

No. 624,826.

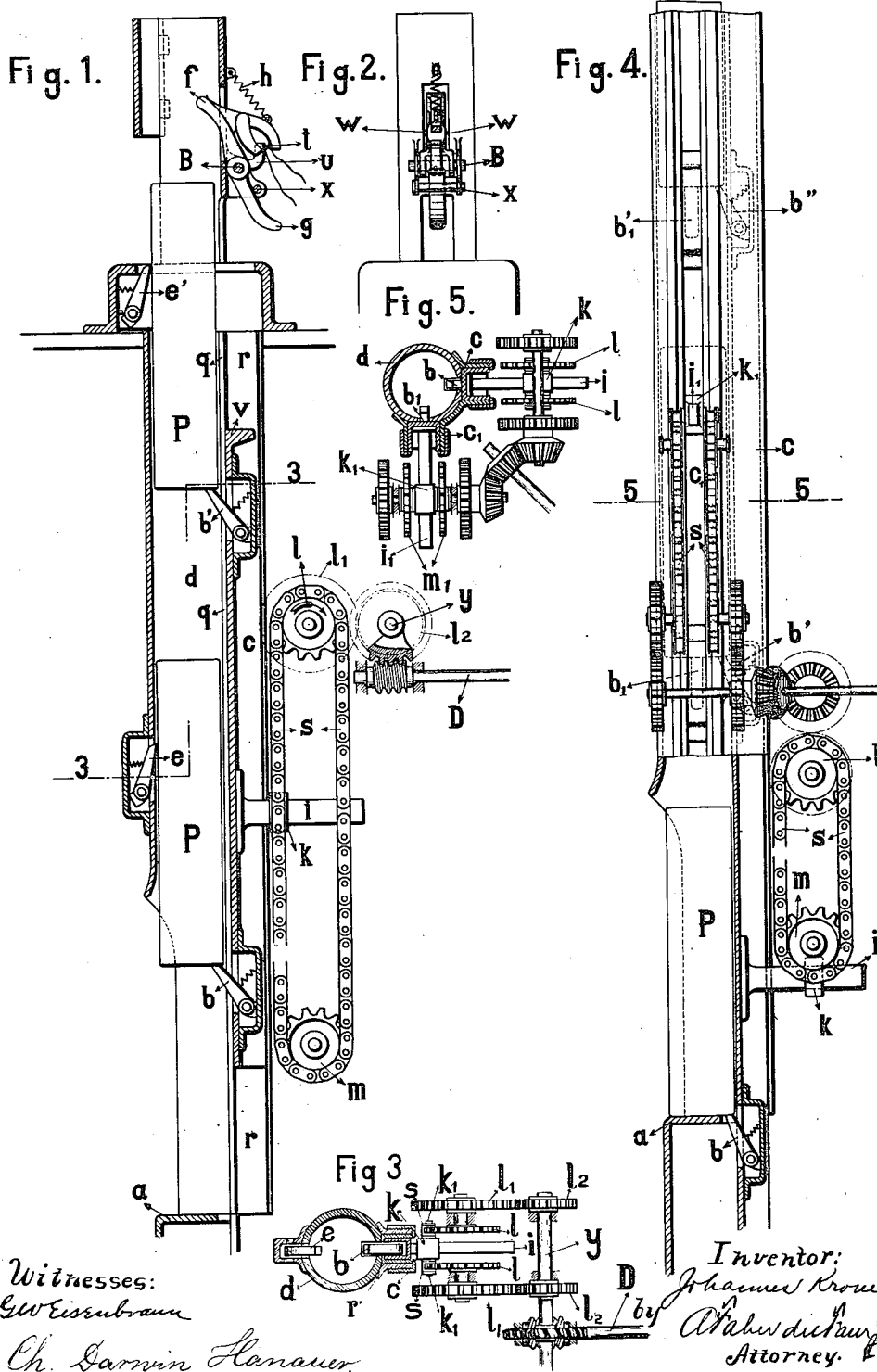
Patented May 9, 1899.

