(No Model.) 2 Sheets—Sheet 1.

J. D. RICHARDSON.

ELEVATOR.

No. 259,923. Patented June 20, 1882.

Fig 1.

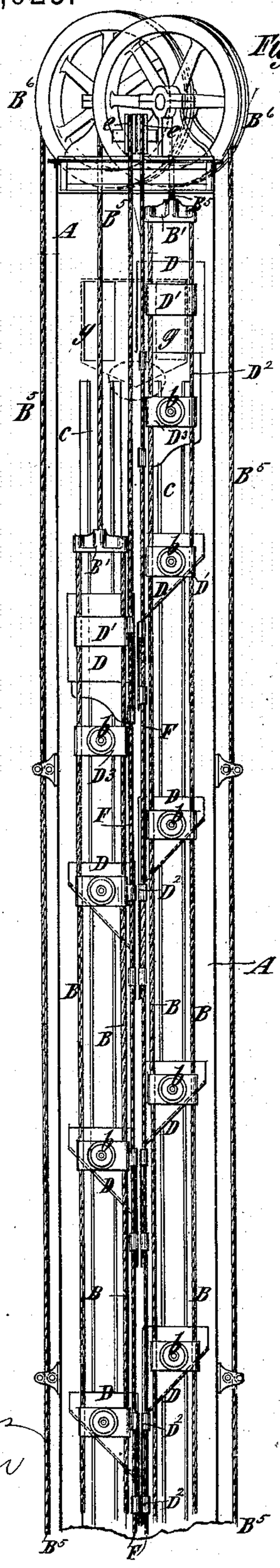
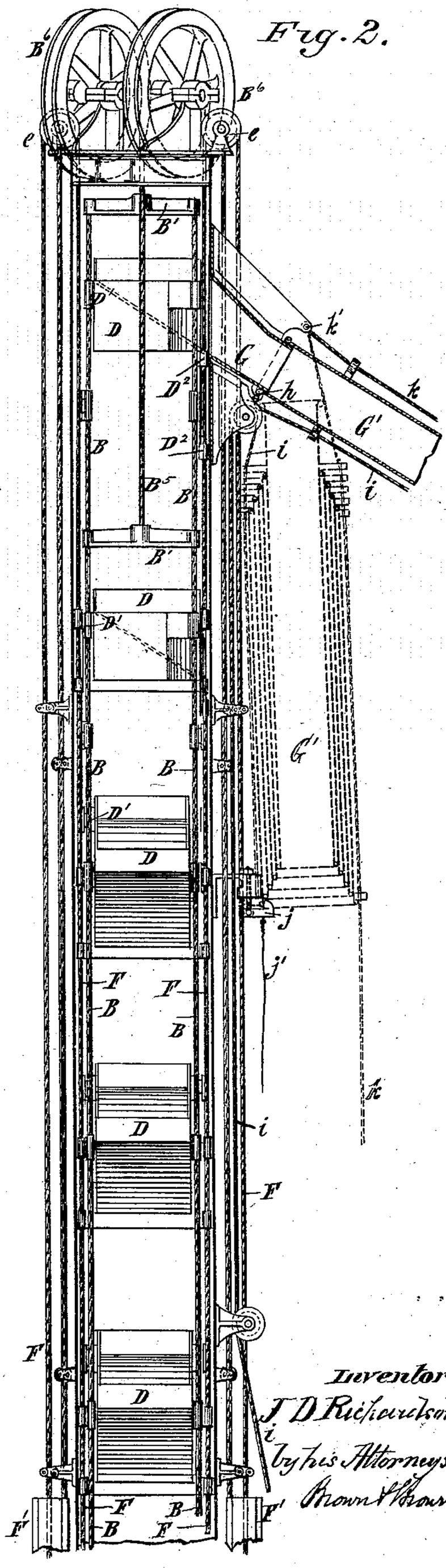


Fig. 2.



