No. 760,277. PATENTED MAY 17, 1904.

J. O. F. THOSS.

AIR CURRENT MOTOR FOR CLOCKS OR LIGHT MACHINERY.

APPLICATION FILED OCT. 31, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

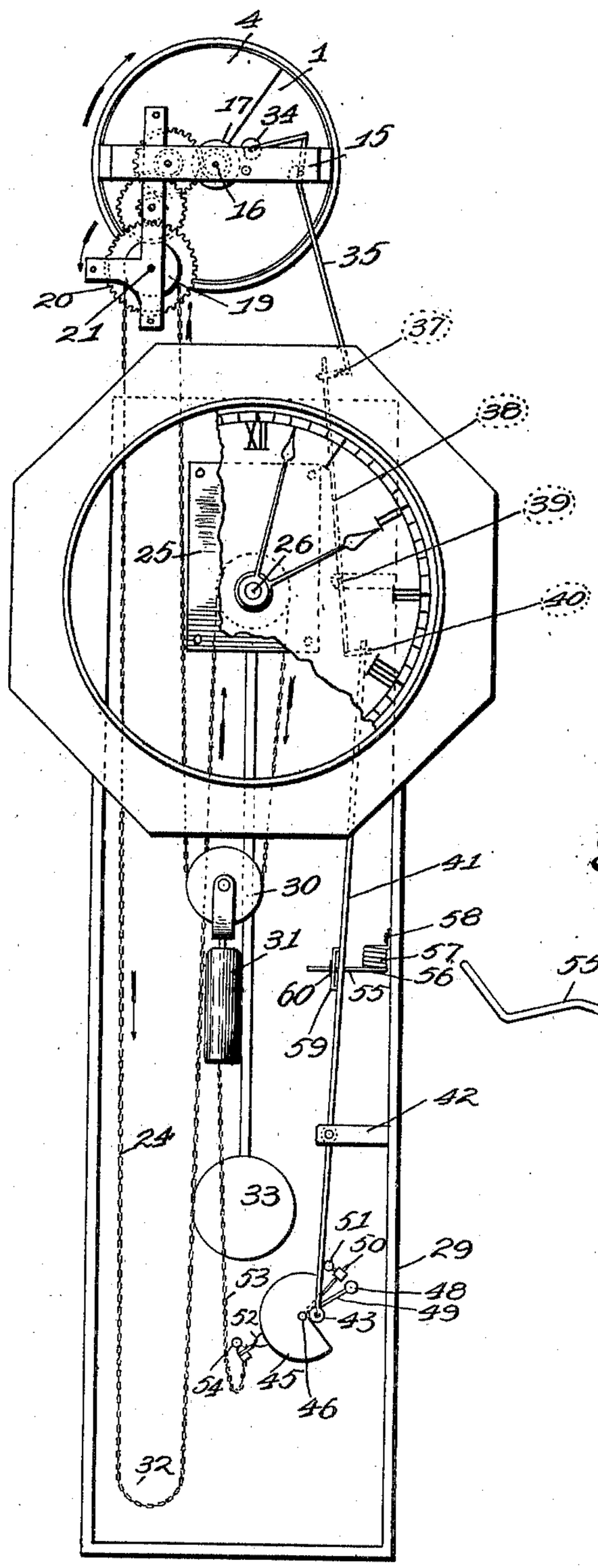


Fig. 2.

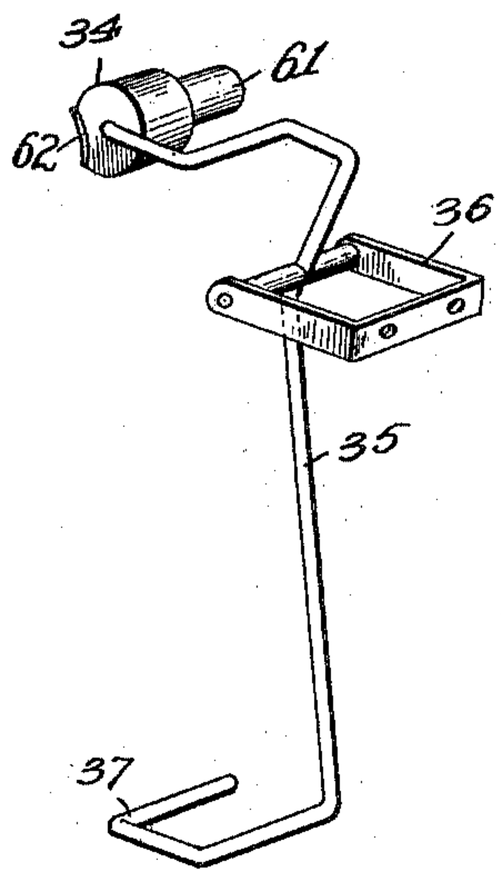
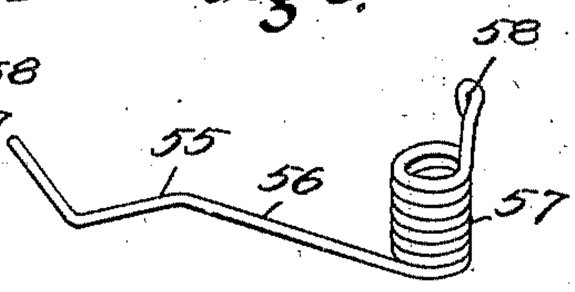


Fig. 3.



