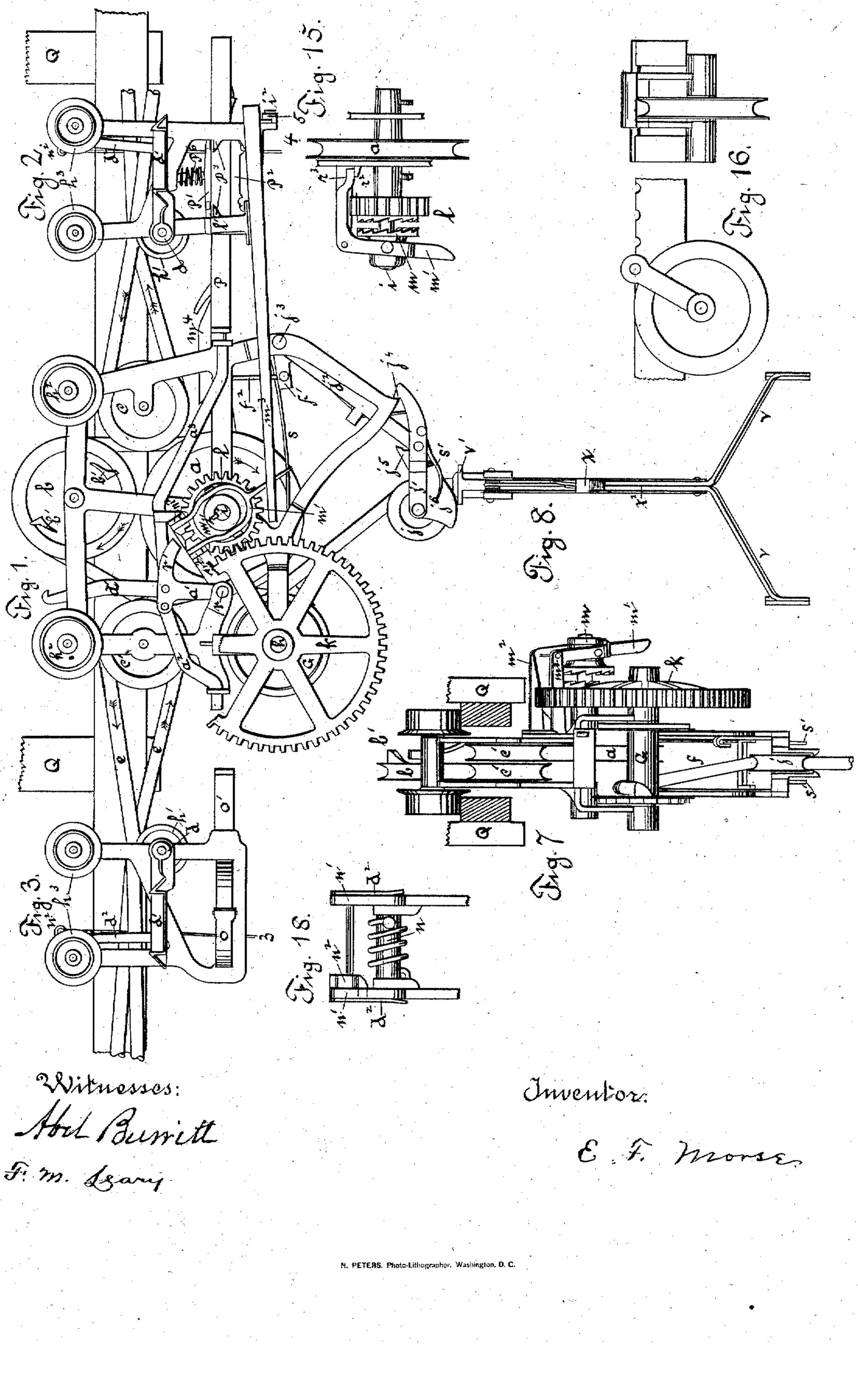
(No Model.) 2 Sheets—Sheet 1.

E. F. MORSE.

HAY ELEVATOR AND CARRIER.

No. 288,587. Patented Nov. 13. 1883.



Witnesses:
Abel Burritt
F. M. Leary

Inventor:
E. F. Morse

(No Model.) 2 Sheets—Sheet 2.

E. F. MORSE.

HAY ELEVATOR AND CARRIER.