Witnesses
Fred Haynes
Ed. Moran

Inventor
J. D. Richardson
by his Attorneys
Brown & Brown

(No Model.) 2 Sheets—Sheet 2.

J. D. RICHARDSON.

ELEVATOR.

No. 259,923. Patented June 20, 1882.

Fig3.

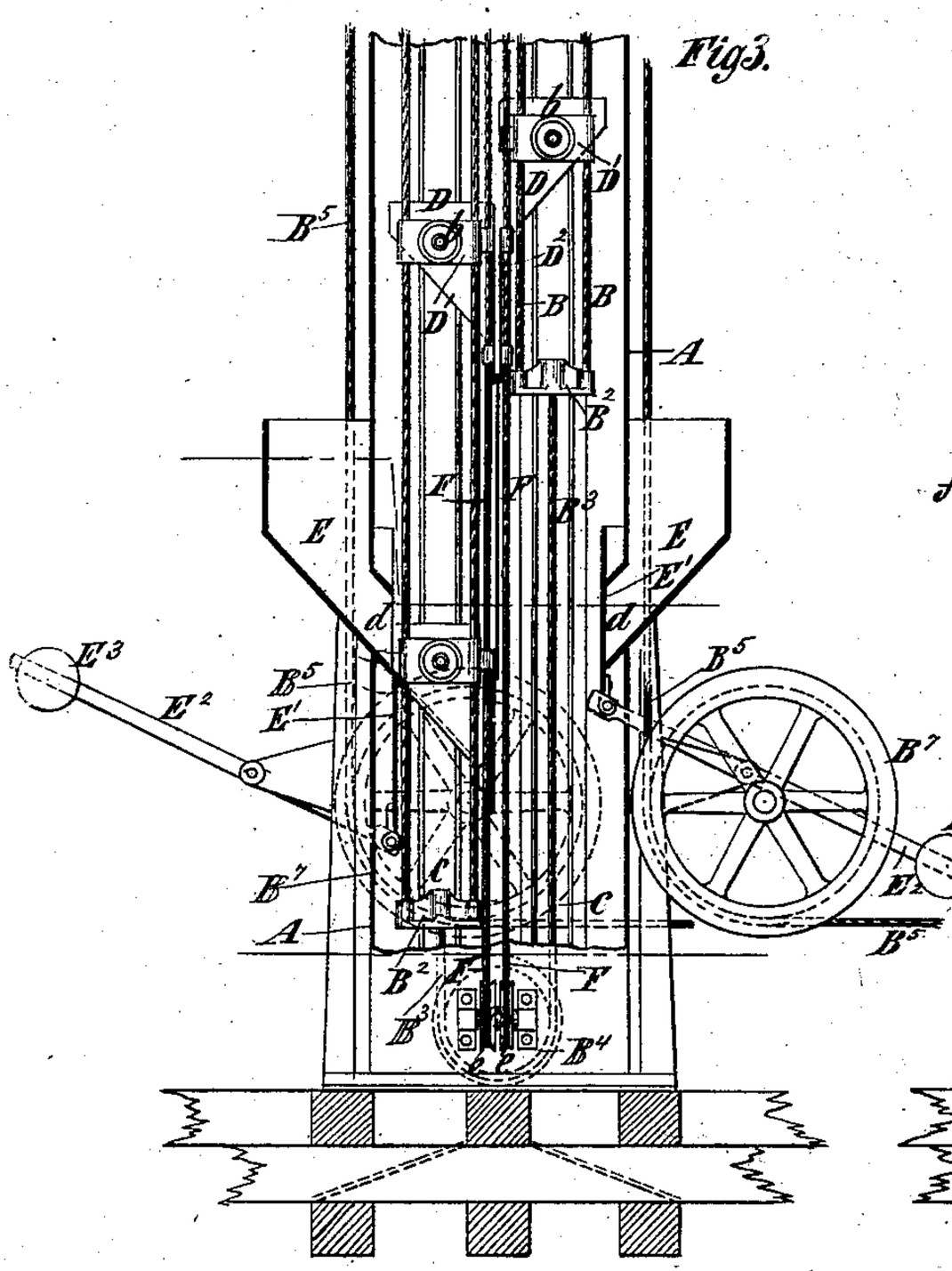


Fig4.