J. KRONE.
AMMUNITION HOIST.

(Application filed Apr. 2, 1898.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses:
G. Weissbraun

Ch. Garnin Hanauer

Inventor:
Johannes Krone
Attorney.

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Fig. 6.

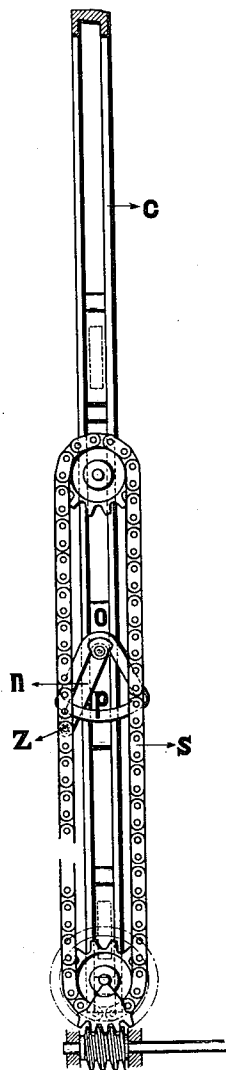
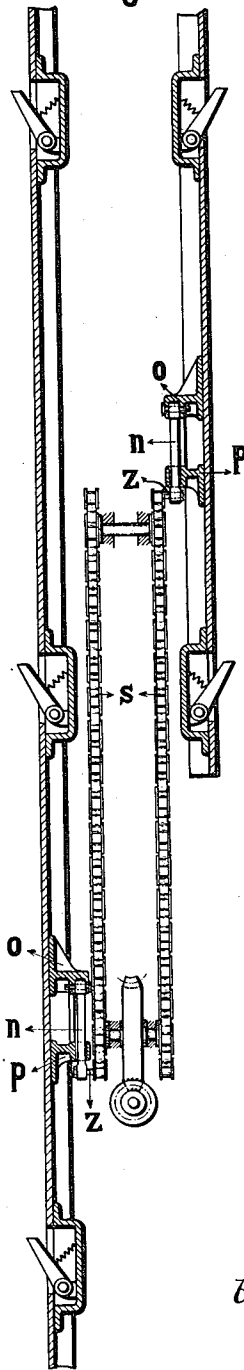


Fig. 7.



Witnesses:
G. W. Essmbrann

Ch. Darwin Lanauer

Inventor:
by Johannes Krone
Walter de la Haye
Attorney.