No. 288,587. Patented Nov. 13, 1883.

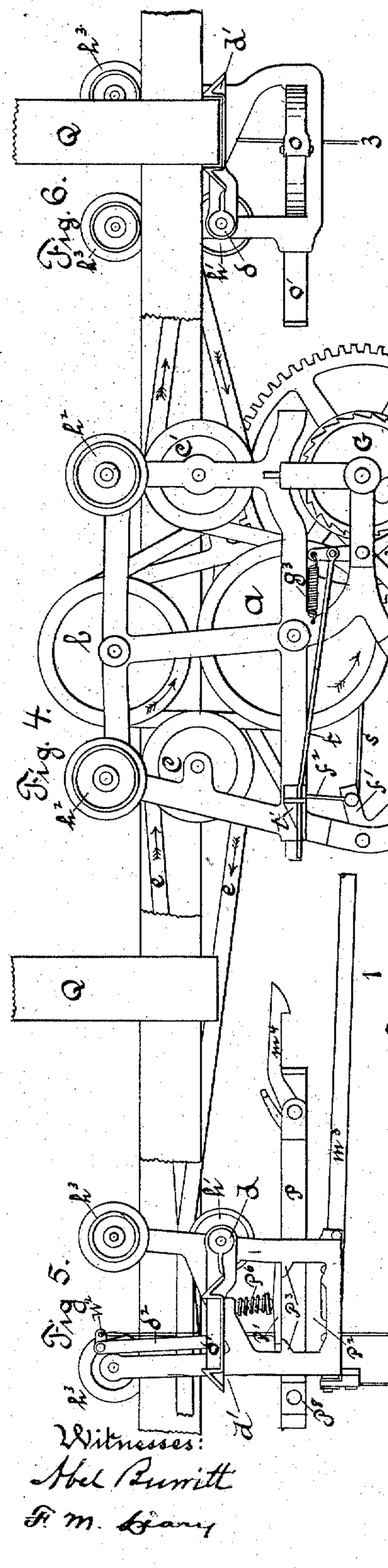


Fig. 6.

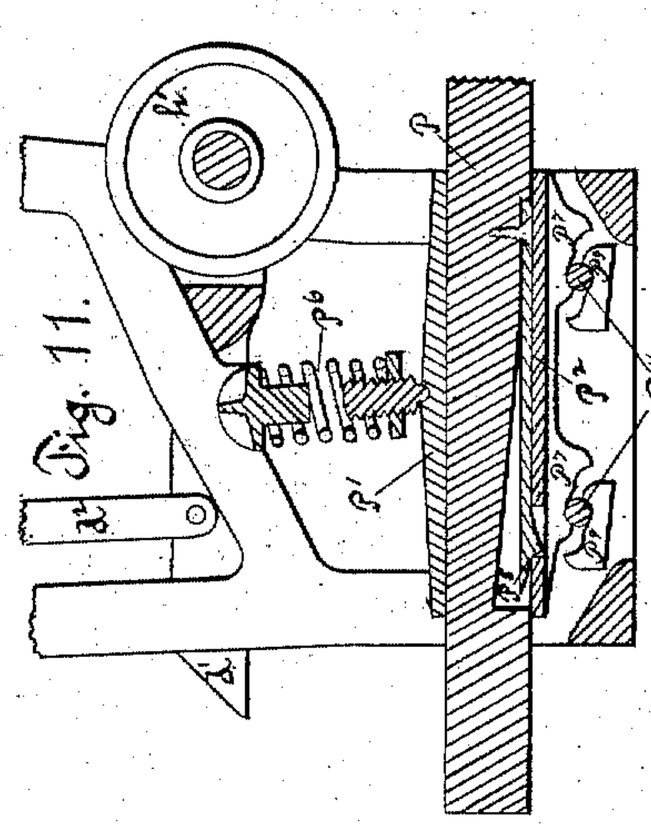


Fig. 11.

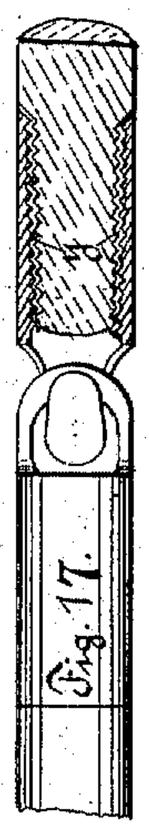


Fig. 17.

