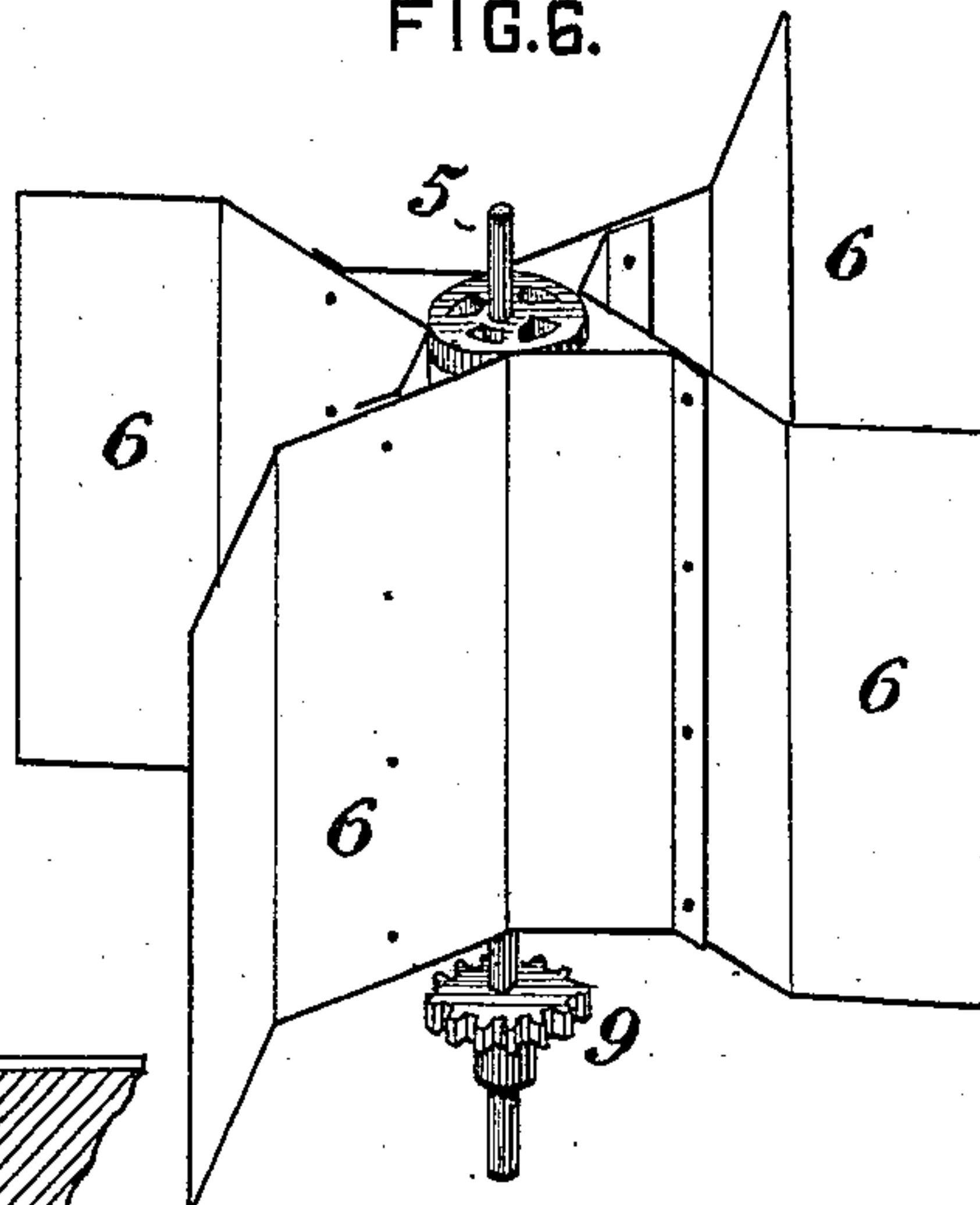


FIG. 6.



WITNESSES:

William B. Carlock
Richard L. Carlock

INVENTOR,

Henry Otto
J. Snowden Bell
Att'y.

UNITED STATES PATENT OFFICE.

HENRY OTTO, OF BLOOMINGTON, ILLINOIS.

WIND-MOTOR.

SPECIFICATION forming part of Letters Patent No. 419,345, dated January 14, 1890.

Application filed November 8, 1889. Serial No. 329,624. (No model.)

To all whom it may concern:

Be it known that I, HENRY OTTO, of Bloomington, in the county of McLean and State of Illinois, have invented certain new and useful Improvements in Wind-Motors, of which

My invention relates to apparatus for the utilization of the pressure of wind as a motive power in mechanical operations, and its object is to provide a motor of such type in which the following advantages may be afforded, to wit: the effective application of a materially greater degree of wind-power than has heretofore been practicable, proper regulation of speed of the motor and driven mechanism, protection of the working parts from exposure and resultant damage, convenient facilities for stopping, locking, and releasing, and provision for compression of the air acting upon the wings or blades in operation.

