(No Model.) 2 Sheets—Sheet 1.

J. HUNT.

MECHANICAL MOVEMENT.

No. 402,018. Patented Apr. 23, 1889.

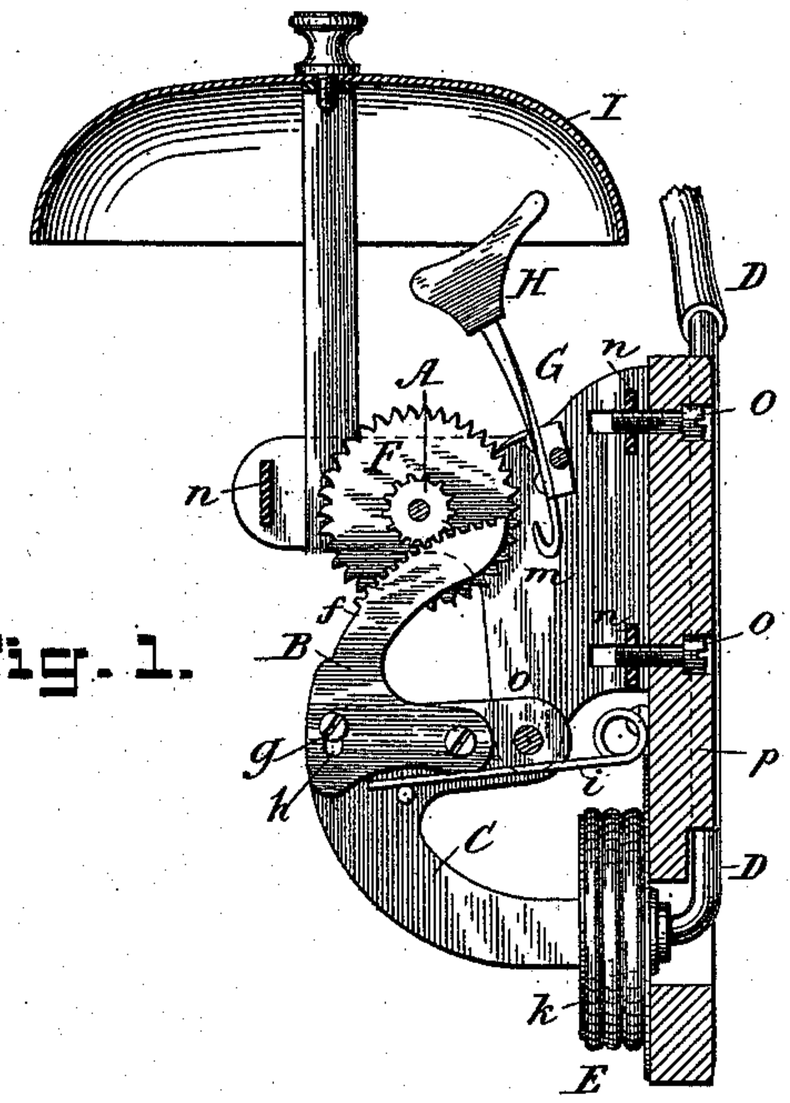


Fig. 1.