Fig. 4.

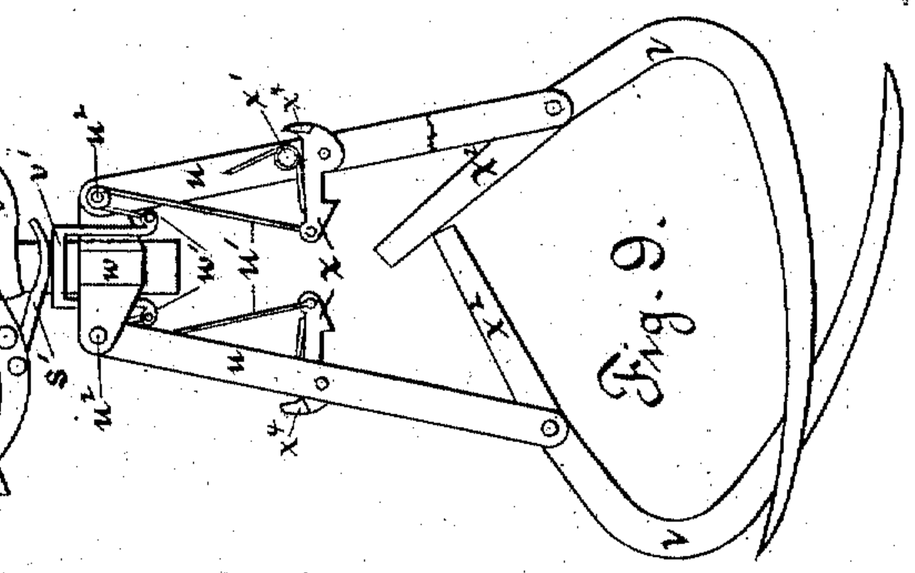


Fig. 9.

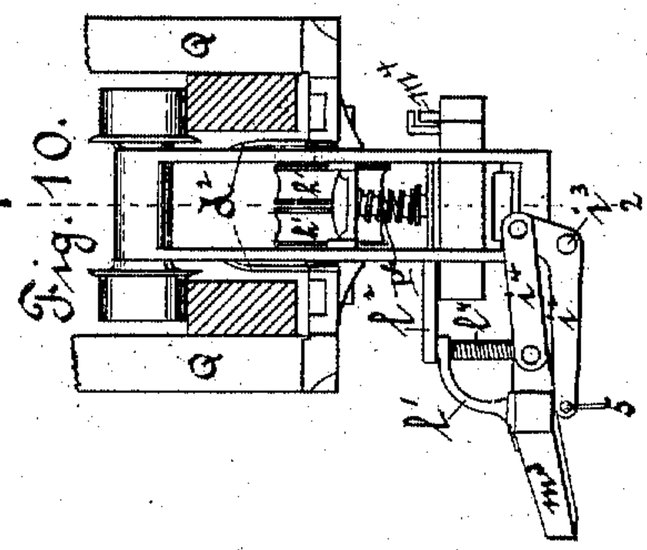


Fig. 10.

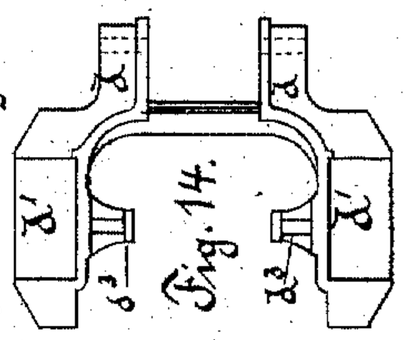


Fig. 14.

Fig. 5.

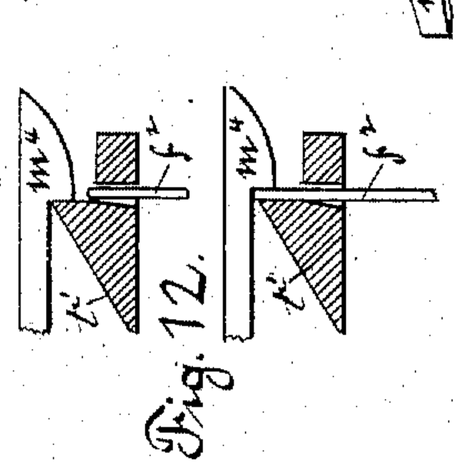


Fig. 12.