To this end my invention consists in certain novel devices and combinations herein-after fully set forth.

In the accompanying drawings, Figure 1 is a view in perspective of a wind-motor embodying my invention; Fig. 2, a plan view of the same with the top plate removed; Fig. 3, a view in perspective of the wing-spindles, driving-shaft, and intermediate gearing; Fig. 4, a similar view illustrating the front and side walls, regulating-doors, and connections; Fig. 5, a similar view of the regulating mechanism; Fig. 6, a similar view of one of the wing-spindles and its driving-wings; Fig. 7, a longitudinal section, on an enlarged scale, through one of the adjustable springs, illustrating its connection to the adjacent inclined guiding-wall; and Fig. 8, a vertical section through the bearings of one of the wing-spindles and of the intermediate pinion-shaft.

In the practice of my invention I provide a casing of substantial sheet metal, composed of a cap or top plate 1 and a bottom plate 2, which are connected by a series of vertical wall-sections 3, 4, and 8, the two walls 4 at the front of the casing, or that side thereof which is directed toward the wind in operation, being united one to the other at their outer ends in the longitudinal center line of the case, and being oppositely inclined at equal angles therefrom in the direction of the

center of the case, in order to direct the wind to the outer wings of a pair of wing-spindles to be presently described. The two outer walls 8, opposite the walls 4, are substantially parallel with and are located at opposite sides of and at equal distances from the longitudinal center line of the case, their front ends being about in line with the junction of the middle walls 4 and extending rearwardly to the forward ends of movable side doors to be presently described.

Two vertical wing-spindles 5, each carrying a series of vertical driving wings or blades 6, by the pressure of the wind upon which the motor is actuated, are mounted in suitable bearings on the top and bottom plates 1 2, and in a cast-metal bearing-frame 7, secured upon the lower side of the bottom plate. The axes of the spindles 5 are located in the transverse center line of the casing on opposite sides of the longitudinal center line and at equal distances therefrom, and the spindles, which are adapted to rotate in opposite directions, as indicated by the arrows in Fig. 2, are set at such distance apart as will enable their respective wings to overlap and clear each other in their rotation, the relation of the wings of the respective spindles tending to drive the air inclosed between them toward the front of the casing and into the current of air flowing in on opposite sides of the inclined walls 4, by which current it is drawn out of the casing, thus completely counteracting the reaction of the wind on the wings 6. The wing-spindles 5 are geared to an interposed vertical driving-shaft 9, which is journaled in a fixed standard or post 10, upon which the casing is supported, each spindle carrying a spur-pinion 9, and the pinion 9 of one spindle meshing with a similar gear 11, of larger diameter, fixed upon the driving-shaft, while the pinion 9 of the other spindle meshes with an intermediate pinion 12, which in turn engages the gear 11, in order to provide for the opposite directions of rotation of the spindles. The wind enters the casing to act upon the wings 6 between the outer faces of the inclined central front walls 4 and a pair of front regulating-doors 13, the rear sides of which are hinged or pivoted in vertical planes to the wall-sec-

tions 3, next in rear of and outside of the walls 4, and also enters between the doors 13 and the outer front walls 8.

Vertical side regulating-doors 14, each in the form of two connected segmental plates, forming a double door, the forward one of which plates is somewhat longer than the other—as, say, in the proportion of three to two—are hinged or pivoted on the line of junction of their plates to the wall-sections 3 in rear of and outside of those to which the front doors 13 are hinged, said side doors, when in the position shown in Figs. 1 and 2, opening wind-inlets between the outer front walls 8 and the doors 13, and forming continuous side walls from the rear sides of the walls 8 to the wall-sections 3 nearest the rear of the casing. The curve of their rear or shorter plates is concentric with the path of the outer edges of the wings, in order to converge the wind to the outlet-spaces 15, which are formed between the wall-sections 3 nearest the rear of the case, and two short rearwardly-inclined wall-sections 16, connected to a vertical tail-piece or rudder 17, secured to the top and bottom plates 1 2 in the longitudinal central plane of the casing and extending rearwardly for a distance about equal to the length of the latter. The area of the outlet-spaces is made about one-third less than the aggregate areas of the four inlets, in order to cause a corresponding degree of compression and increase of force of the wind in the case during operation.

