No. 702,684. Patented June 17, 1902.

A. VAN WAGENEN.

RATCHET MECHANISM.

(Application filed Aug. 15, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

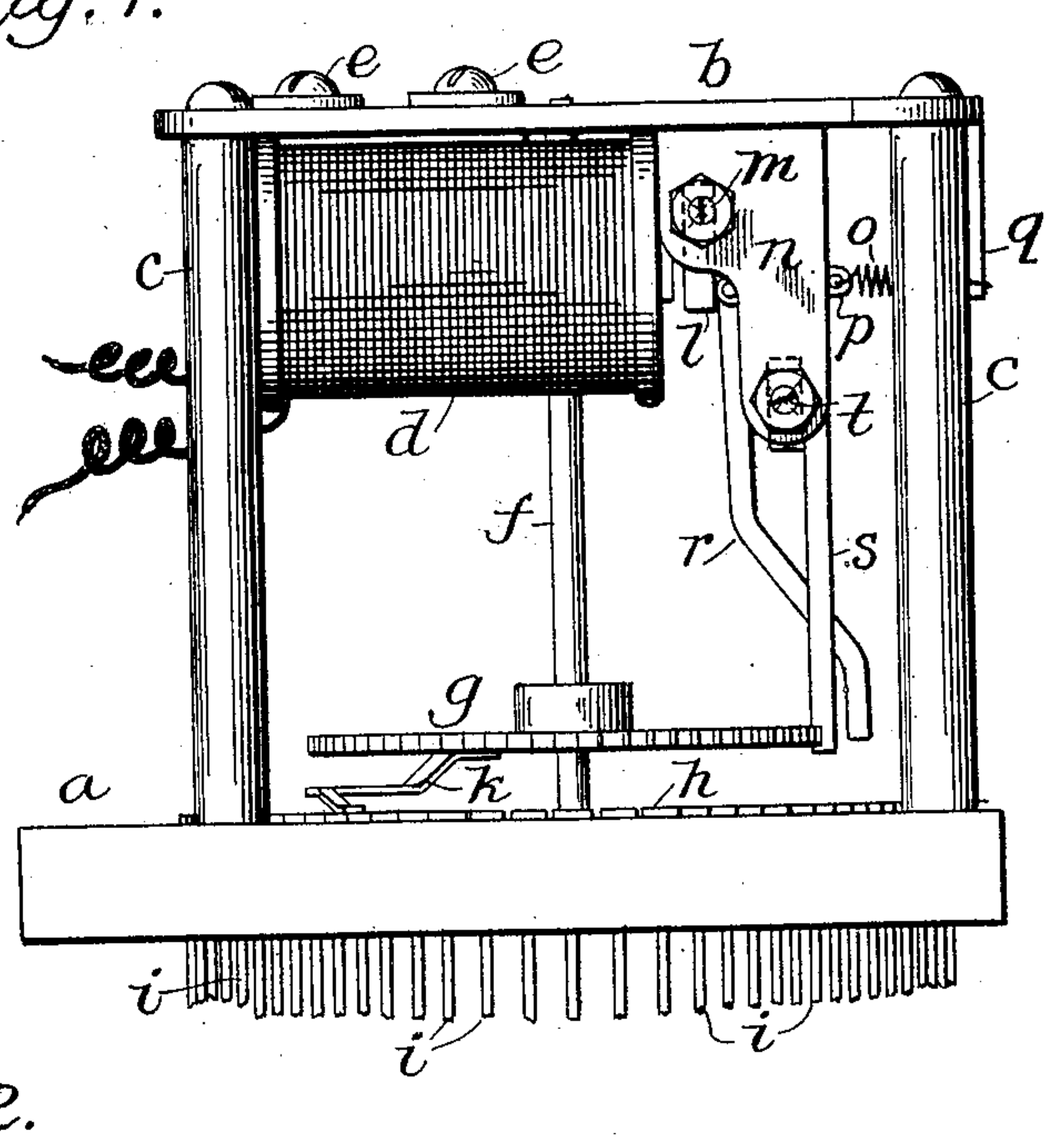

Fig. 2.