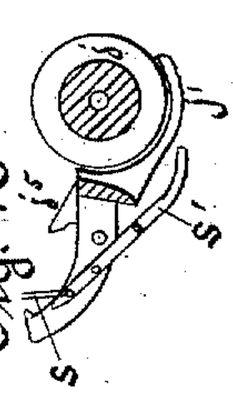


Fig. 13.

Witnesses:
Abel Burritt
F. M. Geary

Inventor:
E. F. Morse.

UNITED STATES PATENT OFFICE.

E. FLUT MORSE, OF ITHACA, NEW YORK, ASSIGNOR OF ONE-FOURTH TO HENRY FITCH, JR., OF JERSEY CITY, NEW JERSEY.

HAY ELEVATOR AND CARRIER.

SPECIFICATION forming part of Letters Patent No. 288,587, dated November 13, 1883.

Application filed July 29, 1882. (No model.)

To all whom it may concern:

Be it known that I, E. FLUT MORSE, a citizen of the United States, residing at Ithaca, in the county of Tompkins and State of New York, have invented a new and useful Hay-Carrier, of which the following is a specification.

My invention relates to improvements in machinery for handling hay; and the objects of my invention are to make a carrier which shall be capable of taking the hay from any place in a long barn or off a loaded wagon, raise it to the carrier, carry it forward along a track in the top of the barn, and at the place desired automatically drop the load and return to its original position, where it will let the fork down and be ready to take another load; and to so construct it that the place from which the hay is taken, and also where it is dropped, can be easily and quickly changed. I attain these objects by the mechanism illustrated in the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a front view of my carrier. Fig. 4 is a back view of the same. Fig. 2 is a front view of the movable buffer-car located over the place from which the hay is to be taken. Fig. 5 is a back view of the same. Figs. 3 and 6 are views of the movable buffer-car located at the place where the hay is to be dropped. Fig. 7 is an end view of the carrier, and Figs. 8 and 9 are views of my fork attached to the carrier by a rope. Fig. 10 is an end view of movable buffer-car, Fig. 5. Fig. 11 is a sectional view of a part of the same on the line 1 2, Fig. 10. Figs. 12, 13, and 15 are detailed views of the carrier, and Figs. 14 and 18 are detailed views of the movable buffer-cars. Fig. 16 is a view of the dead-sheave and its hanger placed at one end of the track, the driving-sheave being placed at the other end. Fig. 17 is a view of the coupling used to connect the ends of the rope that runs the carrier.

Similar letters refer to similar parts throughout the several views.

The power necessary to run the carrier is conveyed to it by the endless rope *e e*, which runs in the direction indicated by the arrows, passing through the carrier, and being supported at the buffer-cars by sheaves *h' h'*. The supports Q Q to the track are made to project below the track-rails, and are used in connection with clamps *d* to hold the movable buffer-cars in position. The clamp *d*, of which Fig. 14 is a plan view, is hung at one end on the frame, Fig. 5, by the pin that passes through and supports sheaves *h'*. The other end of the clamp is provided with suitable places, *d' d'*, for receiving the ends of the supports Q, and is held in position by straps d^2, connecting it to rock-shaft *n*, which rests in hangers projecting from the frame. About rock-shaft *n* is a spring adjusted so as to turn the arms of rock-shaft up and against the frame, when the arms *n'* will have turned by the dead-center and hold the clamp up securely. By pulling cord 4, which is attached to arm n^2 of rock-shaft, the rock-shaft arms may be turned downward and the movable buffer unclamped and moved to any desired position. When the cord is released the spring about rock-shaft *n* raises the clamp.

The buffer *o'* is restrained from all but rectilinear sliding motion by being paired with an open prismatic part of the frame, and is attached to an elliptic spring, *o*, that rests in the frame. This spring-buffer reverses the motion of the carrier and shifts some of its parts when the carrier strikes it.

