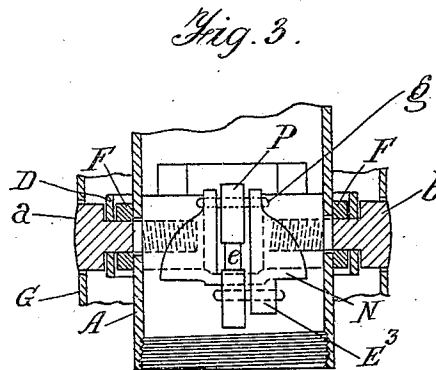
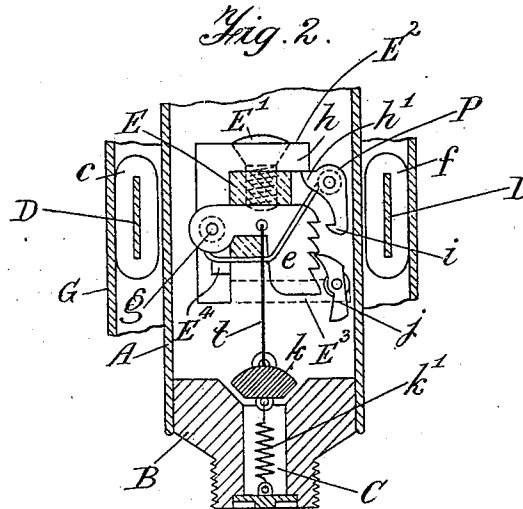
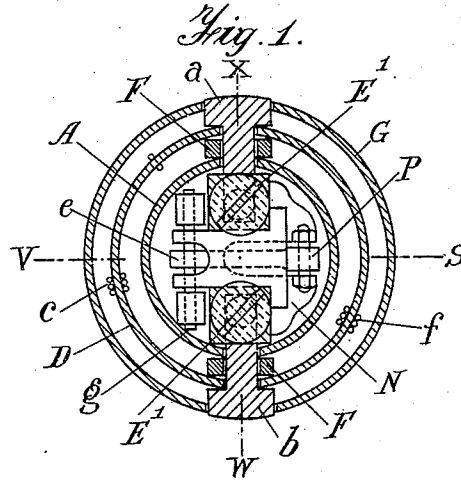


A. GAUDIN & E. TELLIER.
ELECTROMAGNETICALLY OPERATED VALVE.
APPLICATION FILED APR. 23, 1906.

946,344.

Patented Jan. 11, 1910.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

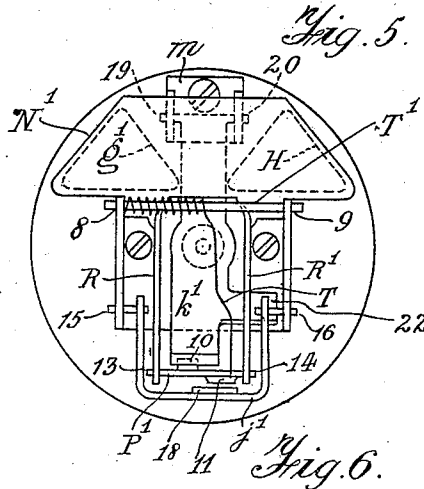
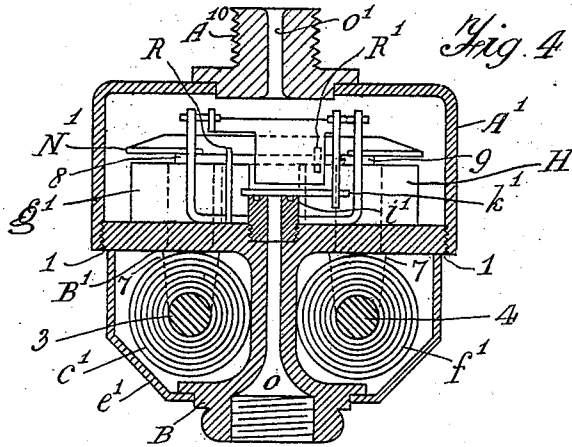


Fig. 8.

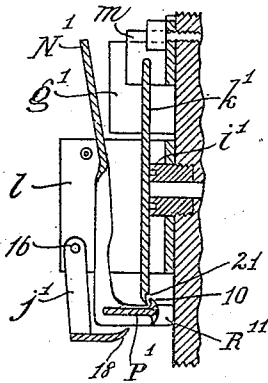


Fig. 6.