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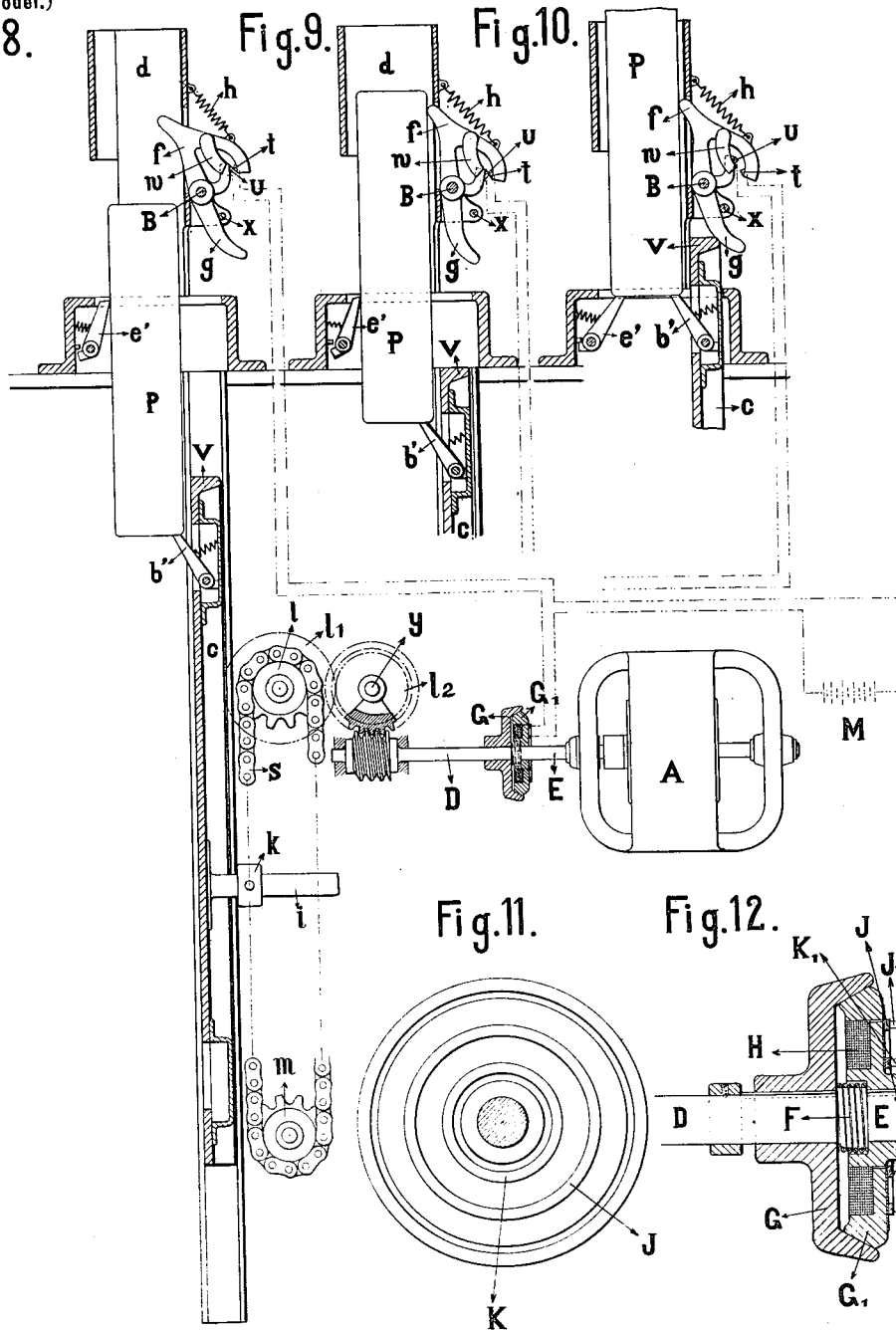
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(No Model.)

Fig. 8.

Fig. 9.

Fig. 10.



Witnesses:

G. H. Esenbrenner

Or Saml. Hanauer

Inventor:
Johannes Krone
by A. P. du Puy
Attorney.

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Fig. 13.

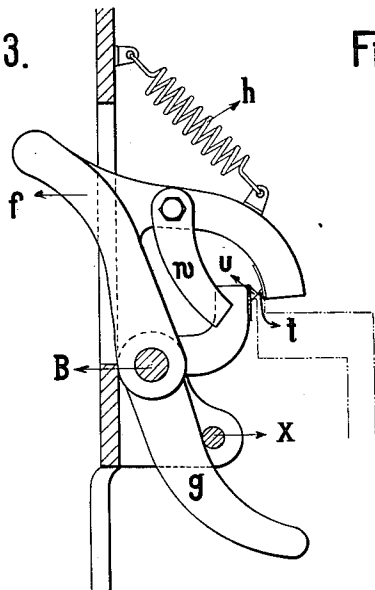


Fig. 14.

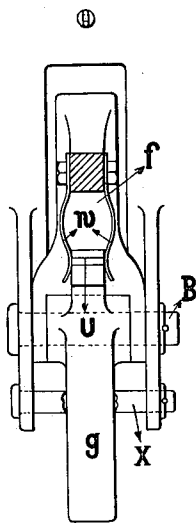


Fig. 15.

