Oct. 7, 1930. F. DUWE 1,777,404

MECHANISM FOR OPERATING SWINGING DOORS OF DRUM WEIRS

Filed Feb. 3, 1927

Fig. 1.

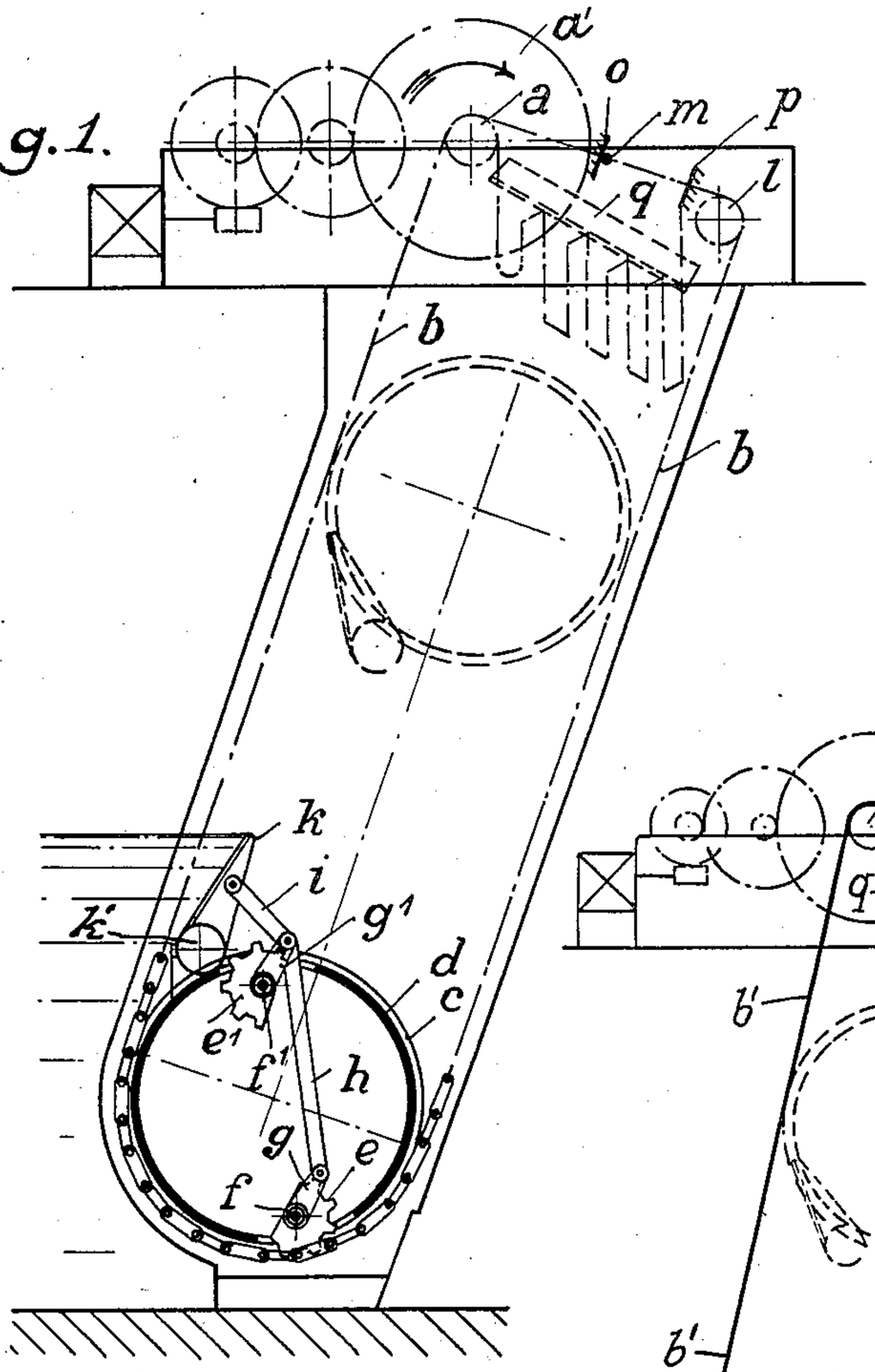


Fig. 4.