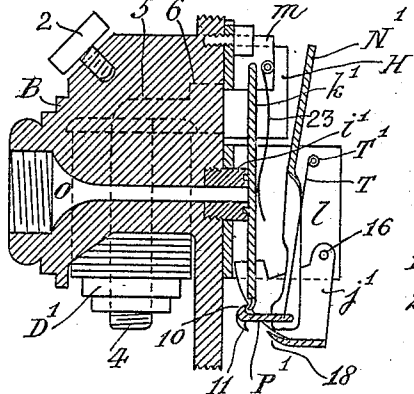
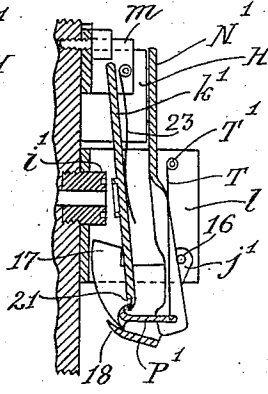


Fig. 7.



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3 SHEETS—SHEET 3.

Fig. 8¹

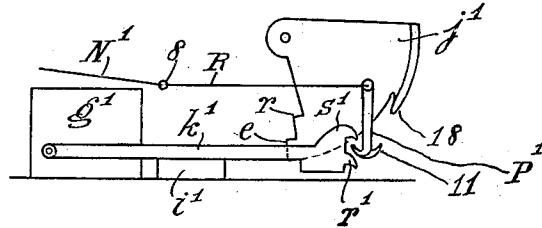


Fig. 9.

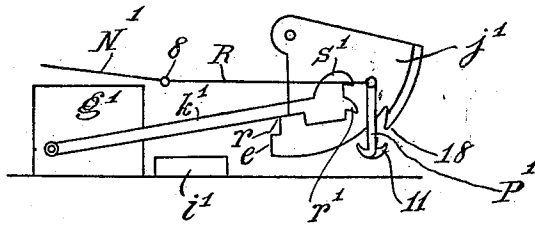


Fig. 10.

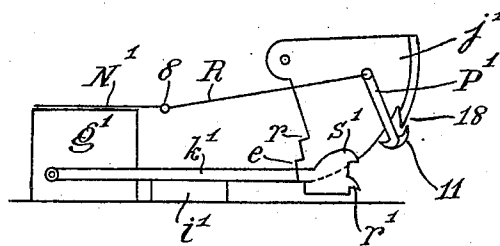


Fig. 12

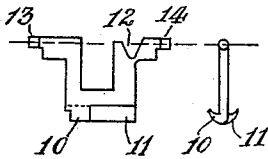
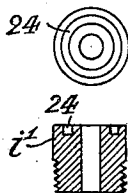


Fig. 11.



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UNITED STATES PATENT OFFICE.

ALBERT GAUDIN AND EDMOND TELLIER, OF DOUAI, FRANCE.

ELECTROMAGNETICALLY-OPERATED VALVE.

946,344.

Specification of Letters Patent.

Patented Jan. 11, 1910.

Application filed April 23, 1906. Serial No. 313,216.

To all whom it may concern:

Be it known that we, ALBERT GAUDIN and EDMOND TELLIER, citizens of the French Republic, residing at Douai, in France, have invented certain new and useful Improvements in Electromagnetically - Operated Valves, of which the following is a specification.

This invention relates to an improved electro-magnetically operated valve more particularly adapted for the purpose of controlling gas-burners and the like from a distance.

The invention is illustrated in the annexed drawing in which—

Figure 1 is a horizontal section of the valve-controlling mechanism, Fig. 2 a vertical section on the line V—S of Fig. 1 with parts broken away and Fig. 3 a vertical section on the line X—W of Fig. 1 with parts removed or broken away. Fig. 4 is a vertical section with parts in elevation, Fig. 5 a plan view and Fig. 6 a vertical section at right angles to Fig. 4 illustrating a modified form of construction. Figs. 7 and 8 are sections on the same plane as Fig. 6 illustrating the armature valve and co-acting parts in different positions, Figs. 8¹ to 10 are diagrams of the aforesaid modified form on an enlarged scale, but showing also a further slight modification. Figs. 11 and 12 are detail views of parts.

The apparatus illustrated in Figs. 1, 2 and 3 comprises an electro-magnet with two coils *c* and *f* and an armature *N* connected with a dog *P* adapted to engage a toothed plate *e* rotatable about an axle *g*, the said plate *e* being connected by a rod *t* with the valve *h* of the gas inlet passage *C*. *A* is a cylindrical casing fastened on the base *B* traversed by the gas passage *C*. *D* is a ring carrying the coils *c* and *f*. *a* and *b* are two screws passed through holes in the ring *D* and in the casing *A* and screwed into a bridge *E*. *F F* are two washers spacing the ring *D* from the casing *A*. The screws *a b* thus serve to secure the ring *D* and the bridge *E* to the casing *A*. *G* is an external casing, broken away in Figs. 2 and 3. To the bridge *E* is secured by screws *E*¹ a forked angle piece *E*² between the legs of which the armature *N* and the plate *e* have pivotal movement independently of each other on the axle *g* which is carried by the legs of the angle piece. The upper end of the angle piece forms a nose *h* for a purpose hereinafter de-