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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 4.

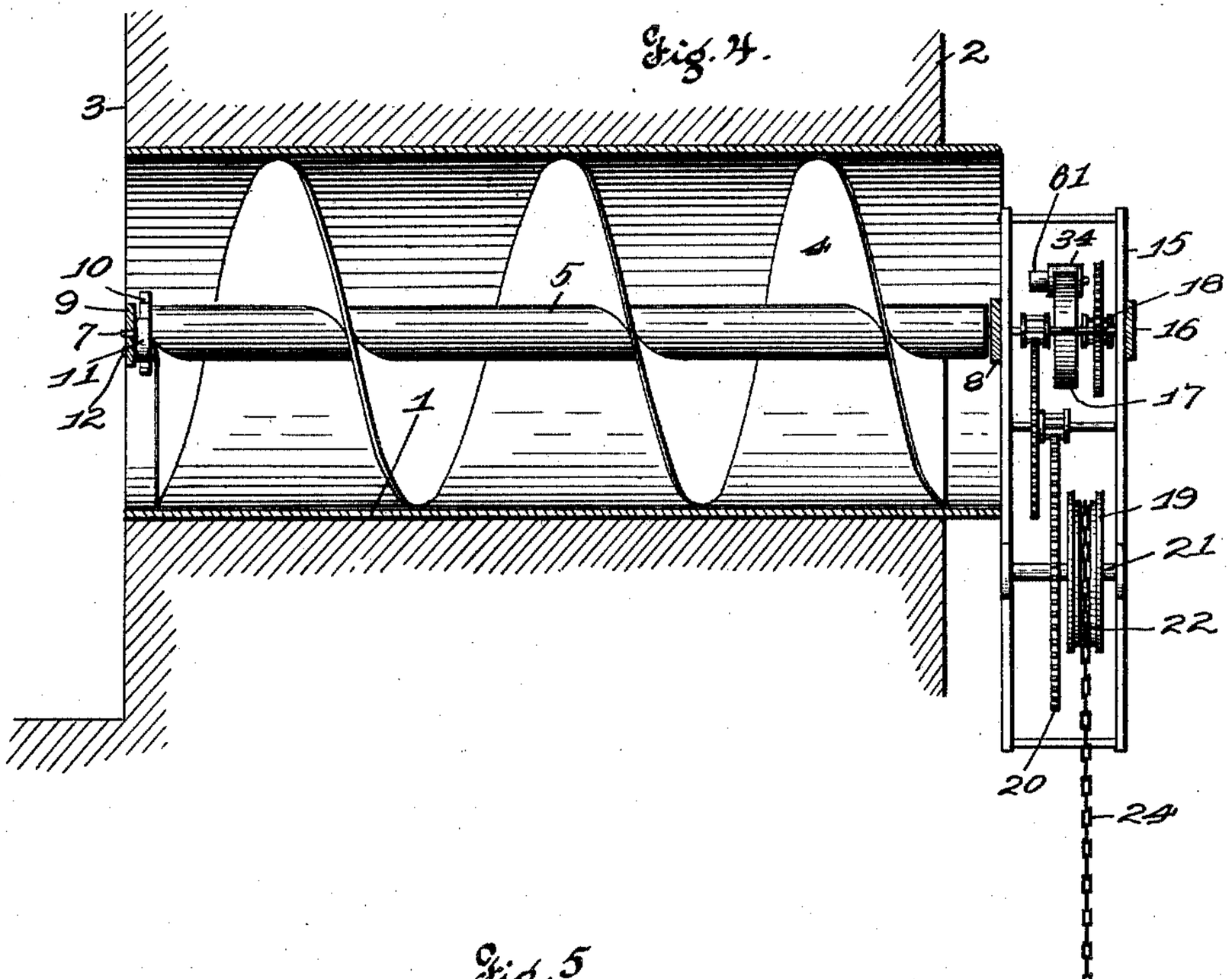


Fig. 5.