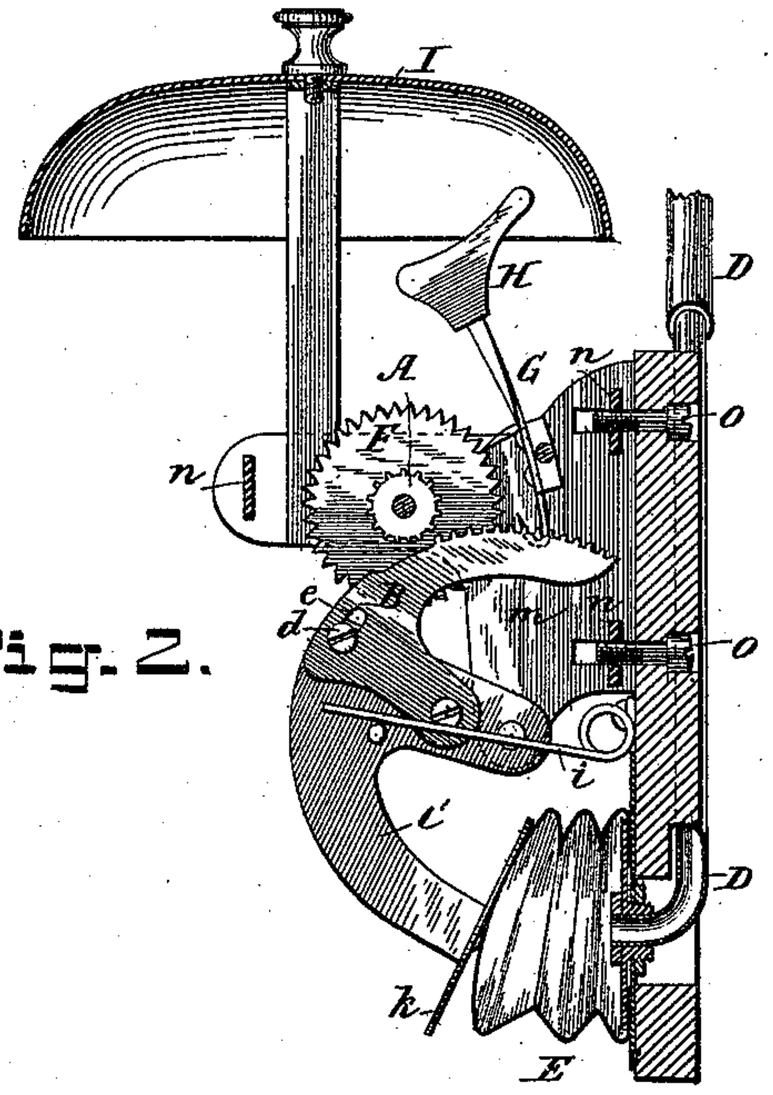


Fig. 2.

Fig. 3.