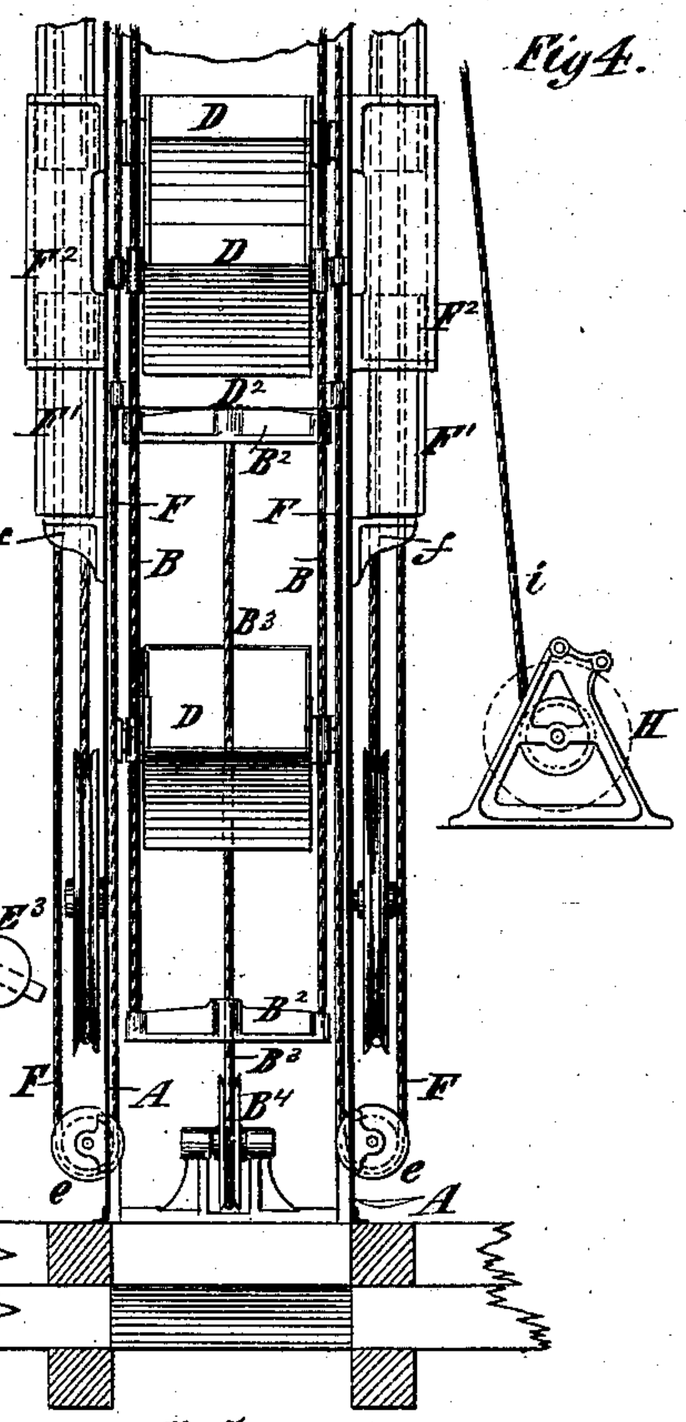


Fig5.

