K. KOHLER.

FLUSH TANK.

APPLICATION FILED SEPT. 11, 1909.

962,765.

Patented June 28, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

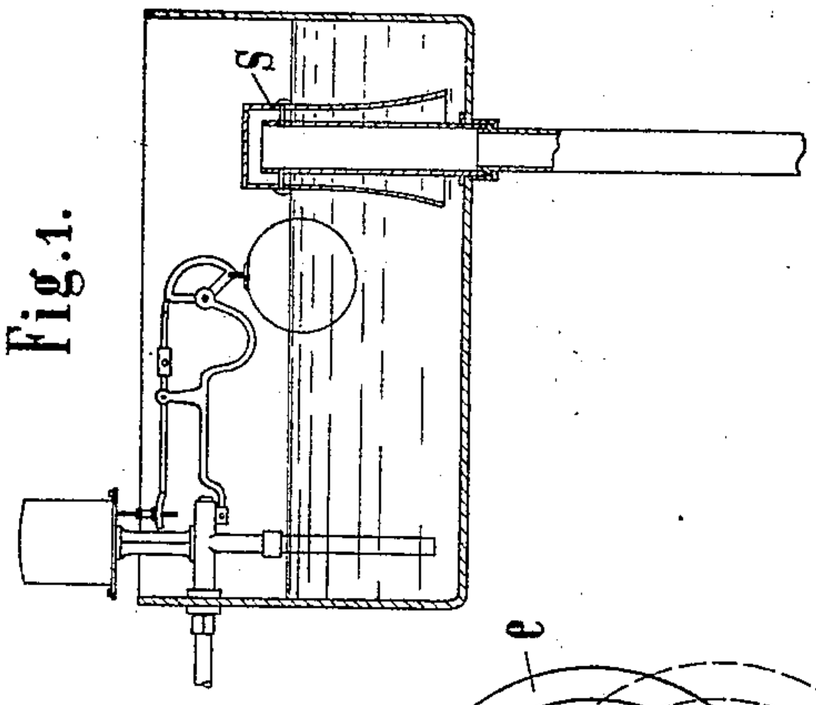
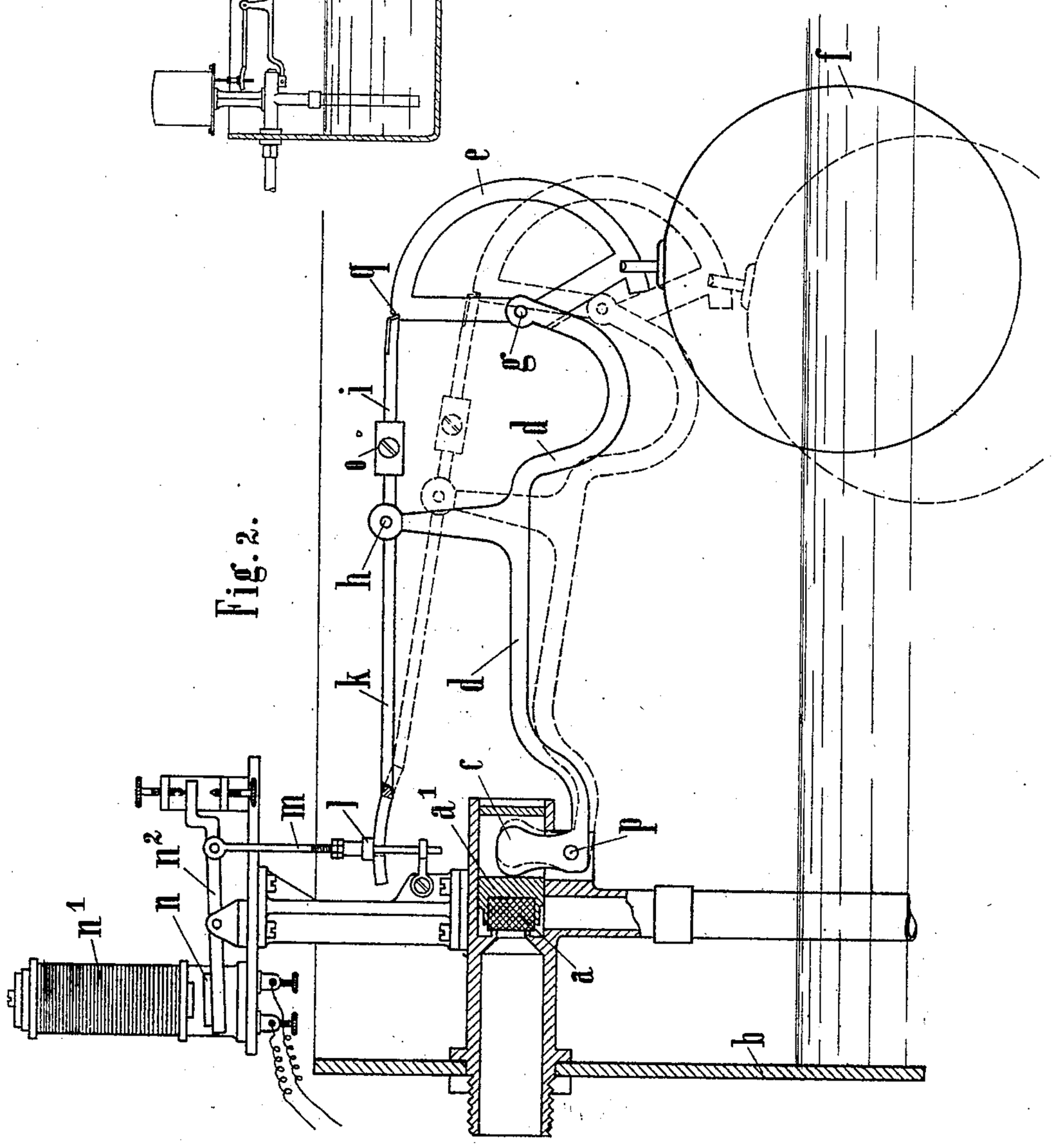