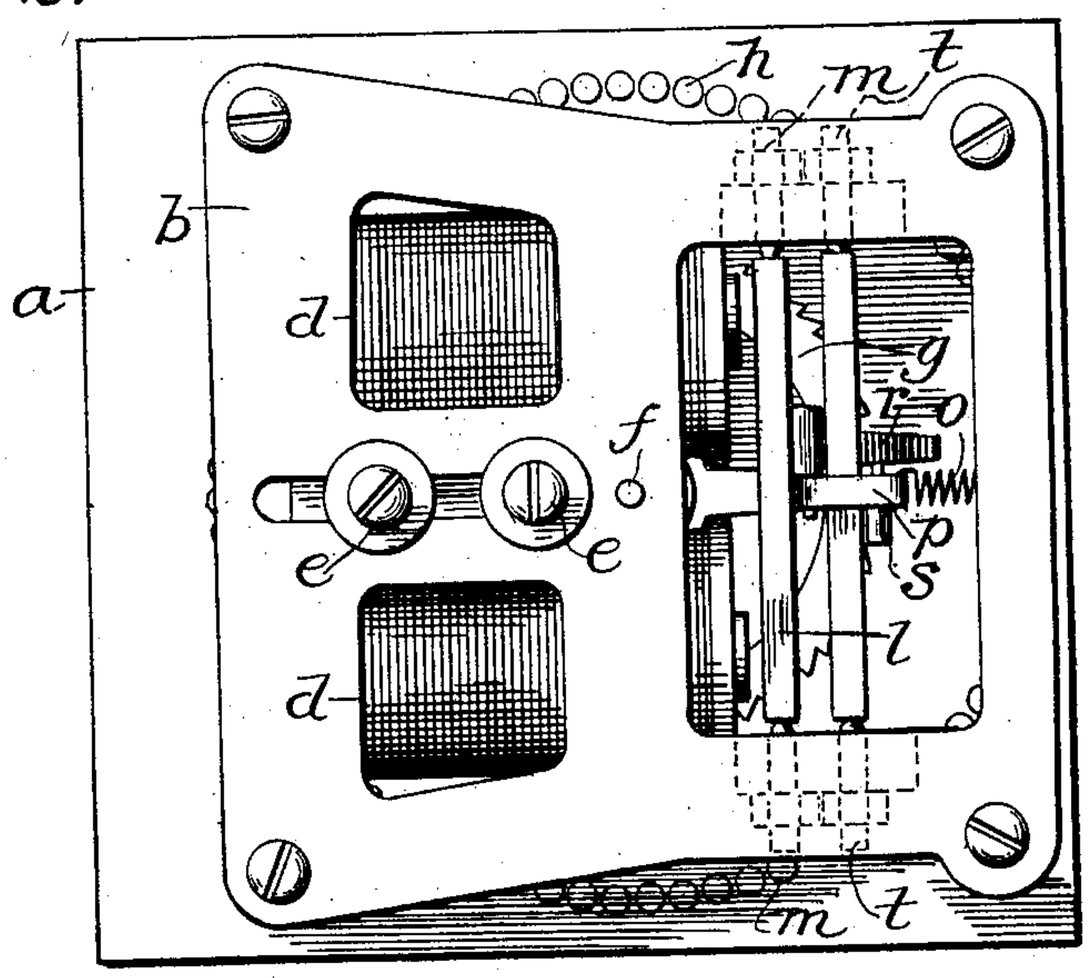

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Fig. 3.

