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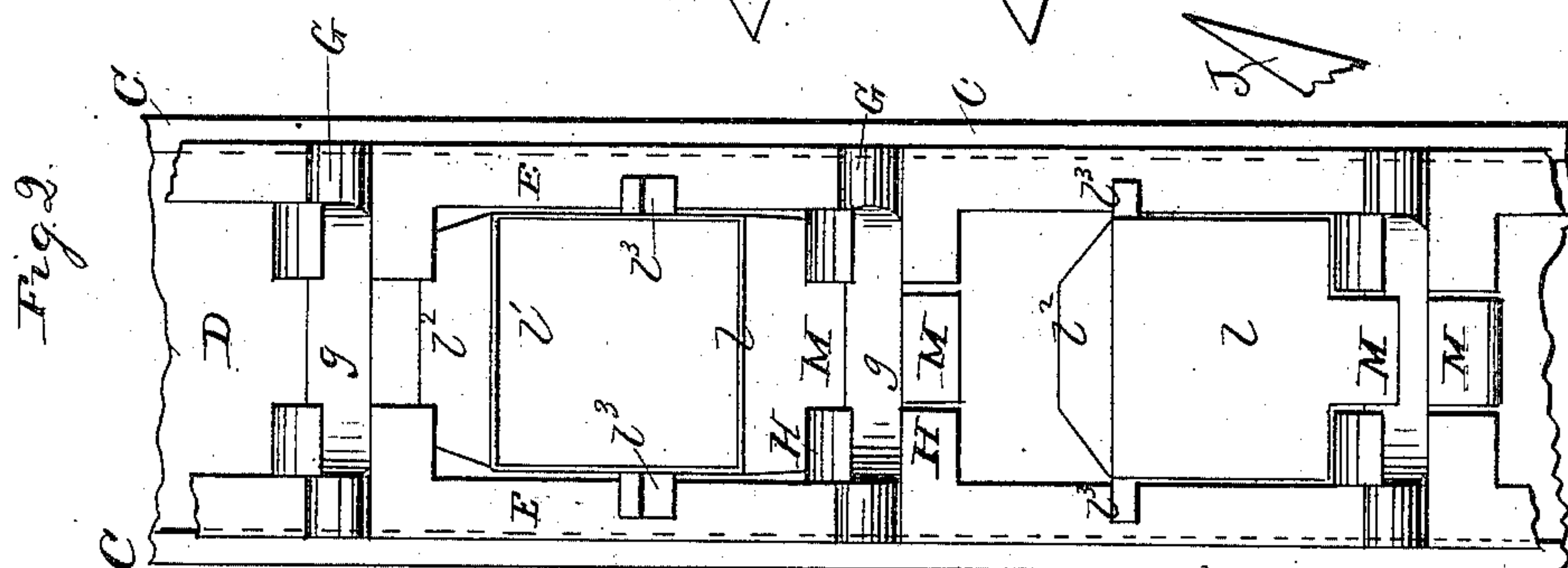