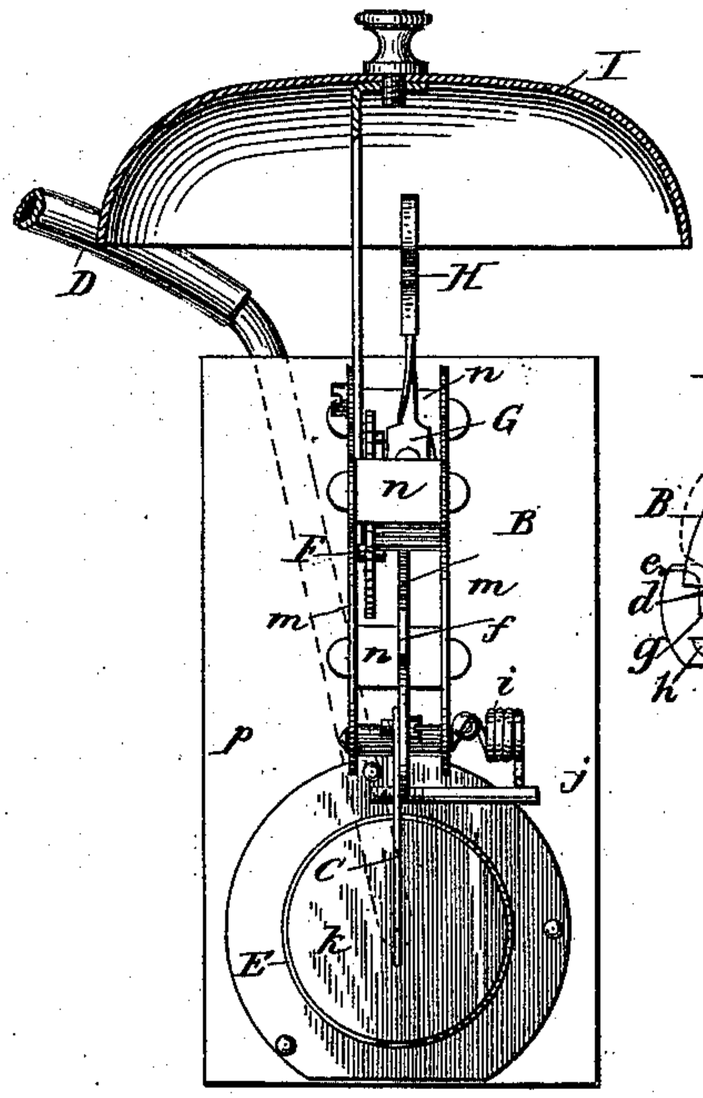


Fig. 6.

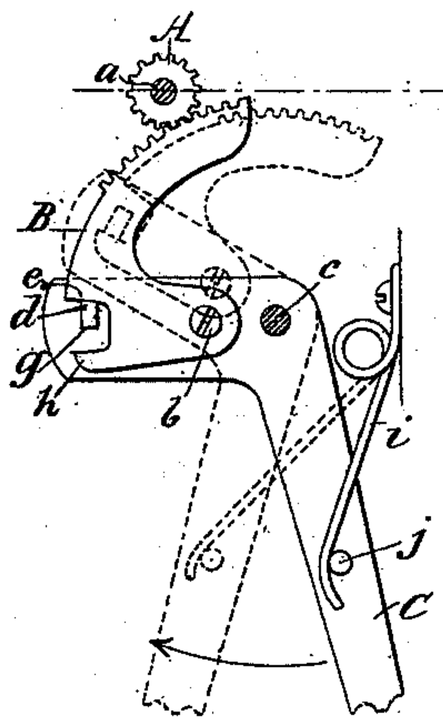
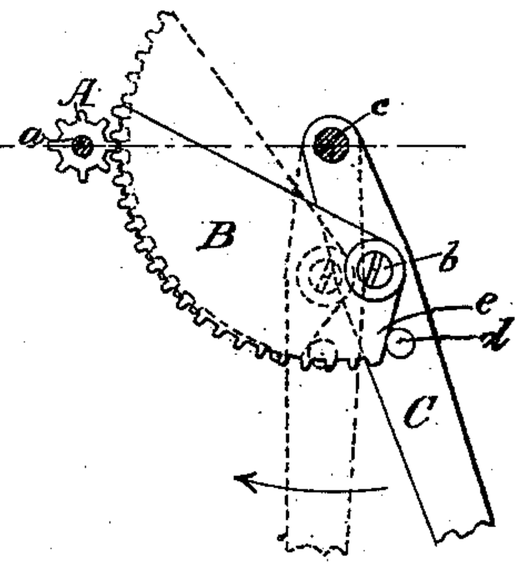


Fig. 7.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 5.