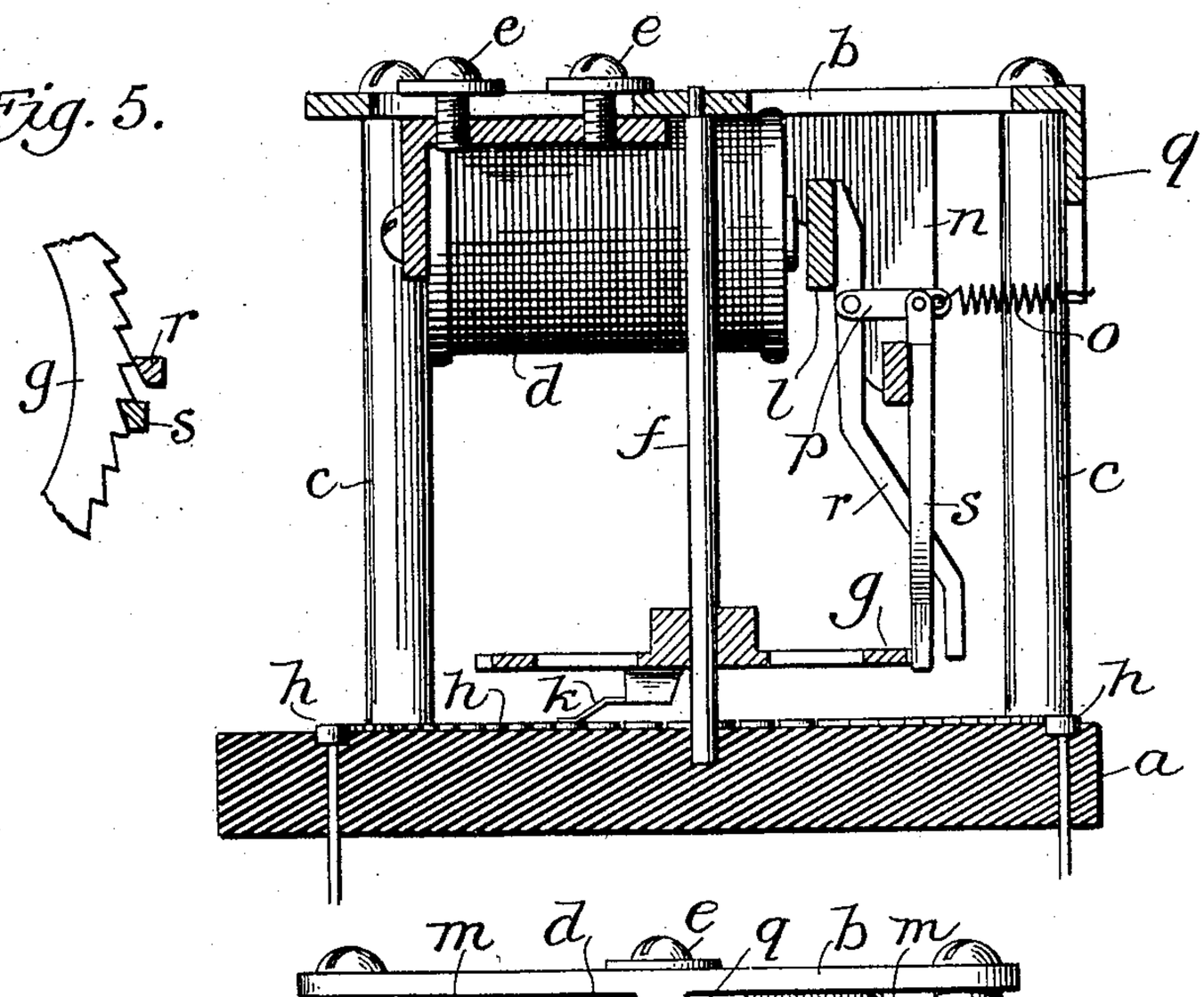