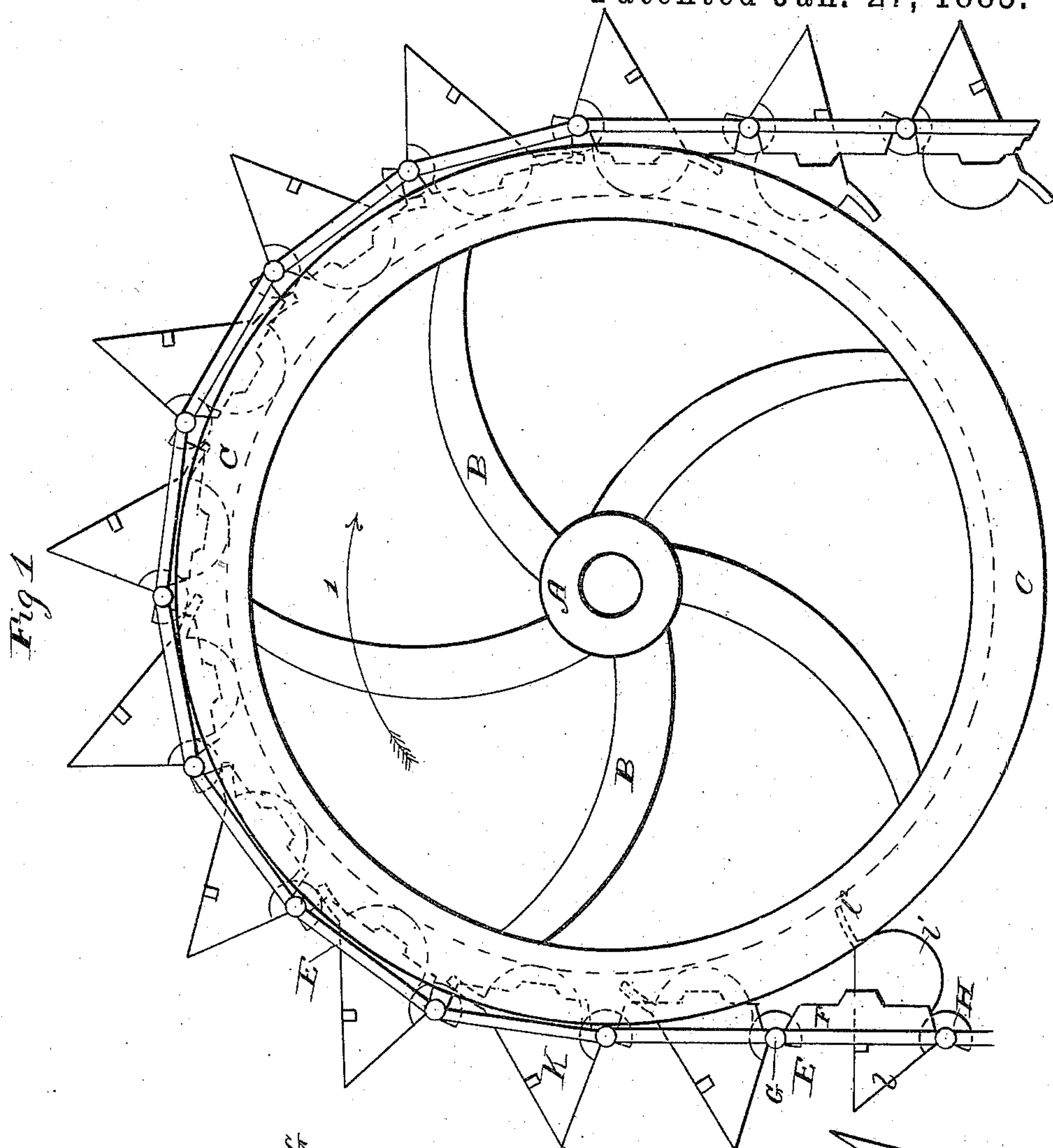
6 Sheets—Sheet 1.