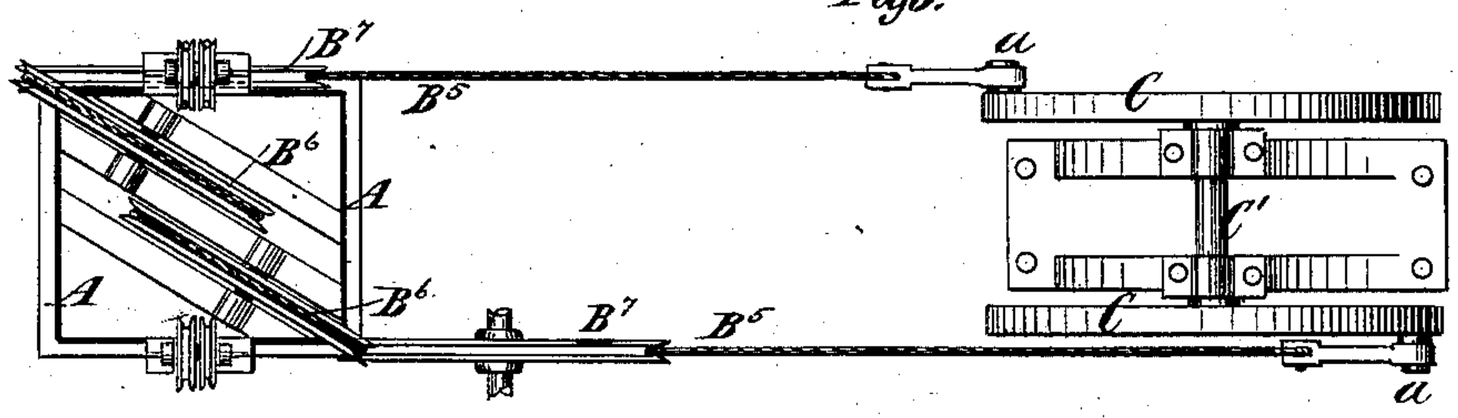


Fig6.

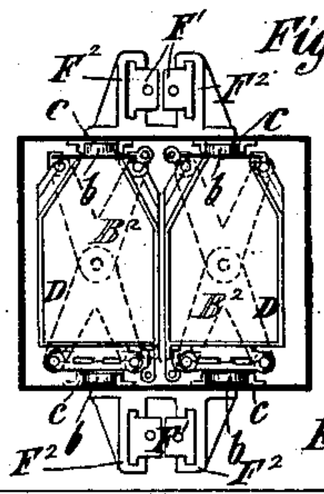


Fig8.

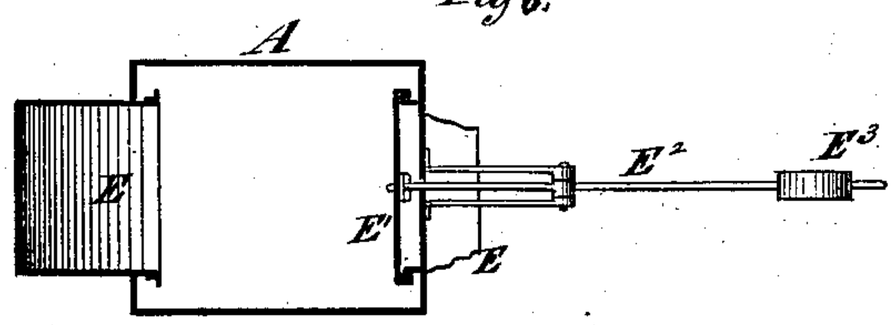
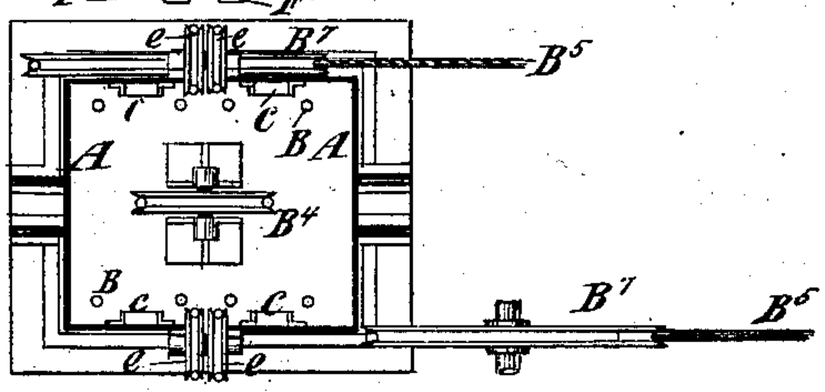


Fig7.



