

UNITED STATES PATENT OFFICE.

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DEVICE FOR AUTOMATIC REGULATION OF OUTLET-SLUICES.

No. 850,703.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, IGNAZ FRANZ WESSELY, a subject of the Emperor of Austria-Hungary, residing at Linz, Empire of Austria-Hungary, have invented certain new and useful Improvements in Devices for Automatic Regulation of Outlet-Sluices, of which the following is a specification.

This invention relates to improved means for automatically effecting the opening or closing of an outlet-sluice in accordance with the changes of the water-level. This change of the extent of opening of the sluice-gate can be effected either by the upper or the lower water-level, so that the water-level in question is maintained constant within small limits, which need not be considered in practice, the result in the case when the lower water-level is used to control the sluice-gate being that the same quantity of water is always discharged from the sluice, whatever be the head.

The device consists of a balanced bell-crank lever controlled by a float, one arm of the said lever being normally in horizontal position, but becoming inclined under the influence of a float when the water-level changes, and thereby switching in a motor operating the driving-gear of the sluice, so that the position of the sluice-gate is correspondingly altered. By the movement of the sluice-gate the lever is at the same time brought back again into its normal horizontal position, owing to the pivot-point of the bell-crank lever being moved in the same direction as that in which the float has moved under the influence of the change in the water-level, whereby the motor is automatically switched out.

A constructional form of my improved regulating device is illustrated in the accompanying drawing.

a is a spindle carrying the driving-gears v w of the sluice-gate z , provided with the rack-bars x y . b is a worm mounted on the spindle a and engaging with a worm-wheel c . The ratio between the worm and the worm-wheel is made so that when the sluice-gate z is moved from one to the other of its extreme positions the worm-wheel c is turned not quite through three hundred and sixty degrees. To the worm-wheel c is secured a cam d or the like. In the construction illustrated the said cam d is formed as a spiral flange and passes between two rollers e' e'' on

a vertically-guided slide e . On the slide is pivoted at f a balanced bell-crank lever, the arm g of which carries a float i by means of an adjustable rod h . The oscillation of the arm g is limited by adjustable stop-screws k and l . The other arm m of the bell-crank lever acts on the control-spindle n by means of a follower q .

The spindle n has mounted on it a grooved disk p , which is connected by a band p' with a disk p'' , fast on a driving-shaft o . Secured to the latter is also a drum r , which rotates with the shaft o and by means of an open belt r' and a crossed belt r'' drives two idle pulleys t and u , respectively, the pulleys being loosely mounted on the spindle a . Between the two pulleys t and u a pulley s is mounted on the spindle a , being secured thereto, whereas on the control-spindle n there is mounted a belt-shifting device B , adapted to shift, by means of levers 1 2 3, the belts r' and r'' in a well-known manner.

The working of the device is as follows: If the water-level remains constant, the arm g of the bell-crank lever is horizontal, and the arm m keeps the control-spindle n in such position that the source of power is switched out. The spindle a therefore stands still, and the pivot-point f of the bell-crank lever is then a fixed point. If the water-level changes, the bell-crank lever is turned by the float i , and the control-spindle n is pushed thereby in one or the other direction, as the case may be, whereby either the open belt r' or the crossed belt r'' is shifted onto the pulley s by means of the belt-shifting device B , which causes the spindle a to be driven in one or other direction. While the position of the sluice-gate is changing, the spindle a rotates, and at the same time the worm and the worm-wheel rotate the cam d , which moves the slide e in the same direction as that in which the float has been moved. The slide e carries with it the pivot-point f of the bell-crank lever, and as the outer end of the bell-crank lever can be assumed as being fixed by the float the lever-arm g is again set in a horizontal position. By this movement of the bell-crank lever the control-spindle n is brought back to the "switched-out" position, so that the belt is shifted back onto its idle pulley, whereby the spindle a is prevented from further rotation, leaving the sluice-gate in the position into which it has been moved.

To use the apparatus for maintaining the upper water-level constant, the device is set in such manner that when the sluice-gate is completely closed the slide *e* is in its lowest position. The bottom set-screw *k* is then set in such manner that the arm *g* of the bell-crank lever is horizontal. In that position of the lever the float *i*, freely floating on the normal water-level, is secured in its natural position by means of the adjustable rod *h* to the said lever. Then the sluice-gate is brought into the position corresponding to the largest desired discharge, the slide also coming into a higher position. In that position of the slide the set-screw *l* is screwed in so far that it just touches the horizontally-set lever-arm *g*. To these two limiting positions of the lever-arm *g* in its horizontal position correspond the positions of the sluice-gate "closed" and "open," and higher or lower water-levels than those given by the said limiting positions can no longer bring about the movement of the sluice. The automatic action hereinabove described takes place between these two limiting positions.

For regulating the sluice-gate to suit the lower water-level the setting of the sluice-gate is effected in the same manner, with the difference that to the bottom limit position of the arm *g* in the horizontal position will correspond the position "sluice open" and to the upper the position "sluice closed."

As the height of the lower water-level depends on the quantity of water discharged by the sluice-gate and the said quantity for a given opening of the sluice-gate depends on the head of the dammed water, the maintaining constant of the quantity of water discharged is effected by means of the device according to this invention in such manner that the change of the quantity of water discharged, which is produced by the change of head or pressure and which again brings about a change in the lower water-level, is neutralized by a corresponding increase or reduction of the outlet area.

By suitably choosing the dimensions of

the float, as well as the length of the arms of the bell-crank lever and the distance between the limit positions of the arm *g* for the "sluice open" and "sluice closed," to which must be adapted the value of the eccentricity of the cam *d*, and also by changing the working proportions and the size of the motor the sensitiveness of the device can be made to suit the requirements of practical working.

I claim—

1. In a device for the automatic regulation of sluices, the combination with the spindle carrying the operating-gear of the sluice-gate, of a slide, means operated by the said sluice-gate-operating spindle for moving said slide in accordance with the position of the sluice-gate, a balanced bell-crank lever, pivoted to said slide, a float connected to one arm and a control-spindle connected to the other arm of said bell-crank lever, so as to move therewith, and means on said control-spindle for causing the said sluice-gate-operating spindle to be driven in either direction.

2. In a device for the automatic regulation of sluices, the combination with a spindle carrying the operating-gear of the sluice-gate, of a slide, means operated by the said sluice-gate-operating spindle for moving the said slide in accordance with the position of the sluice-gate, a balanced bell-crank lever pivoted to the said slide, a float connected to one arm and a control-spindle connected to the other arm of the said bell-crank lever, so as to move therewith, and means on said control-spindle for causing the said sluice-gate-operating spindle to be driven in either direction, and adjustable stops for the float-carrying arm of the bell-crank lever to determine the length of its movement in a predetermined position of the sluice-gate.

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

IGNAZ FRANZ WESSELY.

Witnesses:

JOSEF RUBANCE,
ALVESTO S. HOGUE.