C. W. LEVALLEY.

ELEVATOR CHAIN.

No. 311,334.

Patented Jan. 27, 1885.



Witnesses:

H. E. Bliss
J. S. Barker

Inventor:

Christopher W Pevalley
by Doubleday & Co. Inc.
at 10-

(No Model.)

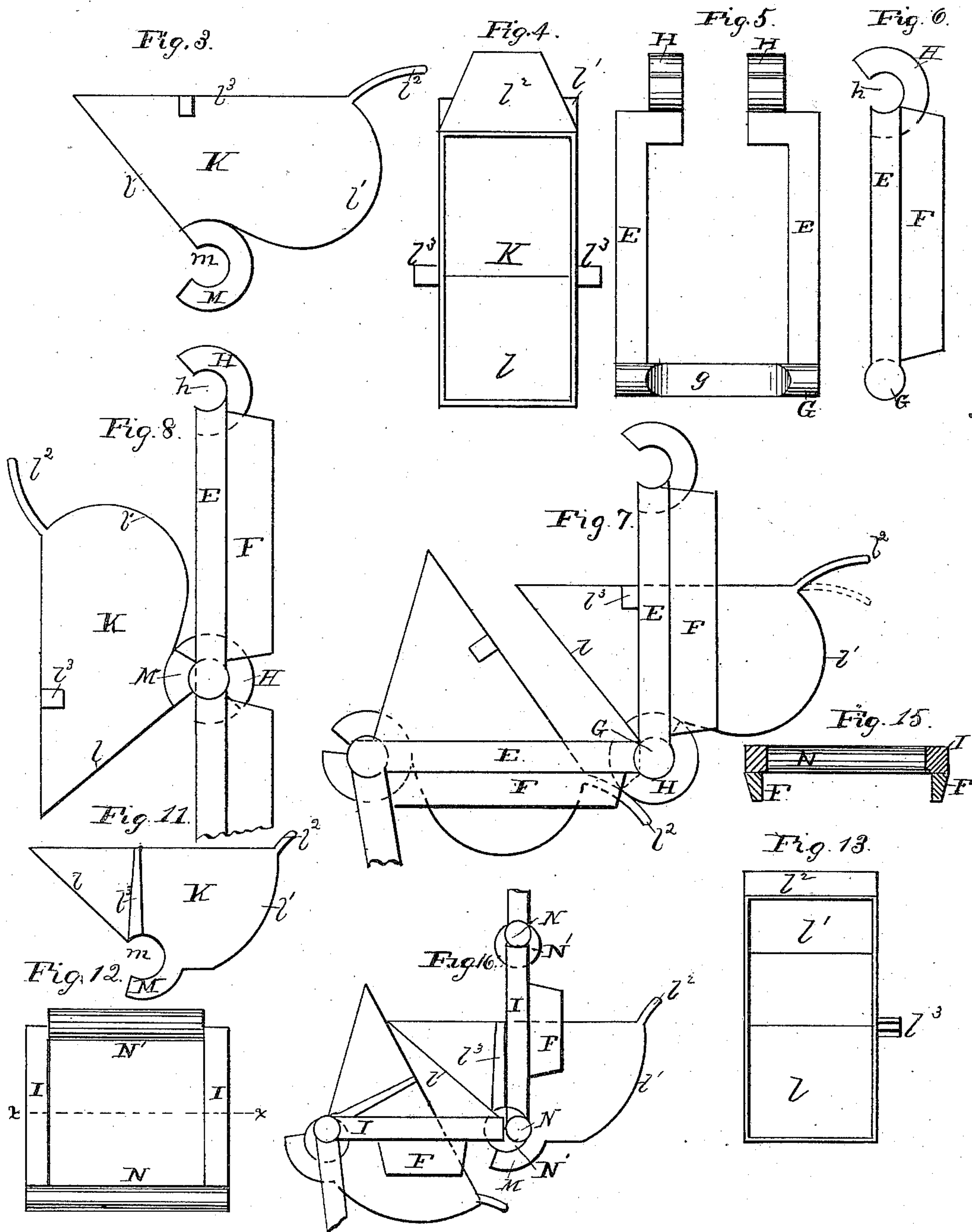
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(No Model.)

6 Sheets—Sheet 3.

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Fig. 9.