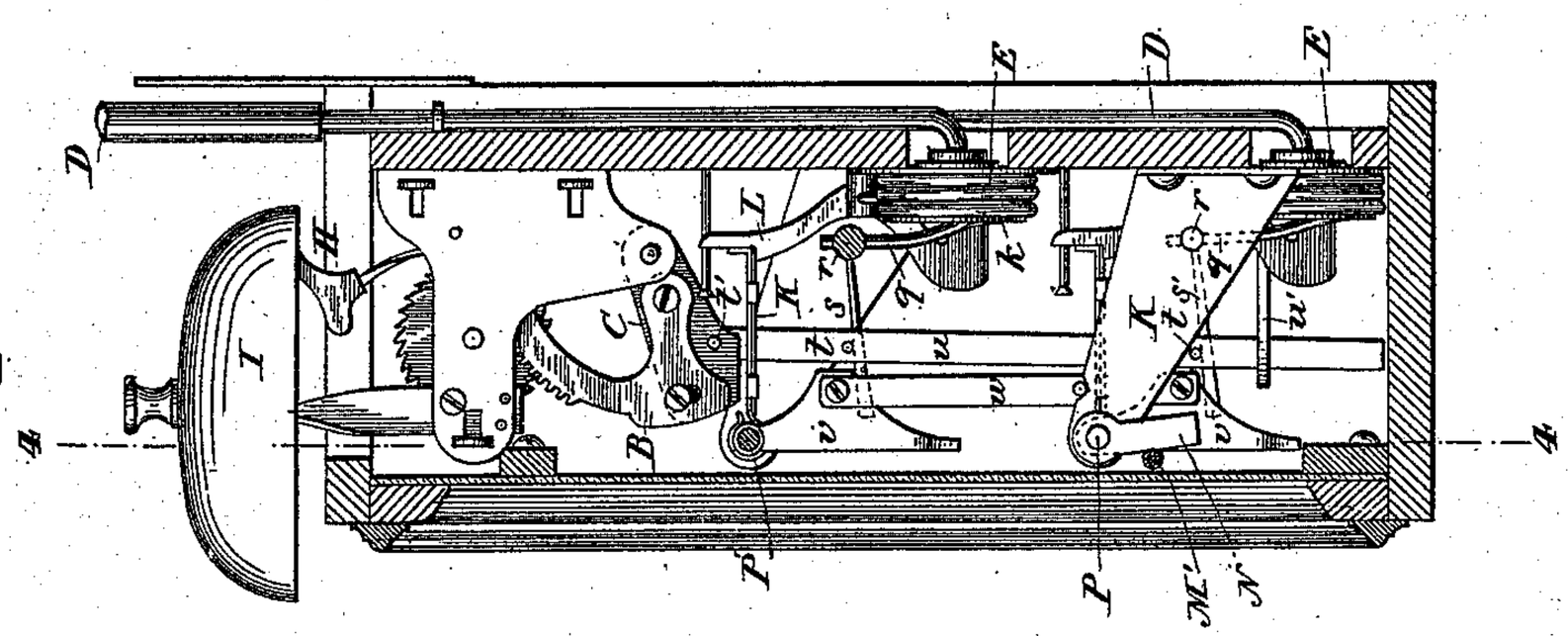
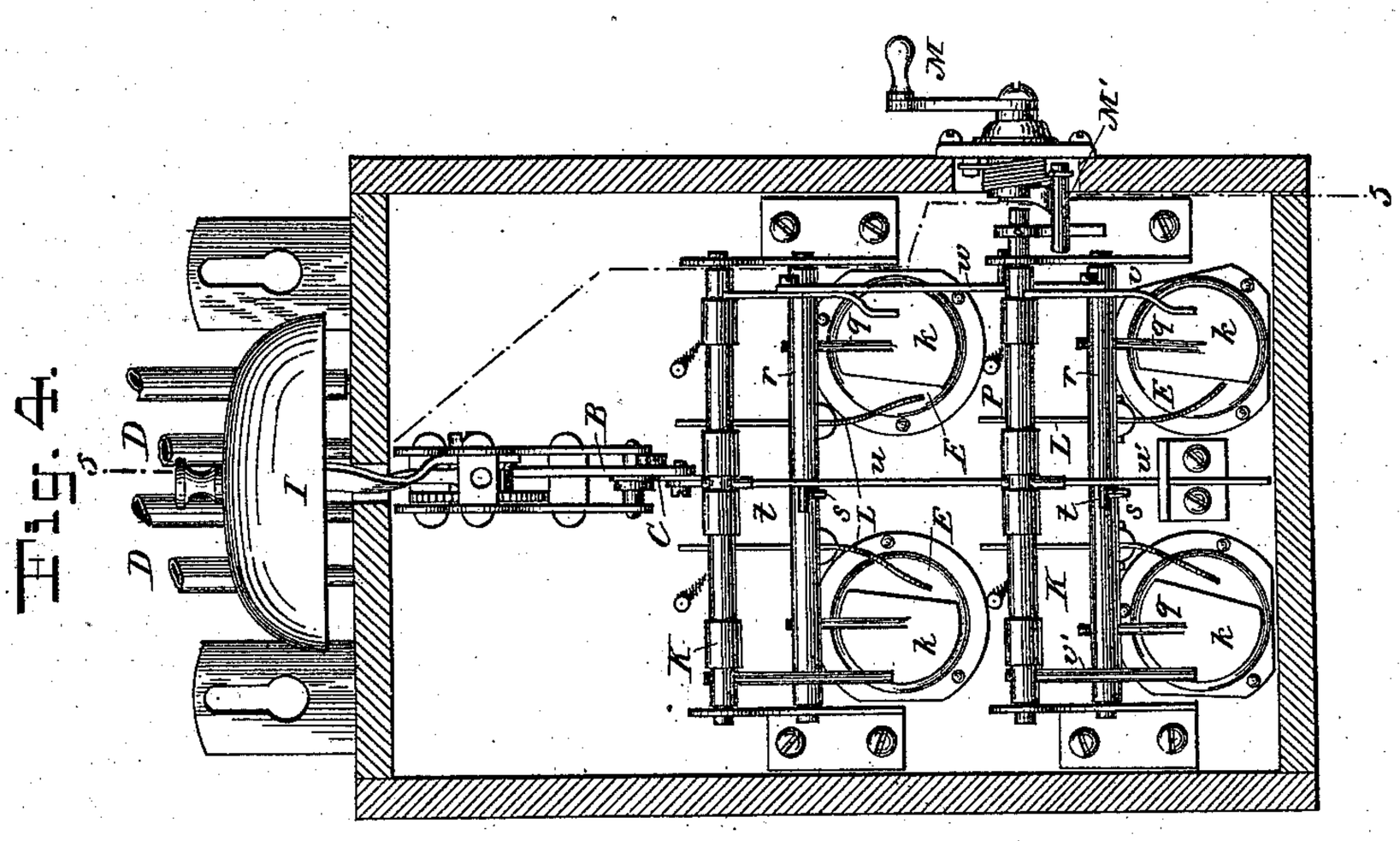