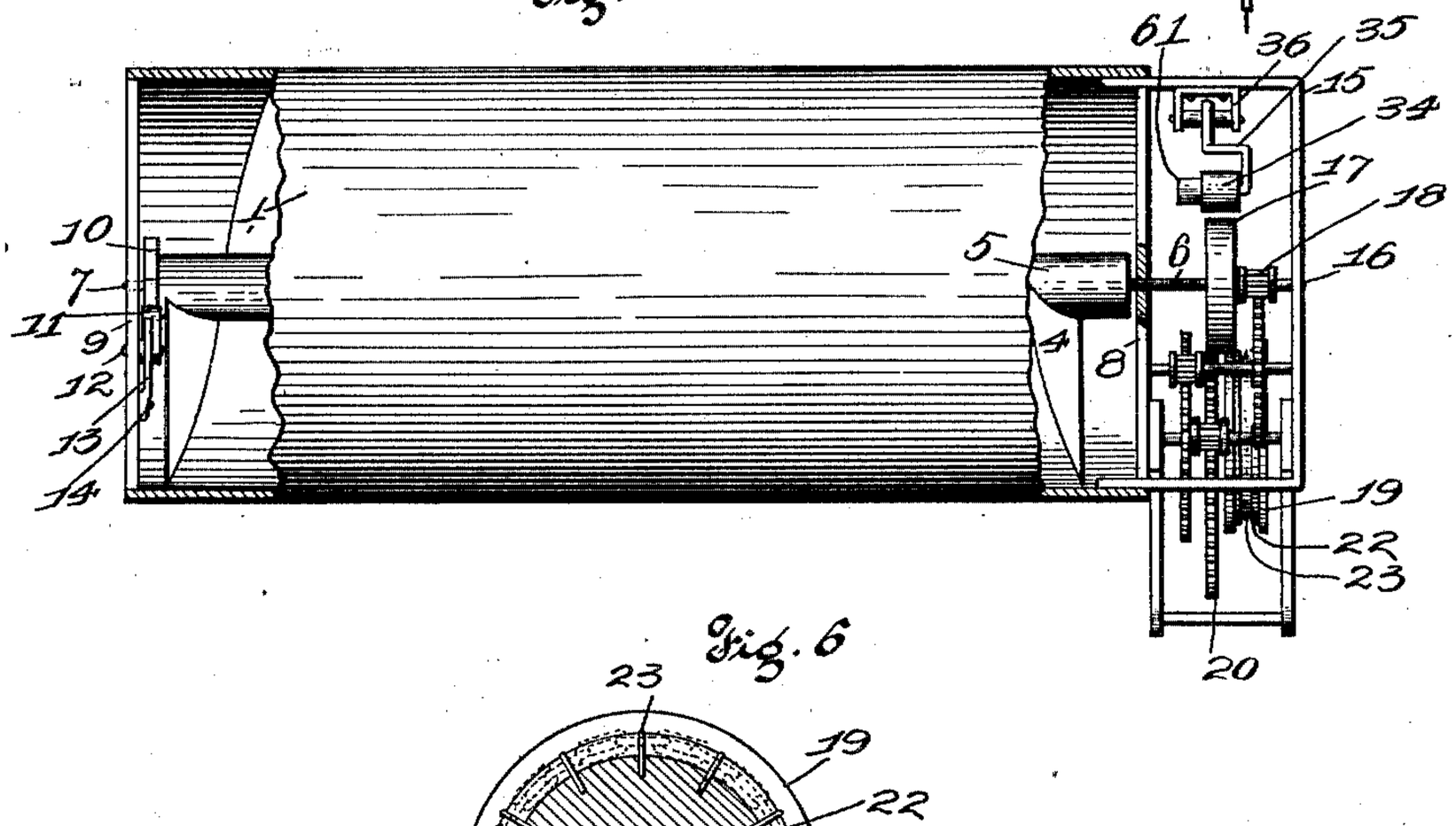
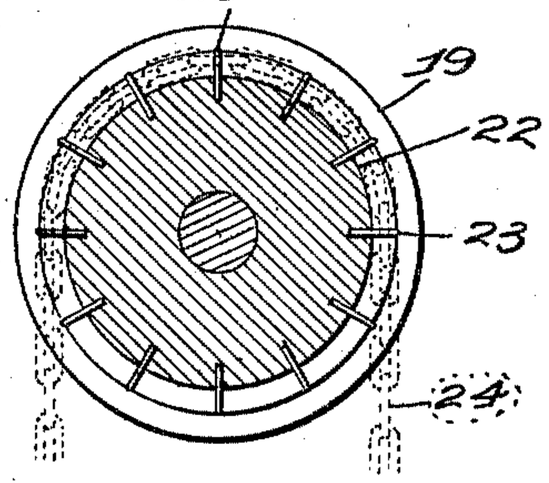


Fig. 6.