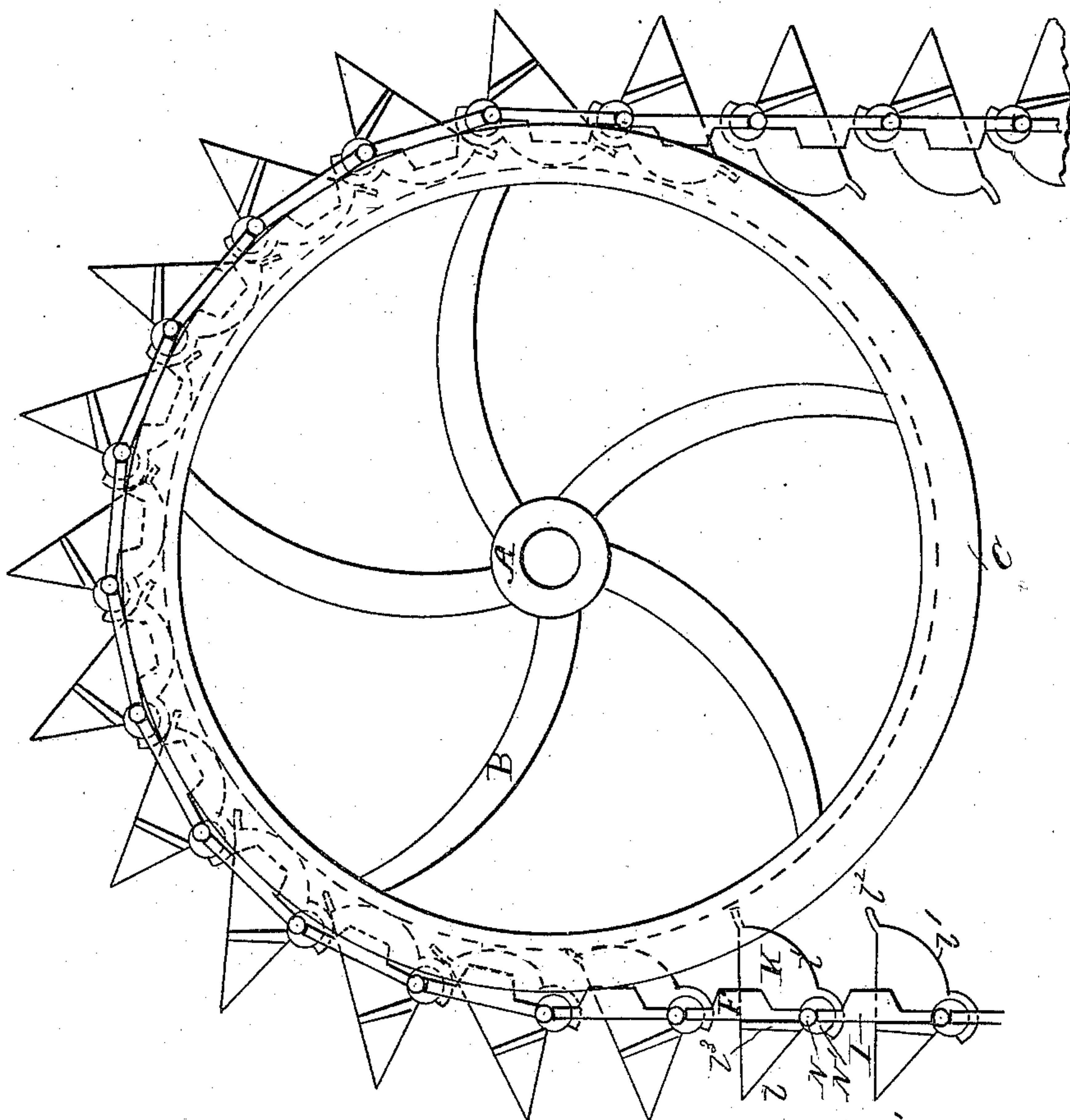