Two horizontal regulating-arms 18 are pivoted at their front ends in a stand 19 between the inclined front walls 4 of the casing, said arms carrying segmental gears 20, concentric with their pivots, which gears engage one with the other to cause coincident movement of the regulating-arms in opposite directions. The regulating-arms are coupled by rods or links 21, passing through openings in the walls 4 to the front regulating-doors 13, and are also coupled by rods 22 to the side regulating-doors 14. The two pairs of doors 13 and 14 are thus caused to move inwardly and outwardly in unison, decreasing or increasing the area of the wind-inlets to the casing.

In order to reduce friction, the regulating-arms are supported on rollers 23, which traverse on curved guideways 24, fixed between the walls 4.

During moderate or normal pressure of wind the doors are held open, or in the position shown in Fig. 2, by adjustable springs 25, one of which is connected to the outer side of each of the walls 4 and bears at its free end against the inner side of the adjacent door 13. In order to reduce the vibratory motion of said springs, they are each connected to the walls by two bolts, the rear one of which is clamped fast and the forward one loose, admitting of a space between the spring and the wall, which can be varied so as to adjust the spring for proper pressure

during operation. Excess of wind-pressure upon the front regulating-doors 13 forces them inwardly, correspondingly reducing the areas of wind-inlet between said doors and the walls 4, the arms 18 coincidentally drawing inwardly the side doors 14 and reducing the areas of wind-inlet on the outer sides of the doors 13. The reduction of pressure upon the wings 6 thereby effected serves to regulate and maintain a uniform speed of the wing-spindles, proper increase of inlet area being again made by the action of the springs 25 upon a diminution of wind-pressure. As the forward ends of the side doors 14 are drawn inward by excess of pressure, their rear ends are forced outward, as indicated in dotted lines in Fig. 2, thereby providing a lateral opening on each side of the casing, said openings serving for the relief of surplus pressure in the casing, and the rear portions of the doors 14 when thus opened present inclined planes to the wind on the outside of the casing, the pressure of which acts, in conjunction with the springs 25, in reopening the doors when the incline of the front doors 13 induces greater wind-pressure than can be overcome by said springs.

Two locking-levers 26, each actuated by a weight 27, or equivalently by a spring, are pivoted on the bottom plate 2 of the casing, each of said levers having a forked front end, which fits between collars on a vertically-movable locking-pin 28, the pins 28 being fitted to slide in the bottom plate 2 at short distances from the outside of the walls 4, and to arrest the motion of the doors 13 when blown inward by excess of wind-pressure, so as to still allow a sufficient space of wind-inlet to operate the wings 6 even during a very heavy wind. The tops of the locking-pins may be beveled or inclined on their outer sides in the manner of a lock-bolt, and corresponding shoulders fixed upon the doors 13, so that in the event of a hurricane said doors, on being blown inward, would press down the locking-pins and lock themselves in closed position. The rear ends of the locking-levers are connected with the regulating-levers 18 by a rope 29, passing around guide-pulleys 30, journaled on the bottom plate behind the levers, and thence through openings in the bottom plate, around guide-pulleys 31 above the same, and around lateral guide-pulleys 32, journaled on the inside of the front walls 4. The rope 29 passes around a roller 33, which swings below the bottom plate, and is provided with a handle 34, in order to keep the rope properly stretched and to enable it to be pulled by the operator. By pulling the handle 34 downwardly the regulating-levers 18 may be drawn inwardly and one across the other, as shown in Fig. 4, and by drawing down the locking-pins 28 flush with the bottom plate by a pull on the front part of the rope, and closing the doors entirely by an additional pull on the rear part and releasing the front part, the projecting ends of the locking-pins will lock

the doors closed, in which position the longitudinal center line of the casing will be brought into line with the wind by the action of the same on the tail-piece or rudder 17.

5 This operation may be made in advance of a heavy snow or hail storm, and the doors thereafter opened by pulling down the projecting ends of the locking-levers with the front part of the rope 29, when the springs 25, acting on
10 the doors 13, will push them outward and open, and coincidently open the side doors 14 through the regulating-arms and connecting-rods.

The casing of the motor is supported upon
15 a suitable circular bearing-plate 35, fixed to the post or standard 10 by a series of rollers 36, journaled in the lower portion of the bearing-frame 7, which is connected to the bottom plate 2. The rollers 36 are preferably
20 provided with flanges adapted to bear against one side of the plate 35, on which they traverse, in order to reduce horizontal friction, in order that the tail-piece or rudder may readily swing the casing into operative position.
25 A lower series of rollers 37, also journaled in the bearing-frame 7, bears against the lower side of the bearing-plate 35, in order to prevent the casing from being lifted therefrom by the wind.