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No. 760,277. PATENTED MAY 17, 1904.

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AIR CURRENT MOTOR FOR CLOCKS OR LIGHT MACHINERY.

APPLICATION FILED OCT. 31, 1903.

NO MODEL. 3 SHEETS—SHEET 3.

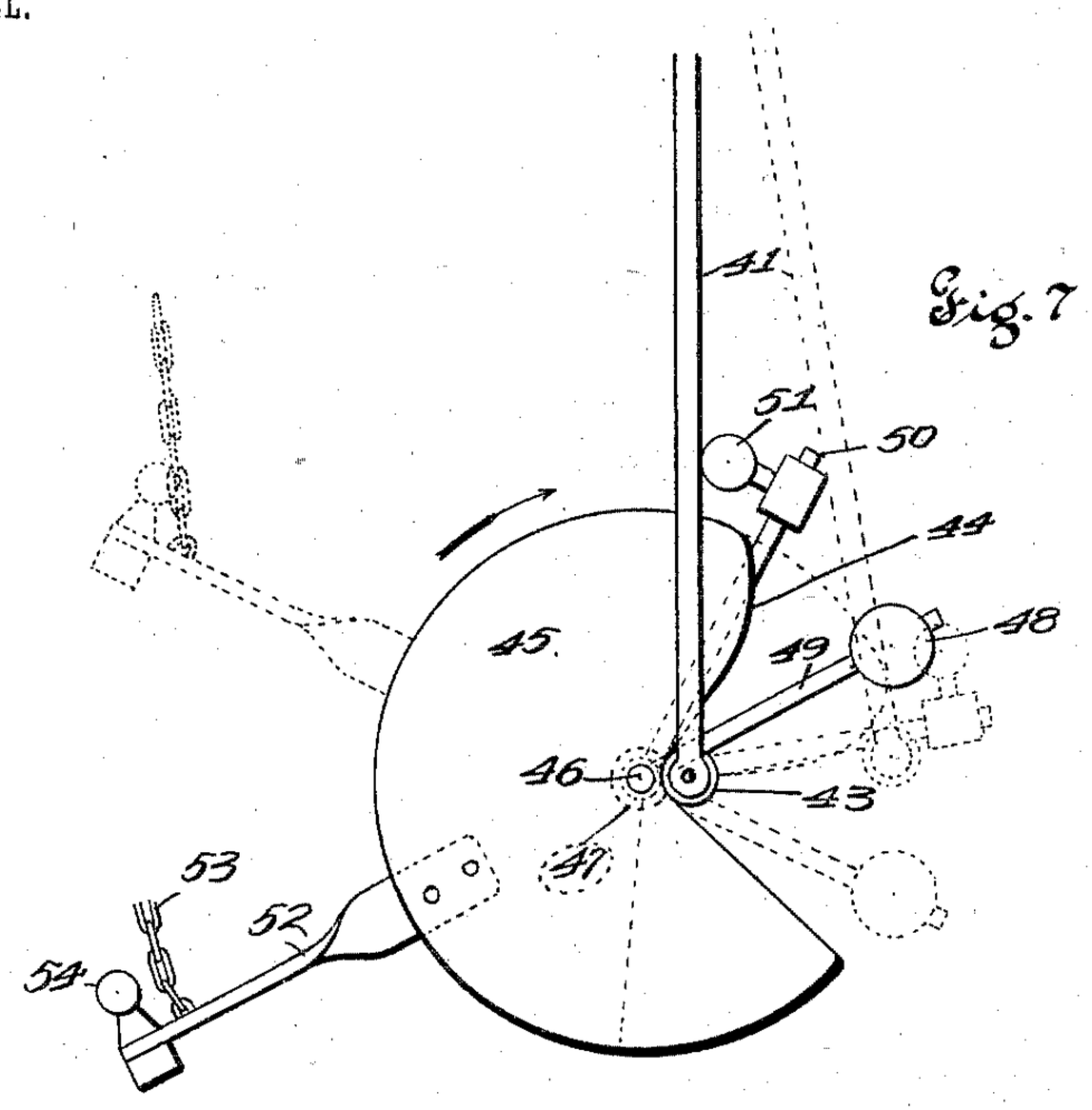

Fig. 7

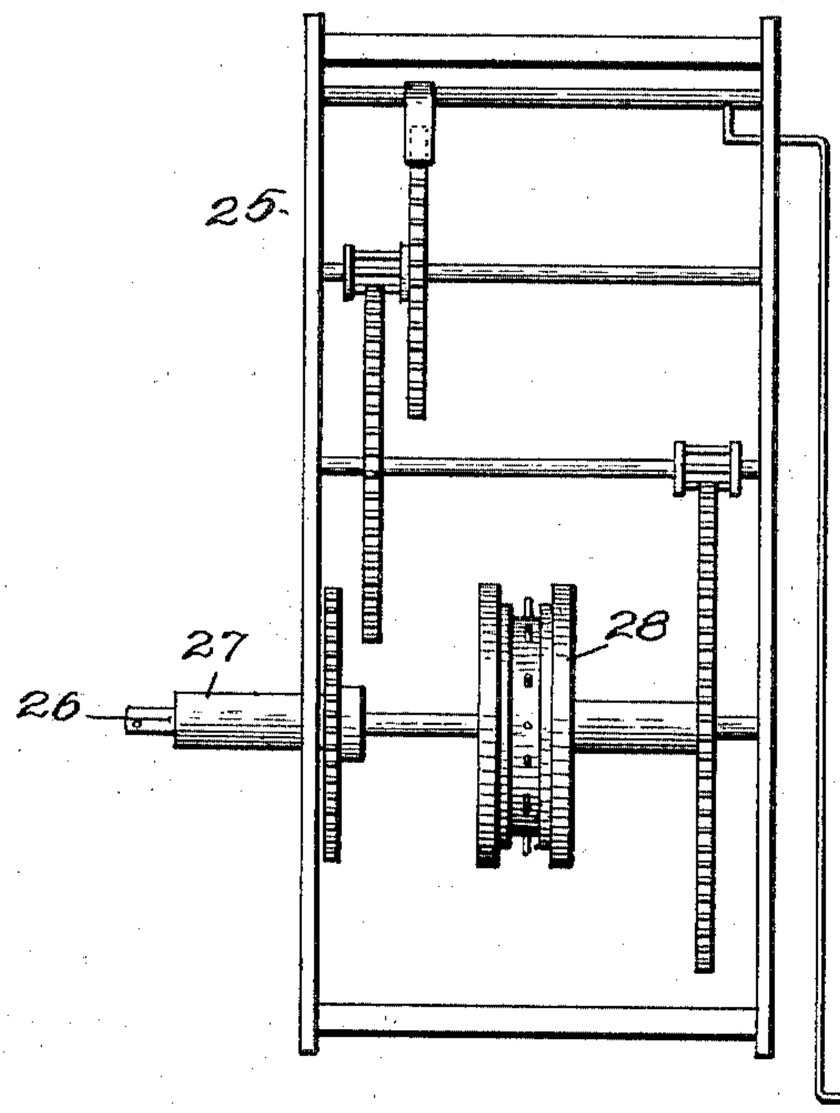

Fig. 8

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No. 760,277. Patented May 17, 1904.

UNITED STATES PATENT OFFICE.

JULIUS O. F. THOSS, OF ST. LOUIS, MISSOURI.

AIR-CURRENT MOTOR FOR CLOCKS OR LIGHT MACHINERY.

SPECIFICATION forming part of Letters Patent No. 760,277, dated May 17, 1904.

Application filed October 31, 1903. Serial No. 179,271. (No model.)

To all whom it may concern:

Be it known that I, JULIUS O. F. THOSS, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Air-Current Motors for Clocks or Light Machinery, of which the following is a specification containing a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to an improved air-current motor for clocks or light machinery; and it consists of the novel construction hereinafter described and claimed.

The object of my invention is to provide an improved motor for actuating self-winding clocks and other light machinery which shall be driven by the power of an ascending rarefied current of air contained within a chimney or stack.

In the drawings, Figure 1 is a front elevation of a self-winding clock with parts broken away and having my invention applied thereto. Fig. 2 is a detail perspective view of a brake-shoe and its mountings. Fig. 3 is a detail perspective view of a yielding retaining-cam made use of in holding the oscillating brake-lever in either of its two positions. Fig. 4 is a sectional side elevation of the wall of a chimney having my invention applied thereto. Fig. 5 is a sectional plan view of the propeller-tube and the driving mechanism detached from the chimney. Fig. 6 is a sectional detail view of the main chain-wheel of the motor. Fig. 7 is a detail front elevation of a cam and its connections arranged for throwing the oscillating brake-lever from one of its positions to its other position in applying or releasing the brake. Fig. 8 is a side elevation of a portion of the clock-movement having one of my improved chain-wheels applied thereto.

I have illustrated my invention arranged to automatically rewind a clock; but from the drawings and the following description it will be readily seen that the invention may be applied to any common light machinery requiring but a small amount of power.