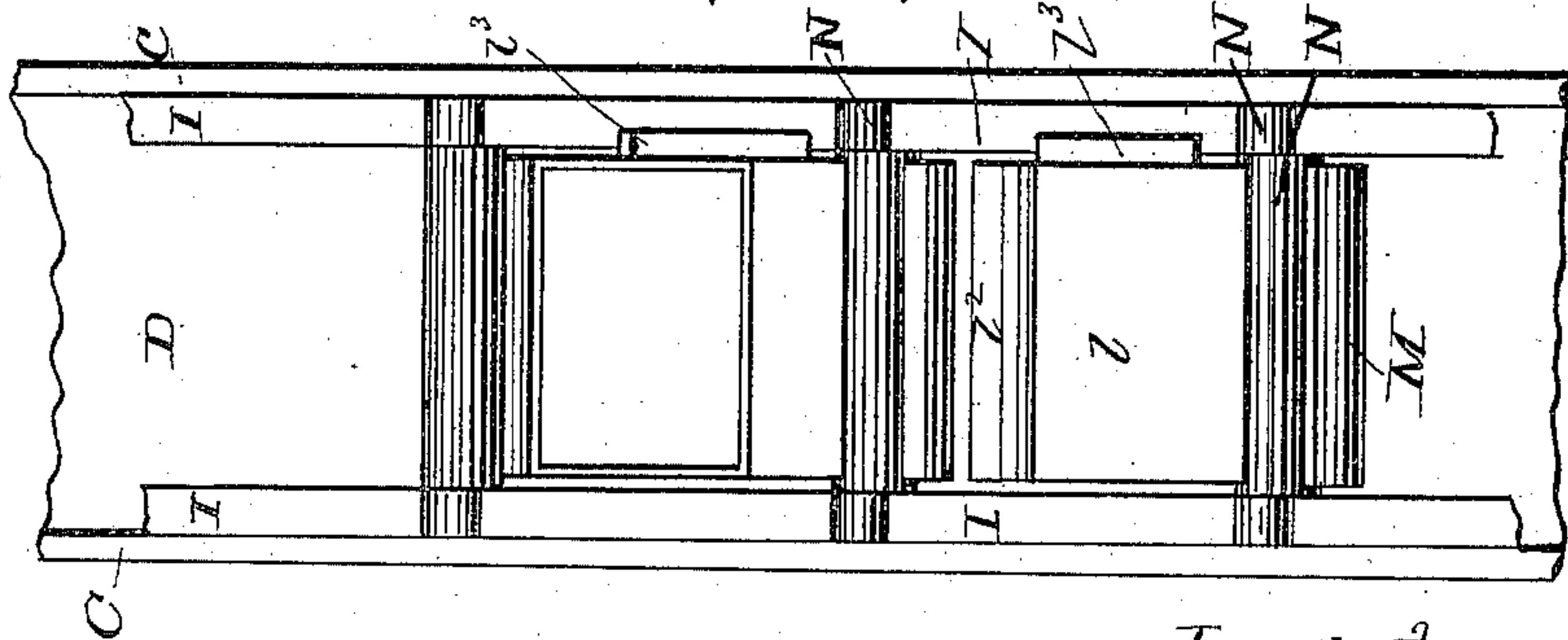