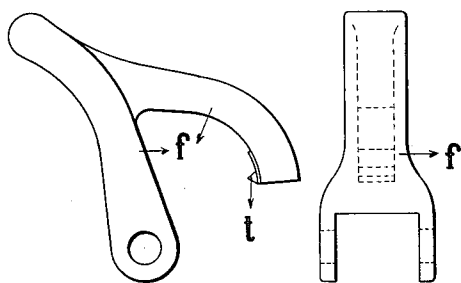
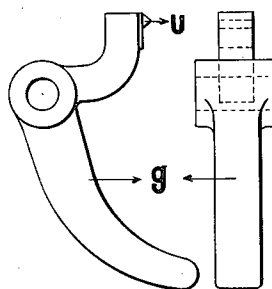


Fig. 16.



Witnesses:
E. W. Essmbrunn.
Ch. Darwin Hanauer.

Inventor:
Johannes Krone
by *Adolf duRoi*
Attorney.

UNITED STATES PATENT OFFICE.

JOHANNES KRONE, OF ESSEN, GERMANY, ASSIGNOR TO FRIED. KRUPP, OF SAME PLACE.

AMMUNITION-HOIST.

SPECIFICATION forming part of Letters Patent No. 624,826, dated May 9, 1899.

Application filed April 2, 1898. Serial No. 676,187. (No model.)

To all whom it may concern:

Be it known that I, JOHANNES KRONE, a citizen of the German Empire, residing at Essen, Rhenish Prussia, Germany, have invented an Improvement in Ammunition-Hoists, of which the following is a specification.

This invention relates to an ammunition-hoist which is designed for war vessels, armored turrets, and the like and which differs advantageously from known constructions by its simple arrangement and also in that it is able, in case of necessity, to convey a large quantity of ammunition rapidly to the place of consumption.

The invention consists in means whereby ammunition is conveyed in a tube by the action of a reciprocating pawl-and-ratchet mechanism and in means whereby the motion of the latter is interrupted immediately in case the cartridge, projectile, &c., that has arrived at the place of consumption is not taken out of the tube.

The nature of my invention will be best understood when described in connection with the accompanying drawings, in which—

Figure 1 is a vertical section through the conveyer, showing the same in operation. Fig. 2 is a side elevation of the upper end of the conveyer, the view being taken from the right as seen in Fig. 1. Fig. 3 is a horizontal section on the line 3 3, Fig. 1. Fig. 4 is a side view, partly in section, of another form of the invention, the upper portion of the conveyer shown in Figs. 1 and 2 being broken away. Fig. 5 is a horizontal section on the line 5 5, Fig. 4. Fig. 6 is a detail view showing another manner of connecting the reciprocating conveyer-rod with its driving-chain. Fig. 7 is a sectional detail view showing the manner of connecting two conveyers with a common driving mechanism. Figs. 8, 9, and 10 represent three successive phases of the operation of the hoist, Fig. 8 also showing a diagrammatic representation of the connection between the hoist and the motor. Figs. 11 to 16 are detail views on an enlarged scale.

Similar letters of reference designate corresponding parts throughout the several views of the drawings.

I shall first describe the arrangement shown in Figs. 1, 2, and 3. The guide-shaft *d* for the ammunition consists of a tube formed with a longitudinal slot *q*. The spring lifting-pawls *b b'* of the rod *c* extend through the slot *q*.

The lifting-rod *c* is capable of sliding up and down in ways *r*, arranged on the guide-shaft *d*. On the side of the guide-shaft *d* opposite to the slot *q* there are provided similar supporting spring-pawls *e e'*, which extend through slots in the side of the tube into the interior of the said tube. The distance apart of the lifting-pawls *b b'*, like that between the supporting-pawls *e e'*, is about equal to the length of the stroke of the rod *c*, while the lowest supporting-pawl *e* is similarly arranged nearly the length of a stroke away from the table *a*, which is designed to receive the ammunition to be hoisted.