Witnesses
Fred Haynes
Ed. Moran

Inventor
J. D. Richardson
by his Attorneys
Brown & Brown

UNITED STATES PATENT OFFICE.

JOHN D. RICHARDSON, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO FRANCIS L. MANCHESTER, OF SAME PLACE.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 259,923, dated June 20, 1882.

Application filed April 21, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. RICHARDSON, of the city and county of New York, in the State of New York, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

My invention is applicable for elevating coal and other substances, and is particularly suitable for very high lifts.

The invention consists essentially in the combination of two carriers arranged side by side, mechanism for imparting to them a direct rectilinear motion alternately in opposite directions, and two series of buckets fixed back to back to said carriers, all being so organized that the buckets of one series, when in their highest position, will deliver their contents into the buckets of the other series, which are then in their lowest position. With the two series of buckets I may combine gates for said buckets, which are opened when the buckets of each carrier alternately are slightly above those of the other carrier, so as to permit the delivery of a load alternately from the buckets of each carrier into those of the other carrier.

The invention also consists in novel means whereby the gates which control outlets in the backs of the buckets are caused to travel with the buckets, and are kept opposite the openings which they control during the whole downward movement of the buckets, but are stopped near the termination of the upward movement of the buckets to cause the latter to travel sufficiently beyond the gates to expose their outlet-openings.

The invention also consists in a novel construction of the top buckets of each series, and in the combination therewith of gates which enable the top buckets to deliver their contents at the side, while all the other buckets of the two series deliver their contents at the back.

The invention also consists in various details of construction and combinations of parts, to be hereinafter described and claimed.

In the accompanying drawings, Figures 1 and 2 represent vertical sections, in planes at right angles to each other, of the upper portion of an elevator embodying my invention; and Figs. 3 and 4 represent similar sections of the lower part of the elevator. Fig. 5 represents a plan of the driving mechanism of the elevator. Fig. 6 represents a horizontal section thereof in a plane above the buckets. Fig. 7 represents a horizontal section thereof in a plane below the buckets; and Fig. 8 represents a plan of one of the feeders or feeding-hoppers, of which two are employed, and from which the buckets are supplied.

Similar letters of reference designate corresponding parts in all the figures.

A designates an upright tower, which contains my elevator, and which may be constructed of metal in any suitable manner, or of other material.

In the tower A are arranged two upright carriers, each composed of a group of four ropes, B, connected at their upper ends by cross-heads or frames B′, and at their lower ends by similar cross-heads or frames, B^2. The two lower cross-heads or frames B^2 are connected by a rope, B^3, which is carried around a sheave, B^4, at the bottom of the tower, so that the two carriers are compelled to move in opposite directions, an upward movement of one producing an equal downward movement of the other.

To the upper cross-heads or frames, B′, are connected ropes B^5, which are conducted over sheaves B^6 at the top of the tower, and thence downward under sheaves B^7. The two ropes B^5 are carried horizontally from the sheaves B^7, and are connected to crank-pins *a* in two wheels, C, which are mounted upon a single shaft, C′, and to which motion may be transmitted in any suitable manner. The crank-pins *a* are set at opposite points in the wheels C, and consequently, as the wheels are turned, a pull is exerted on one of the ropes B^5, while the other rope is correspondingly slackened, and a regular reciprocating and directly rectilineal motion is imparted to the carriers.