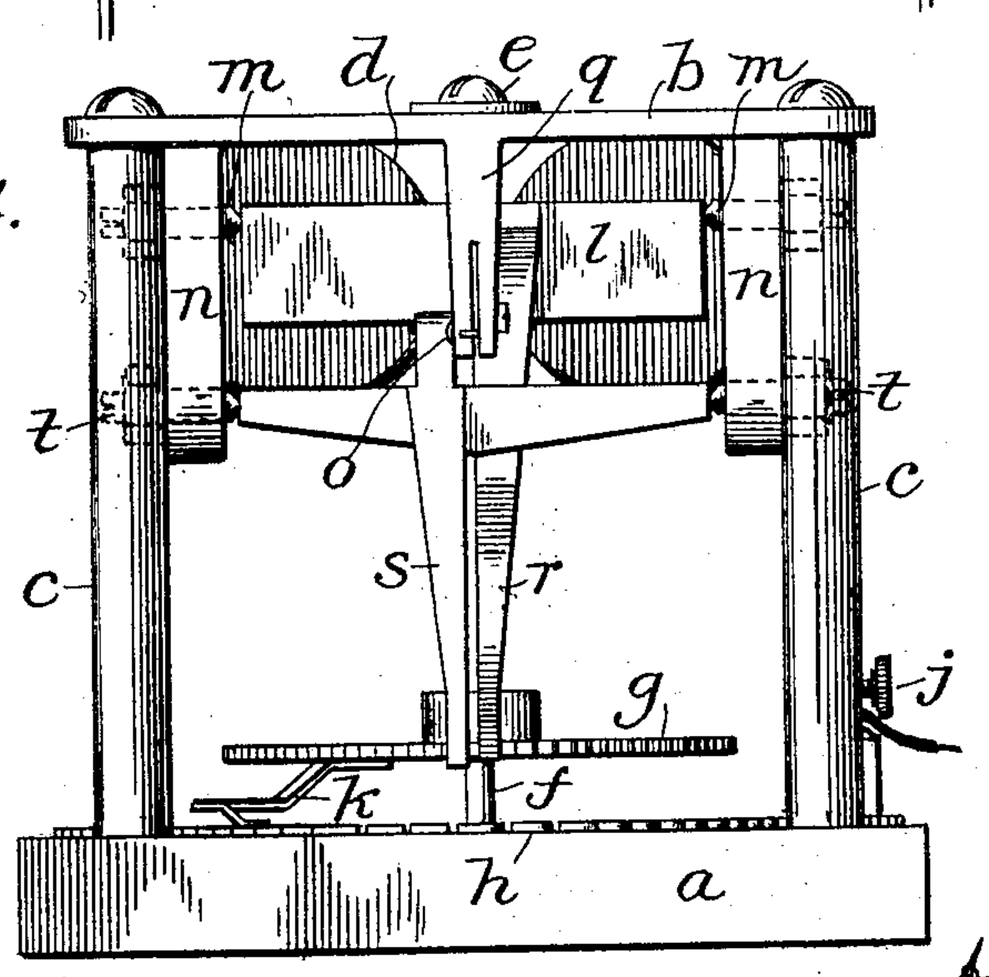