It will now be readily understood that when ammunition—for example, a cartridge *P*—is placed upon the table *a* and the rod *c* is caused to move up and down the lifting-pawl *b*, (see Fig. 4,) which moves down under the table *a*, will grasp the cartridge and raise it up to the level of the spring-pawl *e*, Fig. 1, and will deliver it to the latter, which moves in under the base of the cartridge. While the rod *c* moves down again, the cartridge is held supported by the pawl *e*, to be grasped on the next following upward movement of the rod (which carries, if necessary, a new cartridge away from the table *a*) by the lifting-pawl *b'* and to be raised up to the level of the supporting-pawl *e'*. In this manner the cartridge is conveyed to the upper end of the guide-shaft *d*, whence it is removed by hand or by other means from the shaft.

The lifting-rod *c* is actuated in the following manner: To the rod *c* is secured an arm *i*, which carries a sliding piece *k*, Fig. 1. This sliding piece *k* is provided on its two opposite ends with pins *k' k'*, Fig. 3, engaging two parallel endless chains *s s*, (see Figs. 1, 3, and central part of Fig. 4,) which chains pass over two lower chain-pulleys *m m*, mounted in fixed bearings, and over two upper chain-pulleys *l l*, likewise mounted in fixed bearings. As shown in Fig. 3, the chain-pulleys *l l* are placed a short distance apart and are actuated by gear-wheels *l' l'*, engaged by gear-wheels *l'' l''* on the shaft *y*. The shaft *y* is actuated by an electromotor *A* through a worm-wheel on the shaft *y* and a worm on the shaft *D*. Each of the chain-wheels *m m* is also separately supported, like the wheels *l l*, so as to leave a clear space for the up-and-down motion of the arm *i* of the rod *c*.

When the rod *c* is in the position shown in

Fig. 1 and the motor is started, the chain-wheels *ll* revolve in the direction of the arrow on the upper chain-wheel *l*, Fig. 1, and by means of the sliding piece *k* and the arm *i* the chains carry the rod *c* upward. From the time the sliding piece *k*, connected to the chains, commences to pass onto the upper chain-wheels *ll* until it leaves the same it slides outward on the arm *i* of the rod *c*. During this part of the motion the sliding piece *k*, after passing the highest point of the wheels *ll*, takes a downward course and reverses the direction of the motion of the rod *c*. When during the continued motion of the chains *s s* the sliding piece *k* passes around the lower chain-wheels *mm*, the sliding piece *k* moves inward (to the left in Fig. 1) on the arm *i*, and the direction of the motion of the sliding piece *k* and of the rod *c* is changed from downward to upward.

In order to prevent the ejection of the uppermost cartridge by the next succeeding one if the upper one should not have been removed by hand, a device is provided for automatically disconnecting the chain-wheel shafting from the motor-shaft, which device is illustrated in Figs. 8 to 16.

B is a shaft fixed to the upper end of the guide-shaft *d*. On this shaft *B* are mounted two arms *f* and *g*, so as to be free to turn independently of each other on said shaft. The arms *f* and *g* are shown in detail in Figs. 15 and 16, respectively. They are provided with contact-pieces *t* and *u*, facing each other.

ww are flat springs attached to the arm *f* and bearing against the sides of the arm *g*, causing the arm *g* to follow the motion of the arm *f* unless otherwise prevented.

h is a spring tending to force the inner end of the arm *f* into the guide-shaft *d*, and into the path of the ascending cartridge. The outward motion of the arm *g* is limited by a stop-pin *x*.

Between the driving-shaft *D* and the motor-shaft *E*, Fig. 8, an electromagnetic friction-coupling *G G'* is inserted, which is shown on an enlarged scale in Figs. 11 and 12. The part *G* is arranged to slide on the shaft *D*, but not to turn on it, a spring *F* tending to hold it out of engagement with the part *G'*, which latter part is fixed on the motor-shaft *E*. An armature *II* is arranged within the part *G'* of the coupling, one end of the wire being connected to a contact-ring *J* on the part *G'*, while the other end is connected to a contact-ring *K*, likewise on the part *G'*. When the shaft *E* is in motion, a contact-piece *J'*, connected by a conductor with the contact-piece *u* of the arm *g*, slides on the contact-ring *J*, and a contact-piece *K'*, connected by a conductor with the source of current and thence with the contact-piece *t* of the arm *f*, slides on the ring *K*.