30 The top plate 1 extends in advance of the bottom plate, so as to serve as a roof for the protection of the parts in wet weather, and is properly secured to the wall-sections by bolts and nuts. The bottom bearings of the wing-
35 spindles and driving-shaft are threaded at and near their lower ends, and engage adjustable steel set-screws 38, secured by jam-nuts 39.

I claim as my invention and desire to secure by Letters Patent—

1. In a wind-motor, the combination of a casing provided with front inlet and rear outlet openings, two spindles journaled vertically therein and carrying a series of wings
45 which overlap in the rotation of the spindles, and a driving-shaft geared to and rotated by the spindles, substantially as set forth.

2. In a wind-motor, the combination of a casing, two spindles journaled vertically
50 therein and carrying a series of wings which overlap in the rotation of the spindles, a driving-shaft geared to and rotated by the spindles, inclined front guiding-walls adapted to direct wind entering the casing to the wings
55 toward the sides of the casing, and side walls adapted to direct the discharge of wind from the casing toward the center line thereof, substantially as set forth.

3. In a wind-motor, the combination of a
60 casing, two spindles journaled vertically therein and carrying a series of wings which overlap in the rotation of the spindles, a driving-shaft geared to and rotated by the spindles, inclined front guiding-walls adapted to
65 direct wind entering the casing to the wings toward the sides of the casing, side walls adapted to direct the discharge of wind from

the casing toward the center line thereof, and pivoted regulating-doors controlling the admission of wind to the casing, substantially
70 as set forth.

4. In a wind-motor, the combination of a casing, two spindles journaled vertically therein and carrying a series of wings which
75 overlap in the rotation of the spindles, a driving-shaft geared to and rotated by the spindles, front wind-inlet passages formed in the vertical walls of the casing, and rear wind-outlet passages also formed in said vertical
80 walls and of reduced area relatively to the inlet-passages, substantially as set forth.

5. In a wind-motor, the combination of a casing, two spindles journaled vertically therein and carrying a series of wings which
85 overlap in the rotation of the spindles, a driving-shaft geared to and rotated by the spindles, pivoted regulating-doors controlling the admission of wind to the casing, and springs bearing on said doors and on the casing, sub-
90 stantially as set forth.

6. In a wind-motor, the combination of a casing, two spindles journaled vertically therein and carrying a series of wings which
95 overlap in the rotation of the spindles, a driving-shaft geared to and rotated by the spindles, pivoted regulating-doors controlling the admission of wind to the casing, springs bearing on said doors and on the casing, locking-
100 pins working in the casing and adapted to hold the doors in or near closed position, and hand-actuated locking-levers effecting the movement of the locking-pins into locking position, substantially as set forth.

7. In a wind-motor, the combination of a casing, two spindles journaled vertically
105 therein and carrying a series of wings which overlap in the rotation of the spindles, a driving-shaft geared to and rotated by the spindles, inclined front guiding-walls adapted to direct wind entering the casing toward the
110 sides thereof, sectional side walls connecting the top and bottom of the casing in rear of the front walls, pivoted front regulating-doors controlling the inlet-passages adjacent to the front walls, springs fixed to the casing and
115 bearing outwardly on said doors, pivoted side regulating-doors controlling the inlet-passages adjacent to the side walls, two regulating-arms pivoted in the casing and geared one with the other, and rods coupling the front
120 and side doors to the regulating-arms, substantially as set forth.

8. The combination of a top casing-plate, a bottom casing-plate, two inclined front vertical walls, and a series of side wall-sections connecting the top and bottom plates, a pair of
125 front regulating-doors pivoted to the side wall-sections nearest the front walls, a pair of side regulating-doors each formed of two segmental plates pivoted on their line of junction to the
130 wall-sections next in rear of those which carry the front regulating-doors, each plate controlling a passage between two wall-sections, springs bearing outwardly on the front regu-

lating-doors, two regulating-arms pivoted in the casing and geared one with the other, rods coupling the front and side doors to the regulating-arms, two oppositely-rotating spindles
5 journaled vertically in the casing and carrying a series of wings, and a driving-shaft geared with said spindles, substantially as set forth.

9. The combination of the casing, the piv-
10 oted regulating arms and doors and their connecting gears and rods, the locking-pins, the locking-levers, and the actuating-rope and guide-pulleys, substantially as set forth.

10. The combination of the top and bot-

tom casing - plates, the wing-spindles and 15 wings, the driving-shaft, the intermediate gearing, the inclined front walls, the side wall-sections, the pivoted front and side regulating-doors, the regulating-arms and their connecting gears and rods, and the wall-sec- 20 tions extending in advance of the side regulating-doors and opposite the front regulating-doors, substantially as set forth.

HENRY OTTO.

Witnesses:

WILLIAM B. CARLOCK,
RICHARD L. CARLOCK.