1 indicates a propeller-tube preferably cylindrical in form and which extends through the wall 2 of any suitable chimney or stack, so that the outer end of said tube will communicate with the outer air, while its inner end communicates with the interior 3 of the said chimney or stack. Said chimney or stack should be of sufficient height to create a considerable draft by rarefaction in the usual manner and should, if necessary, be provided on its upper end with a suitable chimney-cowl for preventing back draft in the chimney. The chimney or stack should be used for no other purpose except to rarefy the air passing through the propeller-tube 1, as the use of same for carrying off the products of combustion from a stove or furnace would heat the air within the chimney and cause too great rarefaction and cause the propeller to rotate with such force as to throw an unnecessary strain upon the brake mechanism. Mounted upon said propeller-tube 1 is a common screw-propeller 4, having the usual shaft 5, and said shaft is provided at each end with small journals 6 and 7, which latter are mounted in suitable bearings formed in horizontal cross-bars 8 and 9, which extend across the outer and inner ends of said tube and are carried thereby. Mounted upon the inner end of the shaft 5 is a small ratchet-wheel 10, which is engaged by a pawl 11, pivoted to the cross-bar 9 by means of a bolt or rivet 12. Said pawl is urged into contact with said ratchet-wheel by means of a suitable spring 13, one end of which bears upon the free portion of said pawl and the opposite end of which is fixed to the said cross-bar at 14. (See Fig. 5.)

15 indicates a frame mounted in front of the outer cross-bar 8. The front propeller-journal 6 extends through the front cross-bar 8 and through the front horizontal bar of said frame and has a bearing in the latter at 16. Fixed upon said journals 6 within said frame is a brake-wheel 17 and a pinion 18. Mounted in the lower portion of said frame is the main chain-wheel 19, which has a large gear-wheel 20 upon its shaft 21, and both these wheels are fixed upon said shaft. Said main chain-wheel 19 and the gear-wheel 20 are driven by the propeller 4 through the medium of a train of gearing consisting of pinions and

gear-wheels connected to said pinion 18 and mounted upon the propeller-journal 6, as shown in Figs. 1 and 4. Said chain-wheel 19 is preferably constructed of a wooden body, in which is formed a recess 22 for the reception of the chain, which has a series of short pins or pegs 23 driven into the wood at the bottom of said recess and spaced apart symmetrically, corresponding to the length of the links of the endless chain 24, which runs upon said wheel. (See Fig. 6.)

25 indicates a common clock-movement having the usual escapement and train of gearing, which need not be specifically shown or described, except to state that 26 indicates the minute-hand shaft, and 27 the hour-hand sleeve.

Mounted upon and frictionally connected to the minute-hand shaft 26 is another one of my improved chain-wheels 28, having a construction identical with that of the main chain-wheel 19 previously described.

The endless chain 24 passes over the main chain-wheel 19 and is partially suspended therefrom, and thence passes downwardly to a point near the bottom of the clock-case 29, and thence upwardly and over the chain-wheel 28 of the clock-movement, and thence again downwardly and beneath the pulley 30, from which is suspended the usual clock-weight 31, and then said chain passes upwardly to the starting-point—to wit, the main chain-wheel 19. It will be seen from this construction that I have provided what I term a "slack" loop 32 in the said chain, normally located near the bottom of the clock-case 29 and for a purpose hereinafter mentioned.

33 indicates the usual pendulum.

34 indicates a brake-shoe adapted to be forced into contact with said brake-wheel 17 in order to stop the movement of the propeller after the weight 31 has been wound up and which will release said propeller after the weight has reached a point near the limit of its downward movement. Said brake-shoe is fixed upon the upper end of a lever 35, which is pivotally mounted in a bracket 36, and this bracket is fixed to the frame 15 by means of suitable screws or rivets. The lower end of said lever is provided with a loop 37, which is engaged by the upper end of another lever, 38, pivoted at 39 to some fixed part of the clock-case. (Shown in dotted lines in Fig. 1.) The lower end of said lever 38 has a loop 40, and this loop is loosely engaged by the upper end of the oscillating brake-lever 41. The latter is pivoted intermediate of its ends to a bracket 42, projecting from the interior of the clock-case 29. Mounted upon the lower end of said lever 41 is a roller 43, which projects inwardly into the path of a curved edge 44 of a cam-plate 45, which latter is mounted on a pivot 46, projecting from the back of said clock-case. Said cam-plate 45 is provided upon its rear face with a tubular sleeve 47, which is rigidly connected to said cam-plate and mounted to rock upon said pivot 46. 48 indicates a counterbalance-weight, which is mounted upon an arm 49, projecting from said sleeve 47, in order to take the place of the metal cut from the cam-plate 45 in producing the curved edge 44. 50 indicates another arm projecting from said sleeve 47 and provided with a curved contact-finger 51 for engaging the oscillating brake-lever 41 to oscillate said lever and release the brake-shoe 34 from the brake-wheel 17 when the weight is to be wound up. Projecting from the edge of the cam-plate 45 at a point diametrically opposite the weighted arm 49 is another arm 52, to which the lower end of a short tripping-chain 53 is attached. The upper end of said tripping-chain is fixed to the clock-weight 31. The arm 52 is also provided with a curved contact-finger 54, which is adapted to be engaged by the lower end of said weight as the latter nears the limit of its downward movement in order to rotate said cam-plate and the parts carried thereby in releasing the brake-shoe.