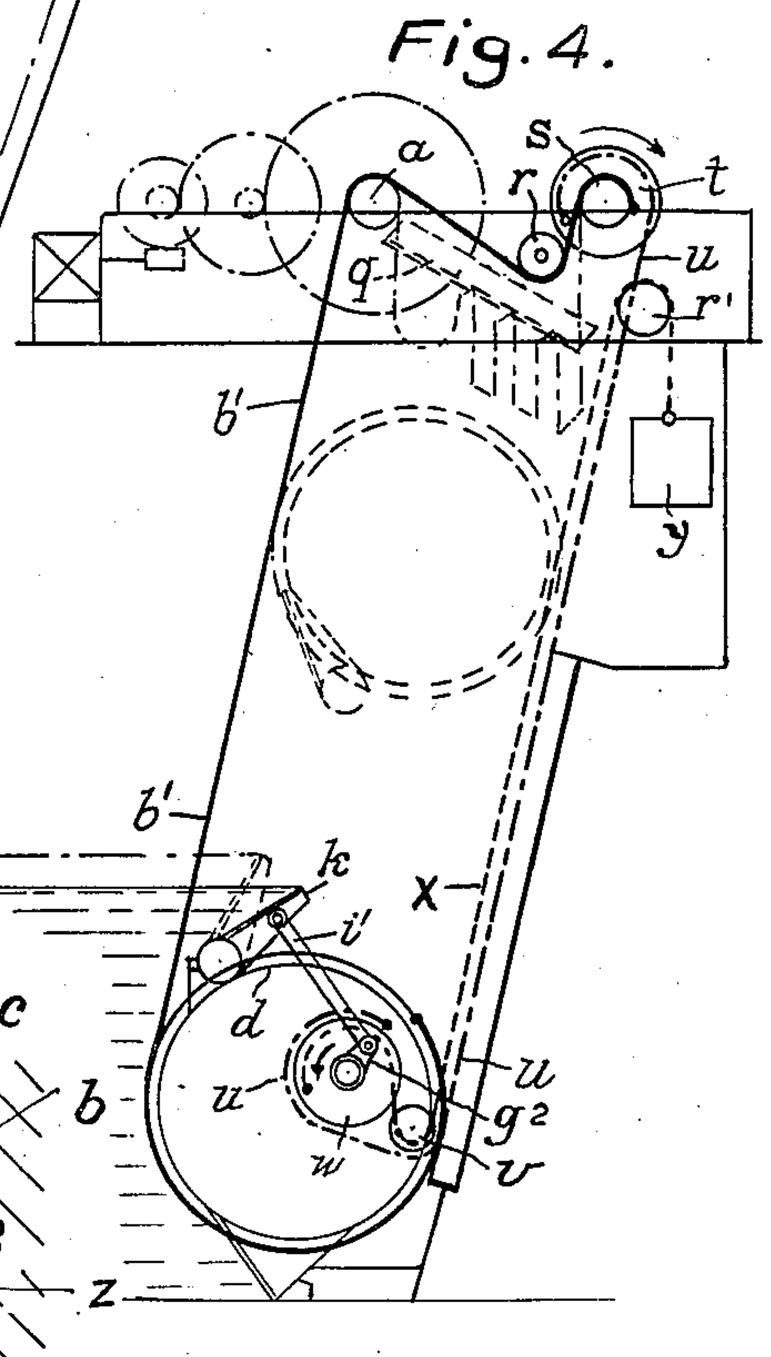
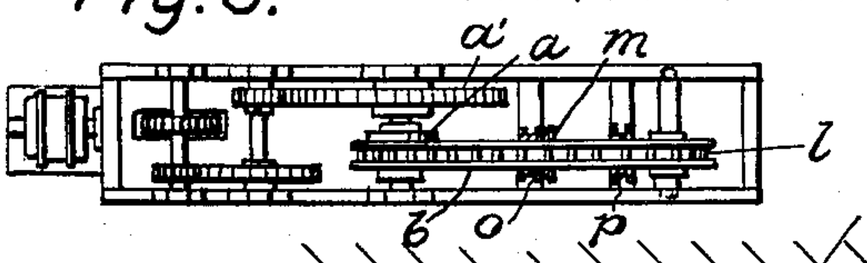


Fig. 3.