The clamping mechanism of buffer-car Fig. 2 is the same as that of buffer-car Fig. 3; but the buffer P, which is to stop the carrier within a limited space, is held between two plates, P' and P^2. The spiral spring P^6 is restrained between the frame of the car and the plate P', and thus subjects the plate P' to the force of the spring P^6, by virtue of which enough friction is caused between the plates and the buffer to stop the carrier by forcing the buffer through the car the desired distance. The buffer must be restored to its former position and be ready to receive the carrier when it returns. To attain this the plates P' and P^2 have a small movement with the buffer, which causes the plates to press the buffer while being pushed backward, and to release it while being pulled forward. When the buffer is forward, the plates P' and P^2 are also forward,

as shown in Fig. 11, and the plate P′ being supported by projections P^3, extending from the frame, the buffer lies loosely between the plates. The lower plate, P^2, is supported by rollers P^4, which lie between inclines P^7 and P^9, projecting from the lower part of the plate and the inner side of the frame, respectively. The spring-catch P^5 is fastened to the lower side of buffer P and springs into a notch in plate P^2. When the buffer is forced back, this catch causes the lower plate to move back and up the inclines, raising the upper plate off projections P^3, thus subjecting the buffer to the force of spring P^6. The movement of the lower and upper plates is arrested by suitable stops. As the buffer is pressed still further backward the catch P^5 springs out of the notch, and the friction between the buffer and plates retains the lower plate at the top of the inclines, where the inclines are made nearly flat, so that the plate has little tendency to move down. However, if the buffer be drawn forward gently, the plates move forward with it and down the inclines, allowing the upper plate to again drop onto the projections P^3, when the buffer will lie loosely between the plates, and, finally, when the buffer is returned the catch P^5 springs into its notch. The buffer is drawn forward by the carrier, which is attached to it by catch m^4.

The sheaves *a b c c′* and drum G are hung in the frame of the carrier, and while sheaves *c* and *c′* are loose the sheaves *a b* and drum G are rigidly attached to their respective shafts. The loose sheaves *c* and *c′* are so placed as to cause the rope *e* to embrace a considerable portion of the circumference of sheaves *a* and B, and thus transmit its motion to them.

Gear-wheel *k* is rigidly attached to shaft *h* and meshes into pinion *l*, which is loose on shaft *i*, being restrained longitudinally by the bearing on the one side and a collar on the shaft on the other. Clutch *m* is made to turn with shaft *i* by key *i′*, but may slide longitudinally, and thus engage the clutch in the face of pinion *l*.

Clutch *m* is operated by elbow *m′*, which is hung to arms m^2, projecting from the carrier-frame. Casting *l′* is hung on arms l^2, projecting from the buffer-car frame, and lever m^3, which is bolted to it, has one end connected by straps i^4 to elbow-lever i^2, which is hung on the frame at i^3, and to which the cord 5 is attached. Clutch *m* is thrown in by lever m^3, being forced against the lower arm of elbow *m′*. Lever m^3 is thrown back by spring l^4.

One end of rope *f*, to which the fork is attached, is fastened to the drum G, and is made to wind evenly by sheave *j*, which is hung in the sheave-frame *j′*. The sheave-frame is pivoted to straps j^2, which are pivoted to the frame at j^3. The end of sheave-frame *j′* is provided with catches j^4, that hook over the lower part of the carrier-frame, and prevent the sheave from turning up about center j^3. For the purpose of unhooking, the sheave-frame has a small movement about the pivots passing through it and straps j^2. This movement is limited by stops j^6. The lower part, j^5, of the sheave-frame projects inwardly over the sides of the sheave *j*, Figs. 7 and 13, and curves downward and outward, so as to guide rope *f* onto sheave *j*.

Lever *a′*, which is pivoted to the frame at *r*, has a catch adapted to engage with lugs *b′ b′* on sheave *b*. It is also provided with a curved arm, *r′*, adapted to strike the upper arm of elbow *m′*, and thus disengage clutch *m*.

Lever *s′*, which is hung on sheave-frame *j′*, is provided with two branches extending along the sides of the lower part, j^5, of the sheave-frame, and adapted to strike and press down ring *v′*, encircling fork-head *w*, for the purpose of tripping the fork. Lever *s′* also has an arm extending backward, to which chain *s* is attached. Said chain passes over a sheave hung on strap j^2, and another at j^3, and is attached to the lower arm of lever *a′*.

Shifting-straps a^2 and a^3 are pivoted to lever *a′*, and pass through suitable guides at the ends of the frame, and are of such length that one or the other must extend beyond the frame enough to shift lever *a′* the desired amount.