Fig. 2.



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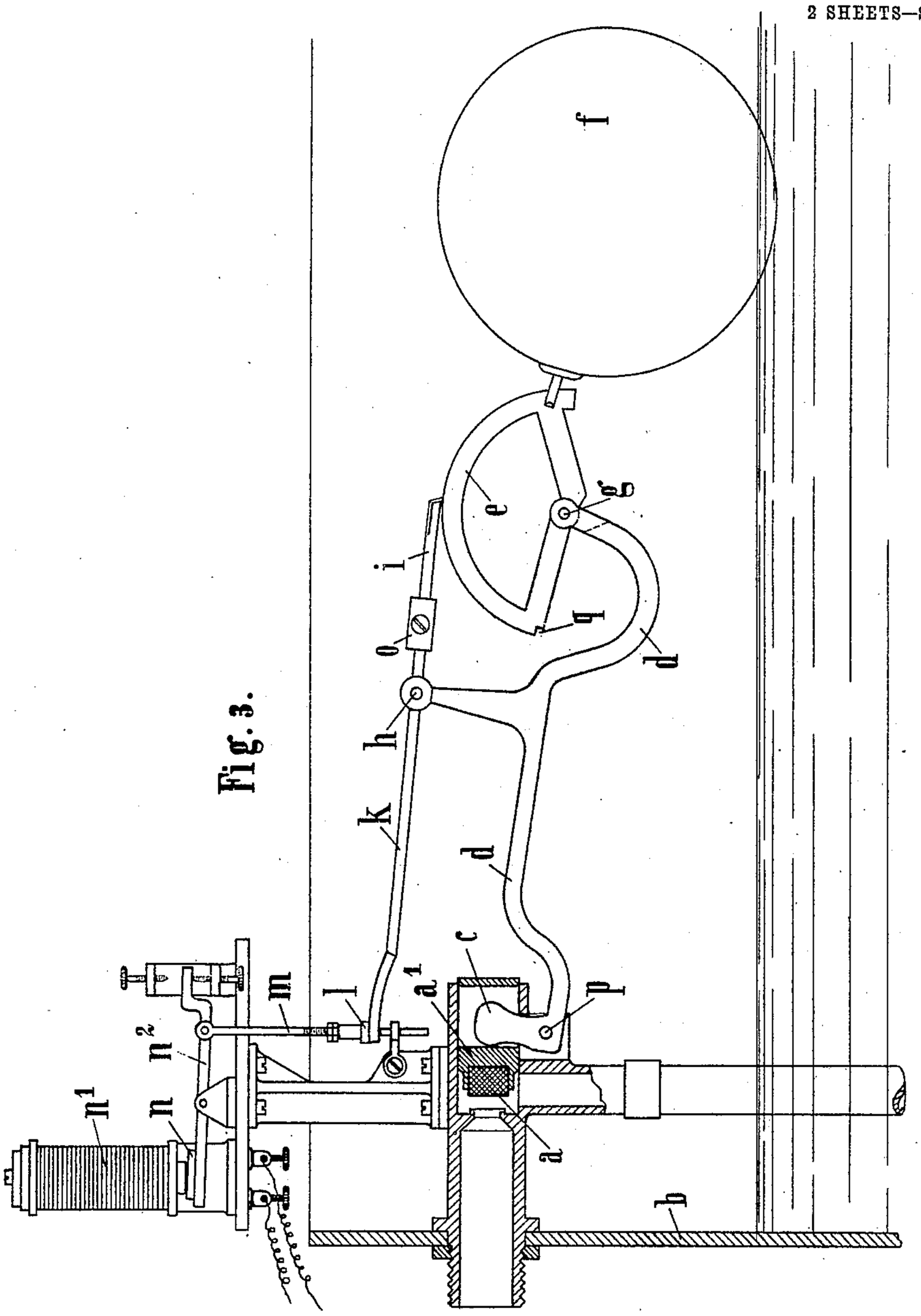
2 SHEETS—SHEET 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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FLUSH-TANK.