Fig. 4.



WITNESSES:
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INVENTOR:
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UNITED STATES PATENT OFFICE.

JOHN HUNT, OF NEW YORK, N. Y.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 402,018, dated April 23, 1889.

Application filed August 24, 1888. Serial No. 283,634. (No model.)

To all whom it may concern:

Be it known that I, JOHN HUNT, of New York city, county and State of New York, have invented certain new and useful Improvements in Mechanical Movements, of which the following is a specification.

This invention relates to mechanical movements of that character wherein reciprocatory movement of one part is converted into rotary movement of another, this conversion taking place only during the forward movement of the reciprocating part, the two parts being virtually disconnected during the backward movement. Ratchet-and-pawl movements are of this class, as are also rack-and-pinion movements in which the pinion is provided with a ratchet which disconnects it from the parts driven through it during the backward movement of the rack.

My invention relates particularly to those movements wherein a pinion has rotary motion imparted to it by the angular motion of a toothed sector. Such movements have been used for driving a vibratory escapement for ringing bells or annunciators as a substitute for rheotomic electric bells. For such purposes the escapement-wheel has been connected through a ratchet and pawl with a pinion meshing with a toothed sector oscillated by means of a bellows in pneumatic annunciators, or by the application of mechanical power in some other way. In order to enable the ratchet and pawl to be dispensed with, such annunciator movements have been constructed wherein the sector is pivoted eccentrically to a carrying-lever which turns around an axis concentric with the sector-teeth when the sector is in mesh with the pinion and having a stop which at such time is in contact with the sector. With this movement the power applied to the carrying-lever is transmitted through the stop to the sector, which consequently turns around the axis of the carrying-lever, and being in mesh with the pinion imparts rotary motion thereto; but on the back-stroke of the carrying-lever the sector disengages itself from the pinion by turning on its eccentric pivot.