Fig. 5.

Fig. 4.



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ANTHONY VAN WAGENEN, OF SIOUX CITY, IOWA.

RATCHET MECHANISM.

SPECIFICATION forming part of Letters Patent No. 702,684, dated June 17, 1902.

Application filed August 15, 1901. Serial No. 72,203. (No model.)

To all whom it may concern:

Be it known that I, ANTHONY VAN WAGENEN, a citizen of the United States, residing at Sioux City, in the county of Woodbury and State of Iowa, have invented certain new and useful Improvements in Ratchet Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in ratchet mechanism, and more particularly to electrical ratchet or "step-by-step" mechanism as employed in the central-station switches of automatic telephone systems and the like for driving the contact-arms of such switches.

My invention consists in the novel arrangement of pawls and operating devices therefor, in the novel means employed for adjusting laterally the positions of the pawls, and generally in the novel combination, construction, and arrangement of the parts.

In automatic telephone systems it is customary to employ at the central station a series of automatic switches corresponding to the several subscribers' stations and each adapted to connect its own service-line with the service-line of any other subscriber's station of the system and to operate the central-station switches by calling transmitters at the subscribers' stations, each such transmitter being connected by a switching-circuit with its corresponding central-station switch and being arranged ordinarily to operate its central-station switch by successively completing and then breaking the switching-circuit, the number of current impulses thus produced in the switching-circuit determining the position to which a contact arm or member of the switch is moved, and therefore determining the connection made. The central-station switch therefore consists usually of a ratchet-wheel carrying a contact arm or brush adapted to make contact successively with a plurality of contact-pieces, each connected to one of the service-lines of the system, and pawls operated by an electromagnet for moving the ratchet-wheel forward one tooth each time the switching-circuit is completed and then broken, and two such pawls are customarily employed, one acting to move the ratchet-wheel forward through the space of half a tooth when the circuit of the magnet is completed, the other operating to move the ratchet-wheel forward through another space of half a tooth when the circuit of the magnet is broken and each pawl acting to prevent the ratchet-wheel from overrunning. As such switches have been constructed in the past the two pawls have usually been placed on opposite sides of the ratchet-wheel, and when this is the case accidental irregularity in the spacing of the teeth of the ratchet-wheel sometimes results in the switch losing step with the transmitting instrument, particularly when operated at high speed. Also the pawls have not been adjustable in position laterally and independently by simple means.

The objects of my invention are to increase the speed of operation of ratchet mechanisms such as described, to avoid loss of step of the mechanism with respect to its actuating instrument, to render the pawls susceptible of ready adjustment laterally, and generally to make the mechanism compact, simple, durable, free from liability to derangement, and comparatively inexpensive. These objects are attained in the ratchet mechanism herein described, and illustrated in the drawings which accompany and form a part of this specification, in which—

Figure 1 is a side view of a central-station switch embodying my invention. Fig. 2 is an end view of the same. Fig. 3 is a transverse section of the same on a plane parallel to that of Fig. 1. Fig. 4 is a front view of the switch, and Fig. 5 is a detail view of the ratchet-wheel and pawls.

In the drawings reference-letter *a* designates a base, which preferably is formed of insulating material, and *b* a top plate, the two being connected by pillars *c*. From plate *b* the magnet *d* is supported by means of screws *e*, located within a slot, which slot permits adjustment of the distance between the magnet and its armature.

Letter *f* designates a shaft, revolubly mounted, carrying a ratchet-wheel *g*. The base *a* is provided with a number of contact-pieces *h*, arranged in circular order beneath the wheel *g*, corresponding in number to the num-

ber of teeth of said wheel and each connected to a conductor *i*, projecting through the base *a*, to which conductors *i* the several telephone-service wires of the system may be connected. The service-wire of the station to which the switch corresponds may be connected to any portion of the metallic frame of the switch—as, for instance, to one of the pillars *c*, which may be provided with a binding-screw *j* for the purpose. Such service-wire, being connected to the frame of the instrument, is in permanent electrical connection with a contact arm or brush *k*, carried by ratchet-wheel *g* and adapted to sweep over and successively make contact with the several contact-pieces *h* as said ratchet-wheel revolves.

The armature *l* of the magnet is pivotally supported by trunnion-screws *m*, mounted in brackets *n*, forming part of the top plate *b*, and the retractile spring *o*, connected at one end to a link *p*, hereinafter mentioned, and, itself connected to the armature, is connected at the other end to a bracket *q*, likewise forming part of plate *b*. The armature *l* carries a pawl *r*, the end of which is beveled to correspond with the angle of the faces of the ratchet-teeth, as indicated in Fig. 5. Another similar pawl *s*, supported by trunnion-screws *t*, mounted in the brackets *n*, is connected by the link *p* at a point above its pivotal axis with the pawl *r*, at a point below the pivotal axis of the latter, and has its lower end beveled like the lower end of pawl *r*. Because of the manner in which these pawls are attached to the link *p* they work oppositely, pawl *r* moving the wheel when the armature moves toward the poles of the magnet and pawl *s* moving the wheel when the armature retreats from the poles of the magnet. The pawls are arranged each to move the wheel through the space of half a tooth during each operation, each current impulse in the circuit of the magnet therefore resulting in the contact-arm *k* being advanced through the space of half a tooth. As one pawl is disengaged from wheel *g* the other engages therewith, and each pawl when in engagement with the wheel prevents motion of the wheel through more than a space of half a tooth. Overrunning of the wheel is therefore impossible and the instrument cannot lose step with its circuit-breaker by reason of overrunning.