scribed. One of the legs of the angle piece is extended at *E*³ to carry the pivot of the pawl *j*. *E*⁴ is a stop for limiting the downward movement of the armature *N*. The said valve is normally held against its seat by means of a tension spring *h*¹. The armature *N* is adapted to rise when current traverses the coils *c f*, these being so wound that consequent poles are produced. The upward movement of the armature is limited by the pole-pieces of the magnet, and the downward movement by the abutment *E*⁴. When the armature is not attracted, the tooth *i* of the dog *P*, which is attached to the armature, normally engages one of the teeth of the plate *e*, and the subsequent attraction of the armature *N* by the magnet thus causes the said plate to be lifted and rotated about the axle *g* through a certain angle and the valve opened until the projection *h*¹ on the dog *P* abuts against the nose *h* and thus causes the tooth *i* of said dog to be disengaged from tooth of the plate. This position is shown in Fig. 2. The plate *e* is then retained in its elevated position by the pawl *j*. Renewed attraction of the armature by the magnet, after the armature has been allowed to descend in order that the dog *P* may again engage the plate *e*, causes the latter to be rotated into a more elevated position, the movement of the plate and consequently of the valve being again interrupted by the abutment of the pawl *P* against the nose *h*. The opening of the valve thus takes place in a plurality of successive steps. For closing the valve the pawl *j* must be disengaged from the plate *e*. For this purpose the lower part of said plate is so constructed that when the latter has been rotated upward through a certain angle the pawl *j* is thrown out of action by the said lower part, so that the plate *e*, when disengaged from the dog *P*, can fall abruptly to its lowest position, the pawl *j* then returning to its operative position. In this case the arrangement may be such, that the first excitation of the electro-magnet causes the valve *h* to be half opened, the valve being fully opened by the second excitation of the magnet, and closed by the third excitation. Only one switch and one electro-magnet are required for this purpose.

The modified construction illustrated in Figs. 4 to 12 comprises a cover *A*¹ and base *B*¹, the coils *c*¹ and *f*¹, wound on soft iron cores 3 and 4 respectively, being externally

arranged and inclosed in a suitable casing e^1 which engages an annular groove 1 provided in the lower surface of the base B^1 . A screw 2 (Fig. 6) serves to fix the casing e^1 to the base B^1 , the casing e^1 being however omitted in this figure. The mechanism comprises a pivoted armature N^1 to the tail of which is suspended a dog P^1 , and a pivoted valve k^1 adapted to co-act with a seat i^1 . The cores 3 and 4 of the electro-magnet c^1 f^1 are bent upward at 5 and flattened at 6 (Fig. 6), so as to form a shoulder at 7 (Fig. 4); the upper and lower ends of the cores are screw-threaded, the said lower ends being connected with each other by a yoke D^1 , and the upper ends, which pass through the base B^1 , being screwed to triangular pole-pieces g^1 and H respectively. The armature N^1 is rotatable about pivots 8 and 9 and is provided with rearwardly extending arms R and R^1 between which the dog P^1 is suspended by means of pivots or journals 13 and 14. The dog P^1 (Fig. 12) is provided with two hooks 10 and 11 and a notch 12, the latter being engaged by a spring or wire T wound on an axle T^1 in such a manner that it tends to normally retain the armature in its position of rest elevated from the poles of the magnet. j^1 is a bow pivotally supported at 15 and 16 and provided with a hook 17, adapted to engage an arm 22 of the valve k^1 , and also with a projection 18 for a purpose hereinafter described. The armature N^1 , bow j^1 and axle T^1 are all supported by a frame 1. The rearwardly extending arm R of the armature terminates in a vertical prolongation R^{11} which serves as a rest or stop for the armature when in the elevated position, as shown in Fig. 8. The journals 19 and 20 of the valve k^1 have bearing in a support m , and the valve is provided at its lower end with a tooth 21 adapted to coöperate with the aforesaid hook 10 of the dog P^1 . The valve k^1 is normally pressed against its seat i^1 by a spring 23, said seat being provided with an annular groove or grooves 24 adapted to be engaged by a corresponding boss or bosses with which the valve is provided.