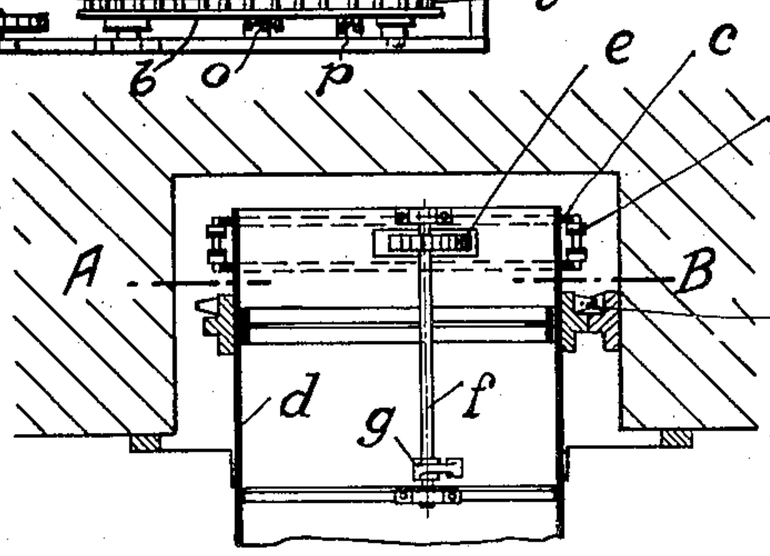


Fig. 2.

Inventor:
Friedrich Duwe
By Arthur Schmidt
Atty.

Patented Oct. 7, 1930

1,777,404

UNITED STATES PATENT OFFICE

FRIEDRICH DUWE, OF MAINZ, GERMANY, ASSIGNOR TO MASCHINENFABRIK AUGSBURG-NÜRNBERG A. G., OF NUREMBERG, GERMANY, A CORPORATION OF GERMANY

MECHANISM FOR OPERATING SWINGING DOORS OF DRUM WEIRS

Application filed February 3, 1927, Serial No. 165,740, and in Germany February 15, 1926.

My invention relates to a drum-weir having its drum-body provided with a swinging door. This swinging door may be moved or swung relatively to said drum-body in two directions, viz: it may be swung outwardly of the latter, whereby said door will assume an erect position with respect to said drum-body, or said door may be swung inwardly with respect to the drum-body, whereby it will be more or less laid down upon the cylindrical surface of the drum.

This invention has for its primary object to devise simple mechanical means for effecting the proper swinging of said door in the manner indicated.

During the raising and lowering of the drum-weir the door must be laid down or swung inwardly, and therefore the swinging motion of the door must be effected while the weir-body is lowered. In order to solve the problem of properly swinging the door I have taken advantage of the fact, that the winch-driver chain used for raising and lowering the weir body, is fully released from any load during the lowered position of the weir. An essential part of this invention consists in the drum-weir and the door being operated by one and the same winch. A further feature of this invention consists in properly dimensioning and arranging said chain and so connecting it with the operating means of the door, that said chain after the lowering and prior to the raising of the weir may move for some short distance in no-load condition and actuate the operating mechanism for the door during such condition.

In the accompanying drawing showing various embodiments of a weir constructed according to this invention,

Fig. 1 is a side-view of a drum weir and door.

Fig. 2 is a section through one end of the weir-drum.

Fig. 3 is a top plan view of a portion of the device of Fig. 1 and Fig. 4 a side view of a modification of the device shown in Fig. 1.