Instead of the carriers being formed of four ropes, as here represented, they may be composed of rods or other suitable devices connecting the upper and lower cross-heads, B′ B^2, and a reciprocating motion may be imparted to them by any suitable mechanism other than that here shown.

D designates buckets, of which two series are

employed, arranged back to back, and which are attached to and carried by the ropes B of the two carriers. The buckets D have clamps D′ attached to their sides, and said clamps are constructed so as to suitably grasp the ropes B, and thereby hold the buckets firmly attached thereto. The ropes B, being always under tension, will move the buckets in a straight path or line; but in order to aid in guiding said buckets I may provide each clamp D′ with a roller, *b*, upon its outer side, which fits in a channel or guideway, *c*, formed on or attached to the wall of the tower A, and of which two are provided for each series of buckets. The channels or guideways may be conveniently formed by pairs of angle-irons attached to the tower, as best shown in Fig. 7. The bottoms of the buckets D of each series are inclined downward toward their backs and toward the other series, as clearly shown in Figs. 1 and 3.

Below each series of buckets D is a stationary feeder or feeding-hopper, E, which is arranged outside the tower A, but the mouth or outlet of which projects into the tower, and the coal, grain, or other material to be elevated is shoveled into these feeders or feeding-hoppers.

The outlet-opening *d* of each of the feeders E is controlled by a vertically-sliding valve or gate, E′, which is normally kept in an elevated position to close the outlet of the feeder by means of a pivoted lever, E^2, to which is applied a weight, E^3. By the reciprocation of the series of buckets D the lower buckets of each series are brought alternately into a position opposite to the outlet-openings *d* of the feeders E, and as the buckets are lowered into such position they strike upon and move downward the valves or gates E′ and receive their load from the feeders E. After receiving their load the buckets D move upward, and as they move the valves or gates E′ follow them and close the outlet-openings *d* of the feeders E. The outlet-openings of all the buckets D, except the top buckets of the two series, are in their adjacent sides, and these openings are normally closed by gates or valves D^2. The gates or valves D^2 of each series of buckets are carried by two endless ropes or carriers, F, which pass around sheaves *e* at the top and bottom of the tower A, and in the portion of each rope or carrier F which extends outside the tower is a weight, F′, which is fitted to and adapted to slide in vertical guides or slideways F^2, as shown most clearly in Figs. 4 and 6. As the buckets D move downward they act upon the gates or valves D^2 and carry them also, at the same time raising the weights F′; but when the buckets move upward the weights, being more than heavy enough to counterbalance the gates or valves, raise the latter as fast as permitted by the upward movement of the buckets. When the buckets have nearly reached the end of their upward movement the downward movement of the weights F′ is arrested by stops or abutments *f*, against which they strike, as shown most clearly in Fig. 4, and as the gates or valves can then move no farther the buckets which are moving upward move beyond them, and so uncover their outlet-openings and deliver their contents into the other series of buckets, which have just completed their movement downward and are just below the several buckets of the first-mentioned series.

From the above description it will be seen that the load is raised step by step and is alternately transferred from the buckets of one series to those of the other series, each bucketful being raised at each movement a distance very nearly equal to the reciprocating movement of the buckets.

Referring now to the manner in which the buckets finally deliver their load at the top of the elevator, *g* designates two openings in the side of the tower A and opposite the position at which the top buckets D arrive at the end of their upward movement, as shown by the right-hand bucket in Fig. 1, and both the outlet-openings communicate with a common discharge-nozzle, G, as shown in Fig. 2.

The upper or top buckets of the two series have their outlet-openings at the side, instead of at the back, and the said openings are controlled by gates or valves D^2, which are attached to the carrier-ropes F, and consequently have not so great a range of movement as the buckets. As each top bucket nears the end of its upward movement its gate or valve D^2 is arrested, as previously described, and the bucket moving onward uncovers its outlet-opening and discharges its contents through the opening *g* into the discharge-nozzle G.