Catch m^4 is pivoted to buffer P, and is adapted to engage with lug *t′* on the carrier-frame.

Releasing-bar f^2 is pivoted to arm *f′*, which is a part of or attached to one of straps j^2, and passes through a guide in lug *t′*, Fig. 12, so as to release catch m^4 when strap j^2 swings up about j^3.

Ratchet-lever s^3, which is hung to the frame, is adapted to engage ratchet-wheel g^2, which is a part of or made fast to drum G. The upper end of ratchet-lever s^3 is connected to the frame by spring g^3, which keeps the lower end in contact with ratchet-wheel g^2. Rod *t*, which passes through a loop at the end of the frame, is also connected to the upper portion of ratchet-lever s^3, and is made to extend beyond the frame, so that ratchet-lever s^3 will release drum G when the carrier strikes buffer P.

The straps *u u* of the fork are pivoted to the ears on the head *w*, and to the end of these straps the fork-tines are hinged. The catches *x*, pivoted between the straps *u* at about their middle point, are adapted to receive the ends x^2 of the fork-tines and hold them fixed relatively to straps *u*. The catches *x* are thrown toward the tines by springs *x′*, and are limited in this movement by stops x^4, Fig. 9.

The chains *u′* are attached to the free ends of catches *x*, and pass over small sheaves between the straps near head *w*, and are attached to the lower ends of arms *w′*, which project downward from and are attached to ring *v′*, so that when ring *v′* is pressed downward the tines are released from catches *x*.

The operation of my carrier is as follows: The rope *e e* passes over sheaves located at each end of the track, which may be of any desired length, and is driven in the direction indicated by the arrows. The rope is sup-

ported at the buffer-cars by the sheaves h' h', and in going through the carrier passes over sheave c, under sheave a, and over sheave c', Fig. 1, in the one direction, and under sheave c', then over sheave b, and under sheave c, Fig. 4, in the other, the two sheaves c c and c' c' being side by side, as shown in Fig. 7. By pulling cord 4 the buffer-car Fig. 2 may be unlocked and moved along the track until it comes under the supports nearest over the place from which the loads are to be taken. Then, if the cord is released, the spring raises the clamp and locks the car. Buffer-car Fig. 3 may be unlocked and moved to the place where the hay is to be dropped, and locked in the same manner. The carrier is then run by rope e to buffer-car Fig. 2, the catch m^4 drops into its place over releasing-bar f^2, as shown in the lower view of Fig. 12, the shifting-strap a^3 and rod t are thrown back, releasing sheave b and drum G, thus allowing the fork, from its own weight, to run down. At the same time the sheave-frame drops to the position shown in Fig. 1, and the releasing-bar f^2 to the position shown in the upper view, Fig. 12. When the load is secured in the usual manner, the cord 5 is pulled and lever m^3 thrust against elbow m', thus throwing clutch m into gear and causing pinion l to revolve with sheave a, which causes drum G to revolve in the opposite direction and elevate the load. When fork-head w strikes the sheave-frame, the sheave-frame is unhooked and raised until straps j^2 meet the stops f^3, Fig. 4, projecting from the inside of the carrier-frame, the releasing-rod f^2 raises catch m^4, and, the drum G and sheave a having now stopped revolving, the rope e draws the carrier ahead until it strikes the buffer o', which stops and starts the carrier in the other direction with the force of the spring o. The fork is prevented from running down by ratchet-lever s^3, which is thrown in as soon as the carrier leaves buffer P. When the carrier strikes buffer o', the strap a^2, which projected beyond the frame, is thrown back and imparts its motion to lever a' and strap a^3, which is thrown so as to project beyond the carrier-frame. The arm r' strikes the upper end of elbow m' and throws clutch m out, thus allowing sheave a to run freely. The motion of elbow m is limited by stop r^2, Fig. 15, projecting from the frame. The forked end of lever s' is thrown down by chain s and forces down ring v', which, by chains u', releases the catches x, and the load throws the tines out and drops. The catch on the upper end of lever a' catches one of lugs b' b' and stops sheave b, thus causing the rope e, passing over it, to run the carrier back until it strikes buffer P, when shifting-strap a^3 is thrown back, which throws lever a' back and releases and allows sheave b to run freely. The catch m^4 now drops into its place and holds the carrier securely to the buffer-car. The rod t is thrown back, and, drum G being released, the fork runs down and is ready to take another load. When the carrier strikes buffer P, it moves the buffer backward, causing it to be pressed between plates P' and P^2 in the manner described; and when the carrier elevates the load it draws the buffer, which moves freely forward in its effort to move ahead. The motion of buffer P is limited by stops P^8.