The pawls are preferably set as close together as possible, the pawls shown in the drawings being separated by a space of one and one-half teeth only. Irregularity in the spacing of teeth on the ratchet-wheel cannot cause the instrument to lose step with its circuit-breaker when the pawls are set so close together, while it may cause the instrument to lose step when the pawls are set more widely apart. Both pawls being trunnioned, they work very smoothly, the more so since the motion of their beveled ends during the time of contact with the ratchet-wheel is substantially parallel with the plane of said wheel, so that no power is lost through friction due to upward motion of the pawls during the time of contact. Since the pawls have independent pivot or trunnion screws, each may be adjusted in position laterally by means of these screws without affecting the adjustment of the other pawl, a matter of importance, since it is essential to perfect operativeness that the pawls shall be adjusted correctly and that the means of adjustment shall be simple and easily operated.

It is obvious that the particular application of my improved ratchet mechanism herein illustrated and described is only one of many uses to which it may be applied; also, that the pawls are not necessarily operated by an electromagnet, since any other device capable of giving a reciprocating motion to one of the pawls (and therefore through the link *p* to the other pawl) is the full equivalent of the magnet; also, if the wheel *g* be driven positively by some means other than the pawls the mechanism forms an escapement the operation of which is controlled by the magnet *d* or other device employed for operating the pawls. The mechanism is also capable of modification in construction and arrangement of parts, and I do not limit myself to the particular construction and arrangement shown and described.

Having thus completely described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a ratchet mechanism, the combination, with a ratchet-wheel revolubly mounted, of two pawls therefor, independently pivoted, and engaging said wheel on the same side thereof, an actuating device for reciprocating one of them, and a connecting device connecting said pawls and arranged to impart motion to that pawl which is not directly driven by the actuating device, and to cause it to reciprocate in opposition to the reciprocation of said first pawl.

2. In a ratchet mechanism, the combination, with a ratchet-wheel revolubly mounted, of two pawls therefor, separate adjustable pivots or trunnions for said pawls, whereby they may be adjusted laterally and independently, an actuating device for reciprocating one of them, and a connecting device connecting said pawls and arranged to impart motion to that pawl which is not directly driven by the actuating device, and to cause it to reciprocate in opposition to the reciprocation of said first pawl.

3. In a ratchet mechanism, the combination, with a ratchet-wheel revolubly mounted, of two pawls therefor, independently pivoted, an actuating device for reciprocating one of them, and a link connected to one pawl at a point between its pivot and the ratchet-wheel, and to the other pawl at a point on the side of the pivot opposite the ratchet-wheel, and adapted to cause the second pawl to reciprocate in opposition to the first.

4. In a ratchet mechanism, the combination, with a ratchet-wheel revolubly mounted, of two pawls therefor, an electromagnet for reciprocating said pawls, an armature carried by one of them, separate pivot-screws for said pawls, whereby they may be adjusted independently in lateral position, a link connected to one pawl at a point between its pivot and the ratchet-wheel, and to the other pawl at a point on the side of the pivot opposite said ratchet-wheel, and a retractile spring.

In testimony whereof I affix my signature in the presence of two witnesses.

ANTHONY VAN WAGENEN.

Witnesses:
F. A. SEIB,
JOHN J. CONNLY.