My invention provides an improvement upon the sector movement last described.

My improved mechanical movement is applicable to a great variety of purposes, among which I have selected a vibratory bell-striking mechanism—such as is used in pneumatic annunciators—as an application which well illustrates its operation and advantages.

Figure 1 is a side elevation, partly in vertical mid-section, of such a bell-ringing device to which my invention is applied. Fig. 2 is a similar view to Fig. 1, showing the parts in a different position. Fig. 3 is a front elevation of the device shown in Figs. 1 and 2, except that the bell is in mid-section. Fig. 4 is a front elevation of a visual indicating pneumatic annunciator to which my invention is applied, the inclosing-case being in vertical section cut in the plane of the line 4 4 in Fig. 5. Fig. 5 is a side elevation of the apparatus shown in Fig. 4, the inclosing-case and part of the mechanism being in vertical section, cut approximately in the directions indicated by line 5 5 in Fig. 4. Fig. 6 is an elevation of the essential parts of my improved mechanical movement; and Fig. 7 is a similar view to Fig. 6, showing the prior construction on which my invention is an improvement.

Referring to the drawings, let A designate the pinion to which rotative motion is to be imparted; B, the sector gearing therewith, and C the lever carrying the sector and to which motion is imparted in order to rotate the pinion.

The carrying-lever C is pivoted at *c* on an axis concentric with the pitch-line of the gear-teeth of the sector B. The sector B is pivoted at *b* to the lever C on an axis eccentric to the pitch-line of its gear-teeth. The lever C is formed with a stop or shoulder, *d*, which during the driving movement abuts against a stop or shoulder, *e*, on the sector B, and prevents the latter from being thrust or wedged against the pinion, or, in other words, holds the sector with its gear-teeth concentric with the axis *c*.

Thus far this description applies equally well to my improved movement and to the prior construction shown in Fig. 7. Referring to that figure, however, it is seen that the axis *c* of the carrying-lever is arranged on a level with the axis *a* of the pinion; also, that the axis *b* is arranged on a lower level than

the axes *a* and *c*. It results from this arrangement that the weight of the sector B tends to press with considerable force against the pinion A, so that after the lever C has been moved to the left, as indicated by the arrow, in order to impart rotary motion to the pinion, the weight of the sector will continue to hold it against the pinion, although the continued rotation of the latter may press it back, and that consequently the action will be analogous to that of a ratchet and pawl in so far as the tendency to retard the continued rotation of the pinion is concerned, except that by reason of the weight of the sector being much greater than that ordinarily given to a pawl this retarding tendency will be correspondingly greater. It will also be observed that the farther the lever C is moved the nearer the axis *b* will approach to a direct line between the axes *a* and *c*, and consequently the greater will be the tendency of the respective gear-teeth to remain in mesh and the greater will be the resistance to the freeing of the segment from the pinion.

According to my invention, as will best be understood by an examination of Fig. 6, the axis *c* is arranged at a considerably lower level than the axis *a*, and the axis *b* is arranged approximately on a level with the axis *c*. It follows from this that the movement imparted by the lever to the sector is first upwardly, instead of being first laterally, as in the former construction, and that the continuation of this movement quickly carries the sector to a point where its own weight tends to throw it away from the pinion, so that it shall clear the latter, this being due to the shifting of the center of gravity of the sector from the left, as it is at starting, to the right of a vertical line drawn through the axis *b*.

I also make the sector B with a space, *f*, denuded of teeth, this space being so arranged that when the sector, on being thrown up, reaches the position where it tends to fall back and free itself from the pinion, its teeth have already passed and cleared the pinion-teeth and the pinion is at the space *f*, so that it may freely revolve without contact with the teeth, and so that if the pinion shall come immediately to a stop that fact will not prevent the falling away of the sector. Although the center of gravity of the sector may pass over the axis *b* before the last teeth of the sector free themselves from the pinion, yet so long as any pressure is transmitted through the lever C the sector will remain in mesh with the pinion, because the thrust due to this pressure and transmitted through the eccentric axis *b* will be greater than the slight tendency, due to the weight of the sector, to throw it out of mesh. The action of the stops or shoulders *d e* is the same in the devices shown in both Figs. 6 and 7.