Fig. 10.



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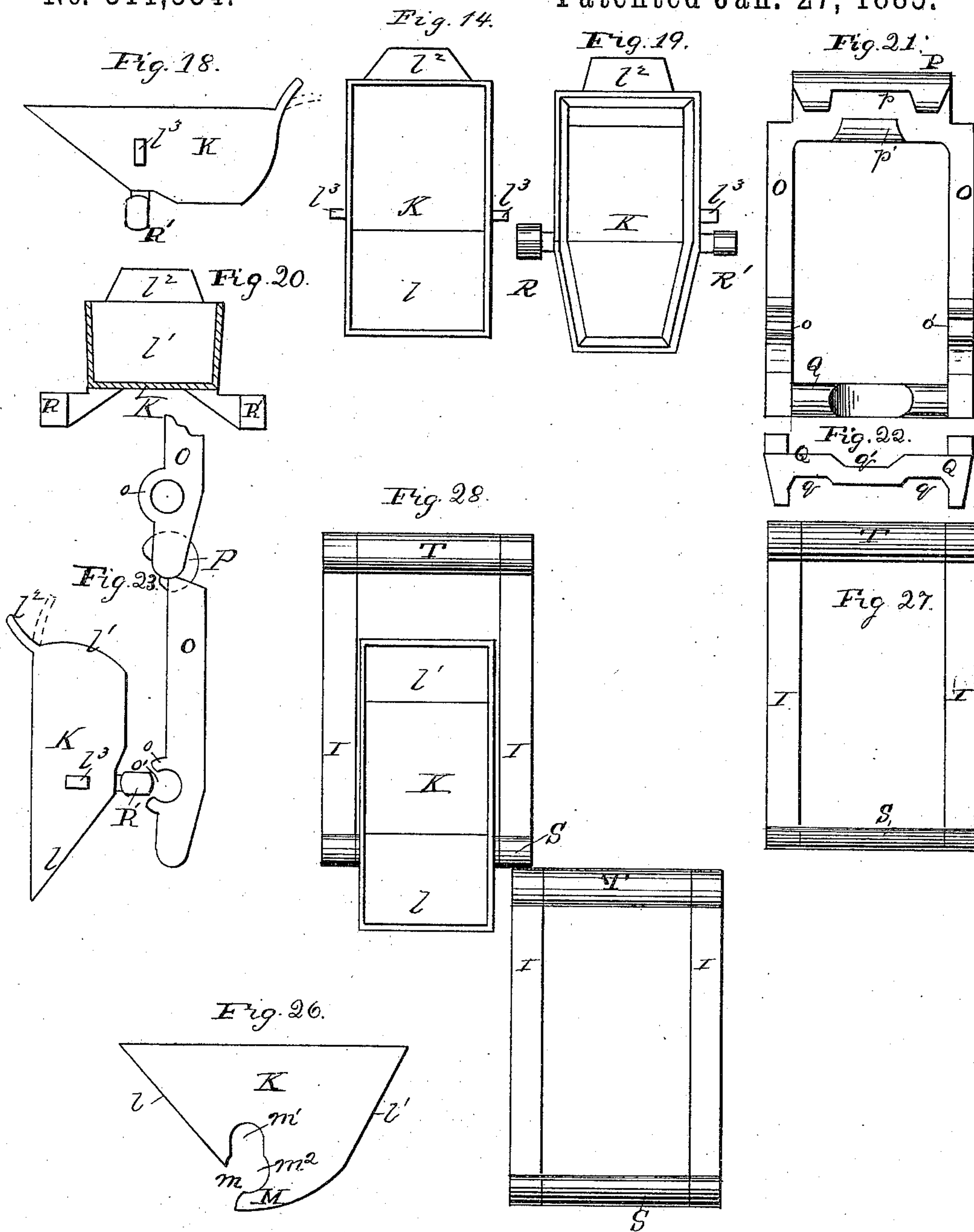
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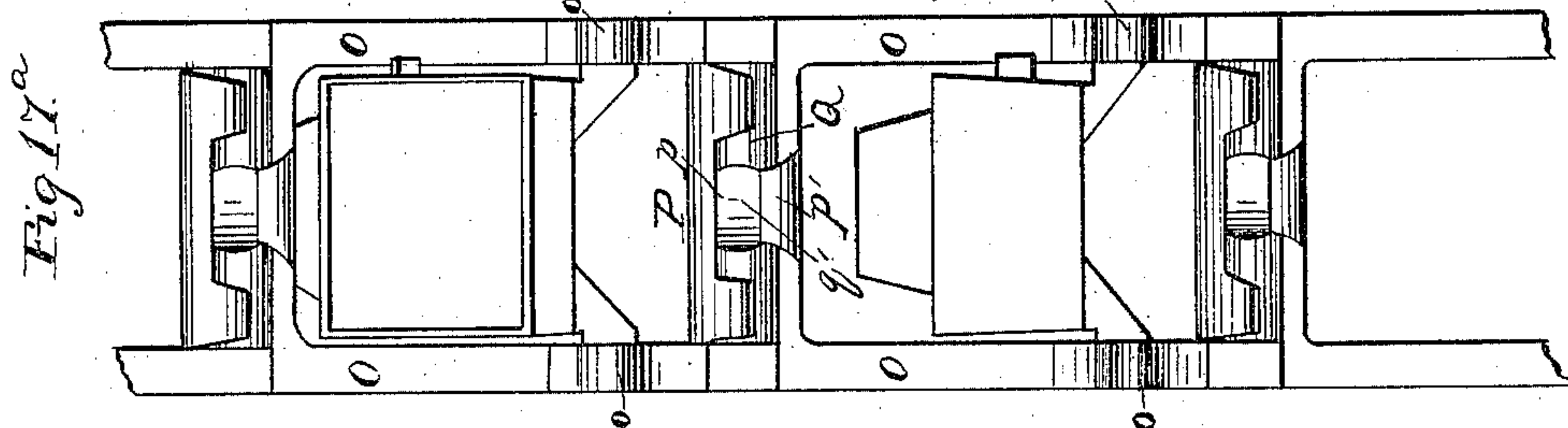