According to Figs. 1 and 2, the endless chain b is driven by means of the pinion a of the winch a^1 and carried around the drum body d by means of guiding members c, as shown in Fig. 2. It will be noted that in the lowered position of the drum d the chain b is released from the load of the weir and may slide upon the guiding members c. The chain b in the lowered position of the weir will be in engagement with a gear sector e mounted within the body of the drum d, and projecting through a slot provided in the surface of said drum. Upon the axle f of said gear sector e is mounted the crank g, which is pivoted to the rod h at one end thereof, while the other end of said rod h is pivoted to a second crank g^1, which is mounted upon the axle f^1 of a second gear sector e^1. The latter is disposed in the drum d approximately opposite to the gear sector e and projects through a slot provided in the surface of the drum d, the same as gear sector e. A second connecting rod i is pivotally connected to the crank g^1 or what is the same, to the connecting rod h, while the other end of the rod i is pivotally connected with the door k which is mounted on the drum-body d of the weir by means of an axle k^1, which is able to resist torsional strains. The chain b is further provided with a stop m at a point between the pinion a of the winch and a guiding roller l which is provided in the rear of said winch, said stop m cooperating with fixed abutments o and p. A suspension device q of any well-known kind provides for suspending said chain b in a plurality of parts, as indicated in Figs. 1 and 3, said parts being wound up during the lifting of the drum d.

The mode of operation is as follows:

If in the lowered position of the drum d, as shown in the drawing, the ordinarily erected door shall be turned down, for instance, prior to the lifting of the weir, the winch may be started in the direction of rotation as indicated by the arrow in Fig. 1. The chain, which is relieved of the weight of the drum, will then start to move under no load and slide upon the guiding members c of the drum. Thereby the gear sector e will be rotated by the crank g and the rods h and i and the door k will be swung about its axle into closed position. Meanwhile

stop *m* of the chain *b* has travelled from the abutment *o* to the abutment *p*, so that further movement of the chain *b* will be stopped. Now, if the drum shall be raised, the rotation of the winch is simply continued, whereby the chain side running upon the pinion *a* will be wound up, the wound up parts being then kept in plurally suspended sections by the suspension device *q*. During the raising of the weir-drum *d*, the latter is positively guided by the gear rim and rack *z*, and will move into the upper position as indicated by the broken lines in Fig. 1. In this manner, the gear sector *e* will become disengaged from the chain *b*. However, the door cannot swing again away from the drum into open position, because the gear sector e^1 has come into engagement with the chain, ere the gear sector *e* has left the chain, thus holding the door closed.

During the lowering of the weir-body the motions of the several parts take place in the opposite sequence. At first the side of the chain will be lowered, which runs upon the pinion *a* of the winch simultaneously with the weir-body, until the chain is again released from the weight of the weir-drum, which rests upon the sole of the weir by means of a tightening plate. Thereupon the chain continues to slide upon the guide *c* in opposite direction as before, whereby the door will again be erected and the stop *m* moves away from the abutment *p* towards the abutment *o*. As soon as it strikes *o*, the winch will be stopped.

In the embodiment shown in Fig. 4 one end of the chain b^1, which runs over the pinion *a* of the winch, is so fixed on the outside of the weir-body *d*, that a certain part of the chain in the lowered position of the weir will partly surround the weir-body. The other end of the chain is carried over a guiding wheel *r* to a chain-wheel *s* and similarly fixed to the latter. The axle of the chain-wheel *s* carries a pulley *t*, one end of an auxiliary rope *u* being fixed to said pulley. The auxiliary rope *u* is carried over a reversing roller *v* to a pulley *w* mounted in the interior of the weir-body *d*, the end of the rope being fixed to said pulley. The ends of the rope *u* are fastened in such a manner upon the pulleys *t* and *w*, that the pulley *t*, which is fast with the chain-wheel, will be surrounded in one end position of the rope upon a greater length by the rope than the pulley *w* is surrounded by the end of the rope fixed thereto. A crank g^2, which is mounted upon the axle of the pulley, is again connected by means of the rod i^1 with the door *k*, which is mounted upon the drum-body *d* of the weir. To the pulley *w* there is further fixed the end of a second rope which partly surrounds the pulley, said second rope being carried over a reversing roller r^1, while the other end of said rope will be loaded by the weight *y*, said weight serving to keep the ropes *u* and *x* in stretched condition.