In order to properly limit the retractile motion of the sector and provide a means for drawing it back to its initial position without too much lost motion, I provide reciprocal shoulders *g* and *h* on the carrying-lever and sector, respectively, which shoulders or stops abut upon the falling back of the sector far enough to clear its gear-teeth from the pinion, as clearly shown in Fig. 2, and on the quick return-stroke of the lever C serve to pull back the sector. So long as this return-stroke is quicker than the velocity at which the sector tends to fall after its center of gravity passes to the left of its pivotal axis *b* the shoulders *g h* will remain in contact until the lever C reaches its normal position and stops, whereupon the sector, continuing its motion, brings the shoulders *d* and *e* into contact. These shoulders are more clearly shown in Fig. 6 than in the actual construction shown in the preceding figures.

My improved mechanical movement obviates all the disadvantages of its predecessor, being free from the clicking heard on the return-stroke, by reason of the sector in Fig. 7 being dragged tooth by tooth over the pinion, being freed also from undue lost motion, and being further adapted to impart a rapid motion to the pinion A, which motion may be continued while the sector remains at its greatest displacement and during the return-stroke.

In practice I construct the several stops *d e g h* by means of a slot in the sector *b* and a screw entering it and tightly screwed into the lever C, free space being left beneath the head of the screw for the easy movement of the parts B and C upon one another for a length equal to the lost motion in the slot. The head of the screw serves to keep the sector B parallel with the lever C at this point, guiding them relatively in the direction toward and from one another. The lever C and sector B are best made by being cut or stamped from comparatively thin plate metal, as shown in Fig. 3. I also provide a spring, *i*, for quickly pressing back the lever C, this spring being fastened to some fixed part and pressing upon a pin, *j*, or other provision on the lever C.

In Figs. 1, 2, and 3 I have illustrated the preferred and one of the most useful applications of my invention—viz., to a pneumatic bell-ringing device. The air compressed in a tube, D, enters and expands a bellows, E, (shown in section in Fig. 2,) and this bellows in expanding presses against a plate or disk, *k*, fixed on the end of the lever C, thereby displacing this lever and imparting motion to the sector B, which, being in mesh with the pinion A, rotates the latter and consequently turns also the escapement-wheel F, which is fixed on the pinion-axis, and the teeth of which in turning vibrate the anchor G, to which the hammer H is fastened, thereby causing this hammer to vibrate and rapidly strike the bell I. The moving parts are mounted between two plates, *m m*, which are

tied together at intervals by tie-pieces *n n*, and are fastened against a back-board, *p*, by screws *o o* entering these tie-pieces. These features of construction, however, are common, the only novelty in this bell-ringing mechanism consisting in the application thereto of my improved mechanical movement.

Figs. 4 and 5 show a pneumatic annunciator to which my invention is applied. The bell-ringing device is the same as that shown in the previous figures, except that it is to be operated from any one of several bellows, E E, instead of from one special bellows. The bellows E E are suitably arranged in order to act upon the indicator tablets or drops K K, which are held up by detents L L, which are displaced by the expansion of the bellows. Thus the expansion of any one of the bellows not only displaces its own detent L and drops its own tablet or drop K, but also rings the bell, which is common to all the bellows and which is operated from either bellows through the medium of a disk, *k*, resting against the bellows and mounted on an arm, *q*, fixed to a rock-shaft, *r*, from which shaft projects forwardly an arm, *s*, which takes under a pin or shoulder, *t*, projecting from a vertically-sliding rod, *u*, guided beneath at *u'* and loosely pivoted at its upper end at *t'* to the carrying-lever C. One shaft *r* serves for as many bellows as there may be in one horizontal tier, and there may be as many horizontal tiers as are desired, the vertical rod *u* being extended past them all and having as many projecting pins *t* as there are tiers, with arms *s* to take under and lift the pins. Thus the expansion of any one of the bellows will push up the rod *u*, thereby communicating motion to the lever C of my mechanical movement, which results in the ringing of the bell.