In order to definitely retain the oscillating brake-lever 41 in its two positions—to wit, with the brake-shoe "off" and "on"—I have provided a yielding retaining-cam 55, which is preferably made of wire, as shown in Fig. 3, with a V-shaped contact-surface at the end of a vibratory arm 56. The inner end of said arm is connected to one end of a coiled torsional spring 57, and the opposite end of said spring is fixed to the clock-casing at 58. 59 indicates a short loop fixed to the said oscillating brake-lever 41 and provided with a roller 60, which is adapted to contact with the said cam 55.

The operation is as follows: In Figs. 1, 5, and 7 the parts are shown in the act of performing the operation of winding up the clock-weight 31, as the brake-shoe 34 is removed from the brake-wheel 17 and the propeller 4 is supposed to be rotating in the direction indicated by the arrow at the top of Fig. 1. The movement of the propeller will, through the action of the train of gearing previously described, cause the main chain-wheel 19 to rotate in a reverse direction. This movement will cause the chain to run over said chain-wheel, and thereby elongate the slack loop 32, but will elevate the weight 31 a corresponding distance. The weight will continue to rise until the short chain 53 is drawn taut and then the upward movement of the weight will also elevate the arm 52, carrying the contact-finger 54, and this will cause the cam-plate 45 to be turned slightly in the direction indicated by the arrow in Fig. 7, and such movement will cause the curved edge 44 of said cam-plate to engage the roller 43 at the lower end of the oscillating brake-lever 41 and force said end of said lever outwardly to the position in which it is indicated by

dotted lines in Fig. 7, and said movement of said cam-plate will of course carry with it the contact-finger 51 of the arm 50. The described movement of the said brake-lever 41 will cause its upper end to move in an opposite direction, and it will engage the loop 40 at the lower end of the intermediate lever 38 and cause the upper end of said last-mentioned lever to move outwardly, and said upper end of said lever engaging the loop 37 at the lower end of the upper lever 35 will also force the said loop outwardly and cause the inner end of said upper lever carrying the brake-shoe 34 to be moved in an opposite direction. This will force said brake-shoe into contact with the brake-wheel 17, and thereby interrupt the rotation of the propeller.

The brake-shoe 34 is preferably made of material having considerable weight, such as iron or brass, and I have found that the weight of said shoe alone will be sufficient to cause said shoe to stop the movement of the propeller against the power of the draft in the chimney or stack. However, I have provided said brake-shoe with an additional metallic weight 61. It will be seen that the operation of rewinding the weight will not interfere in the least with the continuous action of the clock-movement, as the said weight always exerts the same power, tending to rotate the chain-wheel 28 of the clock-movement whether said weight be elevated or depressed, as the pins 23 on said wheel 28 prevent the chain from slipping over said wheel without rotating the same. The same is true of the pins 23 of the main chain-wheel 19, so it will be seen that the weight is compelled to rotate the chain-wheel of the clock-movement no matter what elevation said weight may occupy. As the weight runs down the slack loop 32 will be correspondingly shortened.

The pawl 11 and the ratchet 10 on the propeller-shaft prevent retrograde movement of said propeller should there at any time be a downdraft in the chimney or stack or should the draft entirely cease owing to extreme dampness or cold.

The weight is what I term a "power-storing" device, and therefore I consider myself legally entitled to its mechanical equivalent in the form of a spring which can readily have one end attached to the pulley 30 and its opposite end connected to some fixed part of the clock-casing, and the operation will be substantially the same in both cases. As long as the power-storing device is elevated above the limit of its downward movement it will impart movement to the clock or other light machinery upon which the chain-wheel 28 may be mounted. It will thus be seen that the propeller will rotate intermittently and keep the power-storing device 31 in operative elevation at all times.

The yielding retaining-cam 55 acts upon the oscillating brake-lever 41 to retain it securely in either of its positions whether the brake-shoe be located in an applied or released position.