In Figs. 6 and 8 the valve is shown closed, the hook 10 of dog P^1 engaging the tooth 21 of the valve. Excitation of the electro-magnet causes the valve to be raised by the dog and to be engaged by hook 17 of the bow j^1 (as in Fig. 7) so that the valve does not return to its seat when the armature is released by the magnet. When the electro-magnet is again excited the hook 11 of dog P^1 engages the projection 18 and the bow j^1 is thus swung outward carrying with it the dog P^1 and the dog is by this means deflected and does not engage the tooth 21 of the valve when the latter is released by the hook 17 being withdrawn from under the arm 22 which is consequent on the outward swing

of the bow j^1 . When so released the valve therefore closes under the action of spring 23. The gas or other fluid flows through the duct o with which the base B is provided and through a duct o^1 in a screw connection A^{10} fixed to the cover A^1 (Fig. 4). The lower end of the duct o is enlarged and screw-threaded as shown in Fig. 6 to allow of connecting the valve with the pipe or other conduit which it is to control.

The diagrams 8¹, 9 and 10 illustrate a modification of the construction shown in Figs. 4 to 8, to provide for opening the valve in successive stages. For this purpose the valve has a plurality of projections s^1 r^1 to be successively engaged by the hook 10 of the dog P^1 upon successive magnetic impulses. The bow j^1 has also successive steps s r in place of the projection 17 designed to hold the valve raised in each of the positions to which the dog P^1 lifts it. On reaching the highest step, the bow j^1 will have swung so far in that upon the next magnetic impulse the hook 11 of dog P^1 engages the projection 18. In other respects the action is the same as described with reference to Figs. 4 to 8.

We do not claim broadly an electrically actuated toothed member adapted to engage another toothed member to successively open and close a valve, with means for retaining said second toothed member against retrograde movement but

What we claim as our invention and desire to secure by Letters Patent of the United States is:—

1. In an electromagnetically operated valve the combination with a valve seat and valve normally spring pressed thereagainst, of an electromagnet, an armature adapted to be attracted thereby, an oscillatory toothed member in direct connection with the valve, a dog in connection with said armature adapted upon each attraction of the armature to engage a tooth of said member and move same through a certain distance to open the valve, an abutment adapted to be engaged by said dog to release same from the toothed member when the latter has completed a predetermined movement, means for retaining said oscillatory toothed member in the position given thereto by said dog upon release by the latter, and means acting in conjunction with the toothed member for disengaging said retaining means after a predetermined distance of movement of said toothed member whereby the latter may return to normal position and the valve be closed substantially as described.

2. In an electromagnetically operated valve the combination of a valve seat having an annular recess, a pivoted valve normally spring pressed against said seat and having a projection engaging in said annular recess, an electromagnet, a rockable armature adapt-

ed to be attracted thereby, a toothed member in direct connection with the valve, a dog acting in conjunction with said armature upon each attraction of the latter to engage
 5 a tooth of said toothed member, and move same through a certain distance to open the valve, a pivotal bow having a series of surfaces adapted to retain the valve in the respective positions imparted thereto by the
 10 dog, and an abutment on said bow adapted to be engaged by the dog when the toothed member has completed a predetermined movement whereby the valve is released from said retaining surfaces and permitted
 15 to close substantially as described.

3. In an electromagnetically operated valve the combination with a valve seat and valve normally spring pressed thereagainst, of an electromagnet, an armature adapted to
 20 be attracted thereby, an oscillatory toothed member in direct connection with the valve, a dog in connection with said armature adapted upon each attraction of the armature to engage successive teeth of said mem-
 25 ber and move same through a certain distance to open the valve in successive steps, an abutment adapted to be engaged by said dog to release same from the toothed member when the latter has completed a prede-
 30 termined movement, means for retaining said oscillatory toothed member in the position given thereto by said dog upon release by the latter and means acting in conjunc-
 35 tion with the toothed member for disengaging said retaining means after a predeter-

mined number of successive movements of said toothed member whereby the latter may return to normal position and the valve be closed substantially as described.

4. In an electromagnetically operated
 40 valve the combination of a valve seat having an annular recess, a pivoted valve normally spring pressed against said seat and having a projection engaging the said annular recess, an electromagnet, a rockable armature
 45 adapted to be attracted thereby, a toothed member in direct connection with the valve, a dog acting in conjunction with said armature upon each attraction of the latter to engage successive teeth of said toothed mem-
 50 ber, and move same through a certain distance to open the valve in successive steps, a pivotal bow having a series of surfaces adapted to retain the valve in the respective
 55 positions imparted thereto by the dog, and an abutment on said bow adapted to be engaged by the dog when the toothed member has completed a predetermined movement whereby the valve is released from said retaining surfaces and permitted to close sub-
 60 stantially as described.

In witness whereof we have signed this specification in the presence of two witnesses.

ALBERT GAUDIN.
 EDMOND TELLIER.

Witnesses:

CHARLES BOIVIN,
 LÉON BOIVIN.