962,765. Specification of Letters Patent. **Patented June 28, 1910.**

Application filed September 11, 1909. Serial No. 517,205.

To all whom it may concern:

Be it known that I, KARL KOHLER, a subject of the Grand Duke of Baden, and residing at Neustadt, in Schwarzwald, Germany, have invented certain new and useful Improvements in Flush-Tanks, of which the following is a specification.

My invention relates to flush tanks having lever-controlled admission valves.

For saving water it is well-known to flush series of closets for schools and similar establishments only when the closets have been used, namely after the recesses in instruction. During the instruction, and at night, on Sundays and holidays, and during vacations no flushing takes place. The flushing which takes place optionally frequently at definite intervals at variable, pre-determinable times is brought about by the coöperation of an electric time switch combined with a clock and an electromagnetically-operated device interpolated in the circuit of the time switch for regulating the supply of water to the flush tank. The flush tank is provided with a well-known overflow siphon and is connected with the flush pipe of the closet. The supply and discharge of water to and from the flush tank is controlled by means of a float-valve and an electromagnetically-releasable locking device which, when released, opens the admission valve. The flush tank is at first filled only so far that its siphon is not submerged. When this water level is reached the admission valve closes owing to the buoyancy of the float and remains closed until flushing is to take place. The controlling lever of the admission valve is held in this position. Now if flushing is to take place the locked controlling lever is released electromagnetically by a time switch or the like or in other manner so that the supply valve is opened and allows as much additional water to flow in as is necessary for submerging or operating the siphon. Now the controlling device of the supply valve has frequently given rise to disturbances in such apparatus as the same did not always work certainly and reliably owing to its complicated nature, and an important object of my invention is to remedy this defect.

It has already been proposed to open the supply valve in a more simple manner by means of a controlling pivoted lever both while the float descends and also while it rises and to keep it closed only in the supported locked position of the controlling lever.

My invention comprehends a regulating device of this kind, and an important object is to position the controlling jointed lever, by means of its special form and the arrangement of a specially shaped locking means, in such manner as is necessary at each instant for it constantly and reliably to influence the supply valve.

In order that my invention may be clearly understood I will now explain the same with reference to the accompanying drawing in which several embodiments are represented by way of example.

In said drawing: Figure 1 is an elevation, partly in section, showing a flush tank, discharge siphon and the regulating device for the discharge of water which forms the subject-matter of my invention; Fig. 2 is a like view on an enlarged scale showing one constructional form of the regulating device in two positions, the positions shown by full lines corresponding to the locking position of the controlling lever when the admission valve is closed, whereas the dotted lines show the locking position of the lever when the admission valve is open and the tank is empty; Fig. 3 is a like view showing the same constructional form of regulating device when the lever is disconnected after being bent and the admission valve has been opened by it for admitting the additional quantity of water necessary for submerging the discharge siphon.

Referring to the drawings, *a* designates the admission valve of known construction attached in the usual manner on a vertical wall of the tank *b*. The upwardly bent arm *c* of a controlling lever *d*, *e* provided with a float *f* acts on the closure piston *a'* of this admission valve. This controlling lever is formed as a bending, jointed lever whose arm *d* facing the valve is integral with the pressing arm *c*, whereas the other segment-like arm *e* carries the float *f*. The two arms *d* and *e* are connected pivotally by a bolt *g*. The float *f* is attached to the bottom end of the segment-like arm *e* whereas the top end of the latter has in it a notch or incision *q*.