After the propeller has been stopped, as above described, and as the power-storing device 31 approaches the limit of its downward movement its lower end will come in contact with the rounded contact-finger 54 of the arm 52, which previously occupied an elevated position, as indicated by dotted lines in Fig. 7, and as the downward movement of said weight continues it will carry with it the said contact-finger and arm, and thereby rotate said cam-plate 45 a corresponding distance, and such movement will cause the opposite rounded contact-finger 51 to engage the oscillating brake-lever 41 and move the same gradually toward the left hand in Fig. 7 until it occupies the position in which it is shown in dotted lines, at which time the said oscillating brake-lever will through its previously-described connections release the brake-shoe 34 from the brake-wheel 17, and the propeller will immediately begin to rotate again and rewind the power-storage device or weight 31 until the same approaches the limit of its upward movement, when the short chain 53 will be again drawn taut, thereby operating the cam-plate and its connections, and the brake-shoe will again be applied to the brake-wheel and interrupt the movement of said propeller in the manner previously described.

I do not limit myself to the exact details of construction herein shown and described, as it is obvious that the same may be varied within the limits of skill possessed by ordinary workmen.

The face of the brake-shoe 34 should be provided with a strip of rubber 62 or like material, and the periphery of the brake-wheel 17 should be provided with a rubber face for the purpose of increasing the efficiency of the frictional contact between said parts.

What I claim is—

1. The improved motor for actuating self-winding clocks, &c., comprising a propeller adapted to be driven by a current of air ascending in a chimney or stack, a speed-reducing train of gearing connected to said propeller, a brake-wheel 17 connected to said propeller, the drive-wheel of a clock, an endless chain mounted upon said drive-wheel and connecting the same to the said train of gearing, a power-storing device such as a weight, a roller connecting said power-storing device to such endless chain, a cam-plate 45 mounted to rock in a plane below said power-storing device, an arm 52 projecting from said cam-plate, a chain 53 connecting said arm to said power-storing device, a vertical brake-lever 41 pivoted intermediate of its ends and having a roller 43 at its lower end adapted to be engaged by said cam-plate to oscillate said lever, a brake-shoe 34 adapted for forcible contact with said brake-wheel, and suitable

connections between the upper end of said brake-lever and the said brake-shoe, whereby said brake-shoe will be forced into contact with or released from said brake-wheel when said cam-plate is rocked, substantially as specified.

2. The improved motor for actuating self-winding clocks, &c., comprising a propeller adapted to be driven by a current of air ascending in a chimney or stack, a speed-reducing train of gearing connected to said propeller, a brake-wheel 17 connected to said propeller, the drive-wheel of a clock, an endless chain mounted upon said drive-wheel and connecting the same to the said train of gearing, a power-storing device such as a weight, a roller connecting said power-storing device to such endless chain, a cam-plate 45 mounted to rock in a plane below said power-storing device, an arm 52 projecting from said cam-plate, a chain 53 connecting said arm to said power-storing device, a vertical brake-lever 41 pivoted intermediate of its ends and having a roller 43 at its lower end adapted to be engaged by said cam-plate to oscillate said lever, a brake-shoe 34 adapted for forcible contact with said brake-wheel, suitable connections between the upper end of said brake-lever and the said brake-shoe, whereby said brake-shoe will be forced into contact with or released from said brake-wheel when said cam-plate is rocked, an arm 49 connected to said cam-plate and projecting opposite said arm 52, a counterbalance-weight 48 applied to said arm 49, and an additional arm 50 also connected to said cam-plate and provided with a curved contact-finger 51, which latter is adapted to engage said brake-lever, substantially as specified.

3. The improved motor for actuating self-winding clocks, &c., comprising a propeller adapted to be driven by a current of air ascending in a chimney or stack, a speed-reducing train of gearing connected to said propeller, a brake-wheel 17 connected to said propeller, the drive-wheel of a clock, an endless chain mounted upon said drive-wheel and connecting the same to the said train of gearing, a power-storing device such as a weight, a roller connecting said power-storing device to such endless chain, a cam-plate 45 mounted to rock in a plane below said power-storing device, an arm 52 projecting from said cam-plate, a chain 53 connecting said arm to said power-storing device, a vertical brake-lever 41 pivoted intermediate of its ends and having a roller 43 at its lower end adapted to be engaged by said cam-plate to oscillate said lever, a brake-shoe 34 adapted for forcible contact with said brake-wheel, suitable connections between the upper end of said brake-lever and the said brake-shoe, whereby said brake-shoe will be forced into contact with or released from said brake-wheel when said cam-plate is rocked, an arm 49 connected to said cam-plate and projecting opposite said arm 52, a counterbalance-weight 48 applied to said arm 49, an additional arm 50 also connected to said cam-plate and provided with a curved contact-finger 51, which latter is adapted to engage said brake-lever, and a yielding retaining-cam 55 having a V-shaped contact-surface which is engaged by said brake-lever to retain the same in either of two positions, substantially as specified.

In testimony whereof I have signed my name to this specification in presence of two subscribing witnesses.

JULIUS O. F. THOSS.

Witnesses:

ALFRED A. EICKS,

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