Normally the arms *f* and *g* are in the positions Figs. 8 and 13, the arm *f* projecting into the guide-shaft *d* under the action of the spring *h*, while the arm *g* bears against the stop *x*. In this position of the arms the cir-

cuit is closed by the contacts *t* and *u*, so that the current passes through the armature *II*, the magnetic half *G'* attracts the part *G* of the coupling, and motion is transmitted from the motor-shaft *E* to the driving-shaft *D*.

When now a cartridge arrives at the upper end of the guide-shaft *d*, Fig. 9, it pushes the arm *f* aside, the latter, through the springs *ww*, carrying along the arm *g* into a position within the path of the stop *v* of the rod *c*. During this common motion of the two arms *f* and *g* the contact *t u* remains closed, so that the hoist remains in motion. When the ascending cartridge is at once removed, both arms return together with a closed contact to their former positions, Fig. 8. When, however, the upper cartridge is not removed during the ascending motion, the moment the cartridge passes onto the pawl *e'* the stop *v* of the rod *c* strikes the arm *g* and forces it up against the stop *x*, Fig. 10, whereby the contact-pieces *t* and *u* become separated, the current is interrupted, the armature demagnetized, the part *G* thrown out of engagement with the part *G'* through the action of the spring *II*, and motion of the hoisting-chains is stopped. As soon as the upper cartridge is removed the arm *f* is returned to its original position through the action of the spring *h*, the springs *ww* sliding on the side faces of the arm *g* without turning it as it bears against the stop *x*. By this motion of the arm *f* the contact *t u* is reestablished and the hoisting apparatus again set in motion.

The supporting-pawls *ee'*, which are shown fixed to the guide-shaft in Figs. 1 and 3, may be replaced, as shown in Figs. 4 and 5, by lifting-pawls *b' b'*, which are arranged on a lifting-rod *c'*, which is similar in arrangement and mode of operation, but which is moved in an opposite direction to the lifting-rod *c*. The general arrangement, especially also the common driving-gear, will be understood from the figures without further description. The figures also show that the weights of the two rods *c c'* balance each other and that each of the rods need only make one-half of the stroke which is necessary in the arrangement shown in Fig. 1.

It is thus seen that my invention embodies the combination of a guide-shaft *d*, a lifting-rod *c*, guided in ways on the guide-shaft, means for reciprocating the lifting-rod *c* in the longitudinal direction of the guide-shaft, said lifting-rod being provided with a series of pawls projecting into the guide-shaft engaging the cartridges for their advance and a second series of pawls spaced to support the cartridges on their advancement by the first set, the second set, as shown and described, being either stationary—that is, pivoted to the guide-shaft, as in Fig. 1—or pivoted to a second lifting-rod, as in Figs. 4 and 5.

Fig. 6 shows another mode of driving the rod *c*, the said driving-gear being shown in side elevation in Fig. 7.

Fig. 7 shows only the arrangement, which

will be understood from the figure without further description, according to which the rods *c* of two hoists arranged side by side are driven from one and the same shaft. A connecting-rod *n* is pivoted at *o* to the rod *c* and is guided within a sector *p*, which limits the stroke of the connecting-rod. The lower end *z* of the connecting-rod *n* is connected to the driving-chains *s*. Reciprocating motion of the rod *c* in the direction of the guide-shaft is thus produced, as in the first-described case.

It is obvious that without altering anything in the nature of the invention the reciprocating motion of the rod may be produced by other suitable means—as, for example, by means of automatic reversing-gear or by means of hydraulic cylinders. The hoist-shaft may also assume any desired position.