The indicator shown in Figs. 4 and 5 is substantially similar to that shown in Figs. 9 and 10 of the patent of C. E. Zimdars, dated December 2, 1879, No. 222,343, to which reference is made for a more complete description. In the construction shown the drop-tablets are raised by pulling forward on a crank, M, the arm M' of which inside the casing acts upon a crank-arm, N, on the shaft P, on which the lower tablets are hung, and which shaft carries arms *v* and *v'*, which in swinging up lift the drop-tablets until they are caught by the detents L. When the indicator consists of more than one tier, motion is communicated from the arm *v* of the shaft P to the arm *v'* of the next shaft P', above it, (or beneath, as the case may be,) through the medium of a rod, *w*.

I claim as my invention the following-defined novel features and combinations, viz:

1. The combination of a pinion, a carrying-lever pivoted on an axis below the axis of the pinion, and a sector having teeth normally concentric with said axis and engaging said pinion, and said sector eccentrically pivoted to said lever on an axis normally to one side of said lever-axis, and which ascends as the lever is moved, whereby when the lever is moved to communicate rotation through the sector to the pinion the sector is caused to readily free itself by gravity at the completion of its active movement.

2. The combination of a pinion, a carrying-lever pivoted on a relatively-fixed axis, and a toothed sector having teeth normally concentric with said axis and engaging said pinion, said sector pivoted eccentrically to said carrying-lever at a point normally to one side of the center of gravity of the sector, so that its weight holds it in mesh with said pinion, but which point in the movement of the carrying-lever passes to the opposite side of said center of gravity, so that the sector falls out of mesh with the pinion, and said sector having a toothless space, *f*, to enable it to thus fall out of mesh and free itself from the pinion independently of the continued rotation of the latter.

3. The combination of a pinion, a carrying-lever pivoted on a relatively-fixed axis, and a toothed sector having teeth normally concentric with said axis and engaging said pinion, said sector pivoted eccentrically to said carrying-lever at a point normally to one side of the center of gravity of the sector, so that its weight holds it in mesh with said pinion, but which point in the movement of the carrying-lever passes to the opposite side of said center of gravity, so that the sector falls out of mesh with the pinion, and said lever and sector having reciprocal shoulders arranged to limit the disengaging movement of the sector and as the lever is returned to draw back the sector.

4. The combination of a pinion, a carrying-lever pivoted on a relatively-fixed axis, and a toothed sector having teeth normally concentric with said axis and engaging said pinion, said sector pivoted eccentrically to said carrying-lever at a point normally to one side of the center of gravity of the sector, so that its weight holds it in mesh with said pinion, but which point in the movement of the carrying-lever passes to the opposite side of said center of gravity, so that the sector falls out of mesh with the pinion, and said lever and sector having reciprocal shoulders, consisting of the walls of a slot formed in one part and a screw fixed to the other part entering said slot and having an overhanging head, serving to hold the two parts together, while limiting their relative movement.

5. The combination of a pinion, a carrying-lever pivoted on a relatively-fixed axis, and a toothed sector having teeth normally concentric with said axis and engaging said pinion, said sector pivoted eccentrically to said carrying-lever at a point normally to one side of the center of gravity of the sector, so that its weight holds it in mesh with said pinion,

but which point in the movement of the carrying-lever passes to the opposite side of said center of gravity, so that the sector falls out of mesh with the pinion, and a spring arranged to exert a retractile tension against said carrying-lever.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN HUNT.

Witnesses:
GEORGE H. FRASER,
CHARLES K. FRASER.