It may be remarked that instead of gears l and k, sprocket-wheels and link-belting can be used; also, instead of lever a' being provided with a catch, one of the straps a^2 or a^3 can be extended upward and provided with a suitable catch, and that lug t' can be put between the sides of the frame, instead of at one side; also, that my carrier may be used for carrying other substances than hay.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a carrier, the advance sheave a and return sheave b, in combination with sheaves c c' and rope e, arranged substantially as and for the purpose described.

2. In a carrier, the advance a and sheaves c c', arranged so as to transmit the power from rope e to sheave a, in combination with clutch m and drum G, for the purpose of elevating the load and drawing the carrier ahead, substantially as described.

3. In a carrier, the return sheave b and sheaves c c', arranged so as to transmit the power from rope e to sheave b, in combination with suitable mechanism for stopping sheave b, thus causing the carrier to return, substantially as described.

4. In a carrier, the return sheave b, with lugs b', in combination with a catch which may be an extension of either lever a', strap a^2 or a^3, for the purpose of stopping sheave b and causing the carrier to return, substantially as described.

5. In a carrier, the lever a', in combination with elbow m', clutch m, and shifting strap or straps a^2 a^3, substantially as and for the purpose described.

6. The guiding-sheave j, hung on sheave-frame j', pivoted to straps j^2, which are pivoted to the frame, substantially as and for the purpose described.

7. The catch m^4 and lug t', in combination with releasing-rod f^2, connected to an arm which is a part of or attached to one of straps j^2, substantially as and for the purpose described.

8. The ratchet-lever s^3 and releasing-rod t, in combination with drum G, with ratchet-teeth on one of its sides, substantially as and for the purpose described.

9. The combination of a carrier with two buffer-cars, which may be moved to and locked at different places along the track, and which determine the place where the carrier elevates and drops its load.

10. In a buffer-car, the buffer o' and spring o, for the purpose of stopping the carrier and starting it in the other direction, substantially as described.

11. The clamp *d*, which is securely hinged to the frame at one end, and having places *d'* *d'* at the other, adapted to receive the ends of supports Q, in combination with suitable mechanism for locking and unlocking the clamp, substantially as described.

12. The friction-buffer P, lying between and in combination with plates P' and P^2, either of which has a small movement with the buffer for the purpose of clamping and releasing the buffer, substantially as described.

13. The friction-buffer P, lying between plates P' and P^2, in combination with spring P^6, pressing against one of the plates, substantially as and for the purpose described.

14. The friction-buffer P, lying between plates P' and P^2, the plate P^2 having a small movement with the buffer, and resting on rollers which lie between inclines projecting from the plate and frame, substantially as and for the purpose described.

15. The lever m^3, hinged to the buffer-car, in combination with elbow-lever *m'*, for the purpose of throwing the carrier into gear, substantially as described.

16. The forked lever *s'*, pivoted to the sheave-frame, in combination with chain *s* and lever *a'*, substantially as and for the purpose described.

17. The ring *v'*, encircling the upper part of fork-head *w*, and connected to the tripping apparatus of the fork, in combination with lever *s'*, substantially as and for the purpose described.

E. FLUT MORSE.

Witnesses:
A. BURRITT,
CHAS. H. WHITE.

Correction in Letters Patent No. 288,587.

Affidavit having been filed in the Patent Office showing that the name of one of the patentees of Letters Patent No. 288,587, granted November 13, 1883, for an improvement in "Hay Elevators and Carriers," should have been written and printed *E. Fleet Morse*, instead of "E. Flut Morse;" it is hereby certified that the said patent should be read with this correction therein.

Signed, countersigned, and sealed this 18th day of December, A. D. 1883.

[SEAL.]

M. L. JOSLYN,
Acting Secretary of the Interior.

Countersigned:

BENJ. BUTTERWORTH,
Commissioner of Patents.