What I claim as new is—

1. In an ammunition-hoist for war vessels, armored turrets, and the like, the combination of a slotted guide-shaft; a fixed table for receiving the ammunition at the lower end of the shaft; a lifting-rod guided in ways on the guide-shaft; means for reciprocating the lifting-rod in the longitudinal direction of the guide-shaft; said lifting-rod being provided with a series of pawls projecting into the guide-shaft and engaging the ammunition in its ascent; and a second series of pawls spaced to support the ammunition in its advancement by the first set, all for the purpose of intermittently raising the ammunition, substantially as described.

2. In an ammunition-hoist for war vessels, armored turrets, and the like, the combination of a slotted guide-shaft; a fixed table for receiving the ammunition at the lower end of the shaft; a lifting-rod reciprocating within ways on said guide-shaft; said lifting-rod being provided with a series of pawls projecting into the guide-shaft and engaging the ammunition during the ascent of the lifting-rod; and a second set of pawls pivoted to the guide-shaft and projecting into the guide-shaft for supporting the ammunition until the next succeeding lifting-pawl after its descent engages the ammunition and lifts it another space, substantially as described.

3. In an ammunition-hoist for war vessels, armored turrets, and the like, the combination of: a slotted guide-shaft; a fixed table for receiving the ammunition at the lower end of the shaft; a lifting-rod guided in ways on the guide-shaft; means for reciprocating the lifting-rod in the longitudinal direction of the shaft; said lifting-rod being provided with a series of pawls projecting into the guide-shaft and engaging the ammunition during the ascent of the lifting-rod; a second series of pawls spaced to support the ammunition in its advancement by the first set; an electrically-controlled clutch between the source of power and the driving-shaft, and a contact-breaker actuated by the uppermost ammunition to release the clutch when the ammunition

is not removed in time and to engage it when the ammunition is removed.

4. In an ammunition-hoist for war vessels, armored turrets, and the like, the combination of: a slotted guide-shaft; a fixed table for receiving the ammunition at the lower end of the shaft; a lifting-rod guided in ways on the guide-shaft; means for reciprocating the lifting-rod in the longitudinal direction of the shaft; said lifting-rod being provided with a series of pawls projecting into the guide-shaft and engaging the ammunition during the ascent of the lifting-rod; a second series of pawls spaced to support the ammunition in its advancement by the first set; an electrically-controlled clutch *G G'*; a contact-breaker consisting of the arms *f* and *g* pivoted on a shaft *B* fixed on the guide-shaft *d*, spring *h* on arm *f*; springs *w w* forming a frictional connection between the arms *f* and *g*; stop *x* for arm *g*; contact-pieces *u* and *t* normally held in contact, but separated, when the uppermost piece of ammunition strikes the arm *f*, and conductors for completing the circuit, whereby the clutch is released and motion of the hoisting-chains stopped by the uppermost cartridge until the same is removed, substantially as described.

5. In an ammunition-hoist for war vessels, armored turrets, and the like, the combination of a slotted guide-shaft *d*; a table *a* for receiving the ammunition at the lower end of the guide-shaft; a lifting-rod *c* guided in ways on the guide-shaft *d*; an arm *i* projecting from the lifting-rod *c*; a sliding piece *k* on said projection *i* and connected to the endless chains by pins *k' k'*; means for imparting continuous rotary motion to the chain-wheels, whereby reciprocating motion in the longitudinal direction of the shaft is imparted to the lifting-rod *c*; the lifting-rod being provided with a series of pawls *b' b'* projecting into the guide-shaft and engaging the ammunition in the ascent of the lifting-rod *c*; and a second series of pawls spaced to support the ammunition in its advancement by the first set, all for the purpose of intermittently raising the ammunition, substantially as described.

6. In an ammunition-hoist for war vessels, armored turrets, and the like, the combination of a slotted guide-shaft; a pawl-carrier guided in the direction of the length of the guide-shaft; means for reciprocating said pawl-carrier, and a series of pawls spaced to support the ammunition when advanced by the pawl-carrier; all for the purpose of intermittently raising the ammunition, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

JOHANNES KRONE.

Witnesses:

WILLIAM ESSENWEIN,
FRANK H. MASON.