On the rear arm *d* is a locking device *k*, *i* pivoted on the pin *h;* in its closed position this locking device makes the two pivotally connected parts of the controlling lever into

one rigid arm, and after the lever is released its two parts can rotate freely toward one another around the pivot *g*. This locking device comprises a two-armed lever *k*, *i* whose front arm *i* is formed at its free end as a nose fitting into the notch *q* in the arm *e* or in other manner limiting the oscillation of the arm *e* upwardly. The rear arm *k* abuts against a preferably adjustable stop *l* of the releasing rod *m* which is moved electromagnetically in the illustrated embodiment. To this end it is pivotally attached to the lever n^2 carrying the armature *n* of an electromagnet *n'* and when the latter is energized rod *m* is moved downwardly by the electromagnet which is energized at definite, regulatable times. In order that the two-armed lever *i*, *k*, may always return into that position which admits of the arm *e* being held and the lever *d*, *e* being made rigid, the same is provided in addition with a preferably adjustable, movable weight *o* or is suitably spring-pressed. As the body of the valve *a* gradually wears somewhat during operation, the stroke of the jointed lever *d*, *e* which is necessary for closing the valve also alters. But since, on the other hand, the movement of the releasing rod *m* remains substantially the same, in order to prevent irregularities during working the rear end of arm *k* on which the stop *l* of the rod *m* rests, is curved in an arc of a circle having the fulcrum *p* of the lever *d*, *e* as center. The stop *l* therefore always rests on and certainly influences the locking device uniformly, even when the rear curved end of the locking lever *k*, *i* is moved somewhat farther downward when the valve closes owing to the body *a* of the valve having been worn. This rear end of the arm *k* is preferably forked and clasps the bottom portion of the releasing rod *m*.

My improved flush tank operates as follows:—After the tank has been emptied the jointed lever *d*, *e* takes up the position shown in dotted lines in Fig. 2. This lever is then prevented from bending and the admission valve *a* is opened. In proportion as the water level rises in the tank, the float *f* together with the entire lever device rises until the lever *d*, *e* occupies the position shown in full lines in Fig. 1 and, in consequence of the pressure exercised by the buoyancy of the float on the valve piston, closes valve *a* and keeps it closed. The water level in the tank has then risen almost up to the crown of the siphon *s*. As additional water is not supplied at first, the siphon cannot operate at once and the flushing device remains in this position until the locking device *i*, *k* is released. This occurs as soon as the electromagnet *n'* is energized by any well-known switching device and the armature *n* is attracted and the rod *m* is moved downward. The stop *l* of the latter depresses the rear arm *k* so far that the front arm *i* moves out of the notch in the arm *e* and releases this, whereupon the float *f* can rise a little more and the controlling jointed lever can bend at its joint, as shown in Fig. 3. The admission valve *a* opens under the pressure of the water supply pipe and owing to the additional supply of water the water level rises in the tank so far that the siphon can operate. When the water level sinks in the tank the float *f* sinks and the lever *d*, *e* finally takes up the position shown in dotted lines in Fig. 2 in which it is stiffened by the locking device *i*, *k* and forms a rigid arm. After the tank has been emptied it fills again at once, and as the water level rises the float and the controlling lever rise so far that the admission valve is closed by the buoyancy of the float. The device then remains in this position shown in full lines in Fig. 2 until the locking device is again released and additional water is admitted for the purpose of submerging the siphon.

I claim:—

1. In a flush tank, the combination with the tank having an admission valve, a pivotally mounted two-part jointed lever for controlling said valve, and a float attached to one part of said lever, of a locking device mounted on the other part and normally engaging the former part of said lever for normally preventing said lever bending, and means for releasing said locking device.

2. In a flush tank, the combination with the tank having an admission valve, a pivotally mounted two-part jointed lever for controlling said valve, one part of said lever having a notch and carrying a float, of a locking lever pivoted on the other part of said jointed lever and normally engaging in said notch, and an electromagnetic releasing device for removing said locking lever from said notch.

3. In a flush tank, the combination with the tank having an admission valve, a pivotally mounted two-part jointed lever for controlling said valve, one part of said lever having a notch and carrying a float, of a two-armed locking lever pivoted on the other part of said jointed lever and normally engaging in said notch, one arm of said locking lever carrying a weight and the end of the other arm of the locking lever having a curved portion, and a releasing device comprising an electromagnetically operated rod carrying a stop normally resting on said curved portion, the center of curvature of said curved portion coinciding with the fulcrum of said jointed lever.

4. In a flush tank, the combination with the tank having an admission valve, a pivotally mounted two-part jointed lever for controlling said valve, one part of said lever

having a notch and carrying a float, of a two-armed locking lever pivoted on the other part of said jointed lever and normally engaging in said notch, one arm of said locking lever carrying a weight and the end of the other arm of the locking lever having a curved portion, and a releasing device comprising an electromagnetically operated forked rod carrying an adjustable stop normally resting on said curved portion, the center of curvature of said curved portion coinciding with the fulcrum of said jointed lever.

In witness whereof I have hereunto set my hand in presence of two witnesses.

KARL KOHLER.

Witnesses:
ERNEST L. IVES,
W. W. SCHMIDT.