It is obvious that the openings *g* prevent the guideways or channels *c* from being continued past them upon that side of the tower, and consequently the clamp D′, which attaches the top bucket to the carrier-ropes B on that side of the tower, need not be provided with a roller, *b*.

For the purpose of steadying the carrier-ropes B, however, I may attach to them a clamp, D^3, below the top bucket, as seen in Fig. 1, and provide such clamp with a roller, *b*.

The delivery-nozzle G is provided with a chute, G′, which is composed of telescopic sections adapted to slide one inside the other, and the inner section of which is hinged at *h* to the nozzle G. This chute, when not in use, is adapted to be contracted and swung inward parallel with the side of the tower A, as shown in Fig. 2, by a rope, *i*, connecting all the sections and passing downward to and around a windlass, H, (shown in Fig. 4,) and when so contracted it may be held in place by a catch, *j*, (shown in Fig. 2,) which engages with the lower end of the sections.

When the chute G′ is to be used the catch is withdrawn by a string or cord, *j′*, and the chute is swung outward into line with the nozzle G, as shown in Fig. 2, and extended for

use. The chute G′ on the side opposite the rope *i* is provided with another rope, *k*, which is fastened at *k′* and connects all the sections.

When the chute is to be extended for use the rope *k* is carried to a distance from the tower A and secured, and then serves as a guy-rope to keep the chute steady.

In some cases I may dispense with the gates or valves and pivot the buckets in such manner that the buckets of each series may be tilted on arriving at their highest position, so as to deliver their contents into the buckets of the other series.

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

1. The combination of two carriers arranged side by side, mechanism, substantially such as described, for imparting to them a direct rectilineal motion alternately in opposite directions, and two series of buckets attached to said carriers and arranged back to back, all being so organized that the buckets of each series, when in their highest position, will deliver their contents into the buckets of the other series, substantially as and for the purpose specified.

2. The combination, with two reciprocating carriers, two series of buckets attached thereto, and sliding gates or valves for said buckets, of carriers to which the gates or valves are attached, and means, substantially such as described, for arresting the movement of the gates or valves when the buckets approach the end of their upward movement, so as to allow the said buckets to move away from said gates or valves, substantially as described.

3. The combination, with two reciprocating carriers, buckets attached thereto, and sliding gates or valves for said buckets, of carriers to which said gates or valves are attached, and which are weighted to move the gates or valves upward, and stops for arresting said weights, and thereby stopping the gates or valves before the buckets reach the end of their upward movement, substantially as described.

4. The combination, with the elevator-tower having delivery-openings *g*, of two reciprocating carriers, two series of buckets attached thereto, the top buckets of the two series having delivery-openings in their sides, sliding gates or valves for said buckets, a reciprocating carrier to which said gates or valves are attached, and means, substantially such as described, for arresting the upward movement of the gates or valves before the completion of the upward movement of the buckets, substantially as described.

5. The combination, with two reciprocating carriers and two series of buckets attached thereto, of the feeders or feeding-hoppers E and the self-closing gates or valves E′, adapted to be opened by said buckets in their downward movement, substantially as described.

6. The combination of the tower A, provided on opposite sides with channels or guideways *c*, the two reciprocating carriers, each composed of a group of ropes, B, and cross-heads or frames B′ B², the buckets D, the clamps D′, for attaching the buckets to said ropes, and the guide rollers *b* on said clamps, substantially as specified.

7. The combination, with the two carriers connected at their lower ends and provided with buckets, of the ropes B⁵, connected to the upper ends of said carriers, the sheaves B⁶, over which said ropes pass, and the rotary wheels C, provided with crank-pins *a*, set diametrically opposite each other, and to which said ropes are attached, substantially as specified.

J. D. RICHARDSON.

Witnesses:
FREDK. HAYNES,
ED. MORAN.