If in this construction after the lowering of the weir-body, the door *k*, which during this time is swung towards the drum, is to be erected, the winch is still further rotated in the direction indicated by the arrow. The chain b^1 will then simply be in loosely suspended condition between the drum and the pinion *a*, while the pulley *t* is rotated by the side of the chain, which is fixed to the pulley *s*. The rope *u* will thereby be kept in stretched condition. In consequence thereof the pulley *w*, which is mounted in the interior of the drum *d*, will be rotated in the direction indicated by the arrow, and the door *k* will be erected by the crank g^2 and the connecting rod i^1. The rope *x*, whose end will thereby be further wound upon the pulley *w*, will be kept under tension by the weight *y* when being lifted.

In the opposite way, during an inward swinging of the door *k*, which may be desired prior to the raising of the drum-body of the weir, the part of the chain which is in loosely suspended condition between the pinion *a* and the weir-body *d* will be lifted. The weight *y* exerting a pull on the rope *x* will thereby rotate the pulley *w* in opposite direction to the arrow shown in the drawing. By reason of this, on the one hand, the door *k* will again be swung by means of the crank g^2 and the rod i^1, and on the other hand, the end of the rope *u* which is fixed upon the pulley *w* will be wound up, so that by action of the rope *u* the pulley *t* will be rotated in the direction of the double-arrow shown in the drawing, and the end of the chain, which is fixed to the chain-wheel, will be wound up. After such swinging of the door *k*, the weight *y* will come to rest upon a proper support, so that the pulleys *w*, *t*, the ropes *u*, *x* and the end *s* of the chain will come to standstill, while the part of the chain which runs upon the pinion *s* of the winch will be wound up, the thus wound up part of the chain again adjusting itself with respect to the suspension device and the ropes *x* and *u* being partly wound upon the weir-body during its upward motion.

I claim:

1. In a drum-weir provided with a swinging door, means for both raising and lowering the drum, and means operatively connected with said first-named means for opening and closing said swinging door.

2. In a drum-weir provided with a swinging door, a chain passing around the drum, means for moving said chain in either direction to thereby raise and lower the drum, and operating means for said swinging door carried by said drum and operatively connected with said chain and said door for opening and closing the same.

3. In a drum-weir provided with a swinging door, a chain passing around the drum, a winch for moving said chain in either direction to raise and lower the drum, and means operatively connected with said chain and said door for opening and closing the same, said chain being relieved of the weight of the drum after the lowering, and prior to the raising, of the drum.

4. In a drum-weir provided with a swinging door, an endless chain passing around the drum being in sliding engagement therewith, two gear sectors provided on said drum in opposite relation to each other and adapted to be engaged by said chain, means operatively connected with said gear sectors and said door, and a winch for pulling said chain in either direction to thereby raise and lower the drum and simultaneously operate said door by means of said gear sectors.

5. In a drum-weir provided with a swinging door, an endless chain passing around the drum being in sliding engagement therewith, two gear sectors provided on said drum in opposite relation to each other and adapted to be engaged by said chain, means operatively connected with said gear sectors and said door, a winch for pulling said chain in either direction to thereby raise or lower the drum and simultaneously operate said door by means of said gear sectors, a guide-roller on the frame-work of said winch, a stop provided on said chain at a point intermediate said winch and said guide-roller, and fixed abutments adapted to cooperate with said stop so as to prevent the sliding of said chain upon said drum after the opening and closing of said door.

In testimony whereof I affix my signature.

FRIEDRICH DUWE.