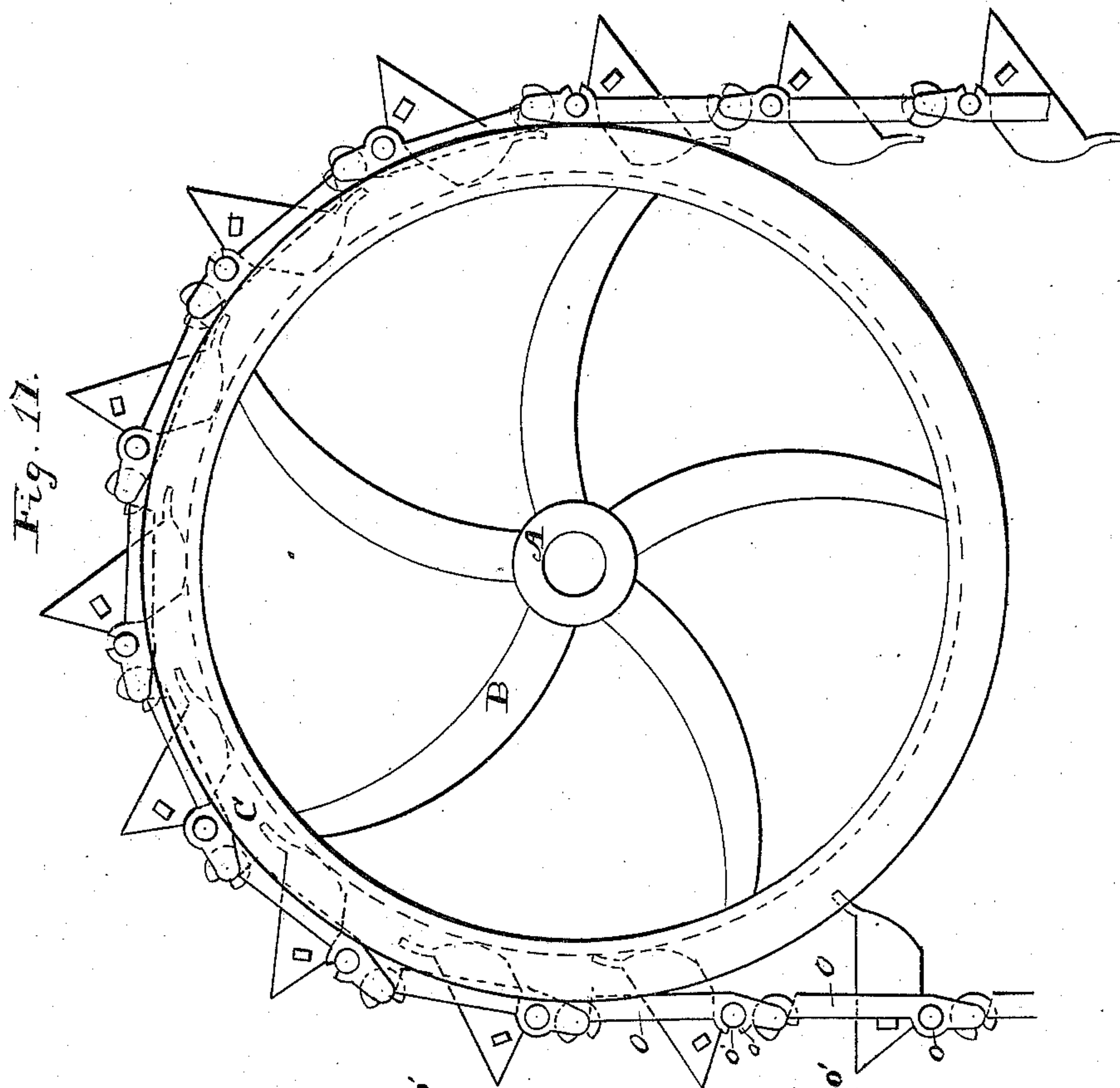
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6 Sheets—Sheet 6.

C. W. LEVALLEY.

ELEVATOR CHAIN.

No. 311,334.

Patented Jan. 27, 1885.

Fig. 24.

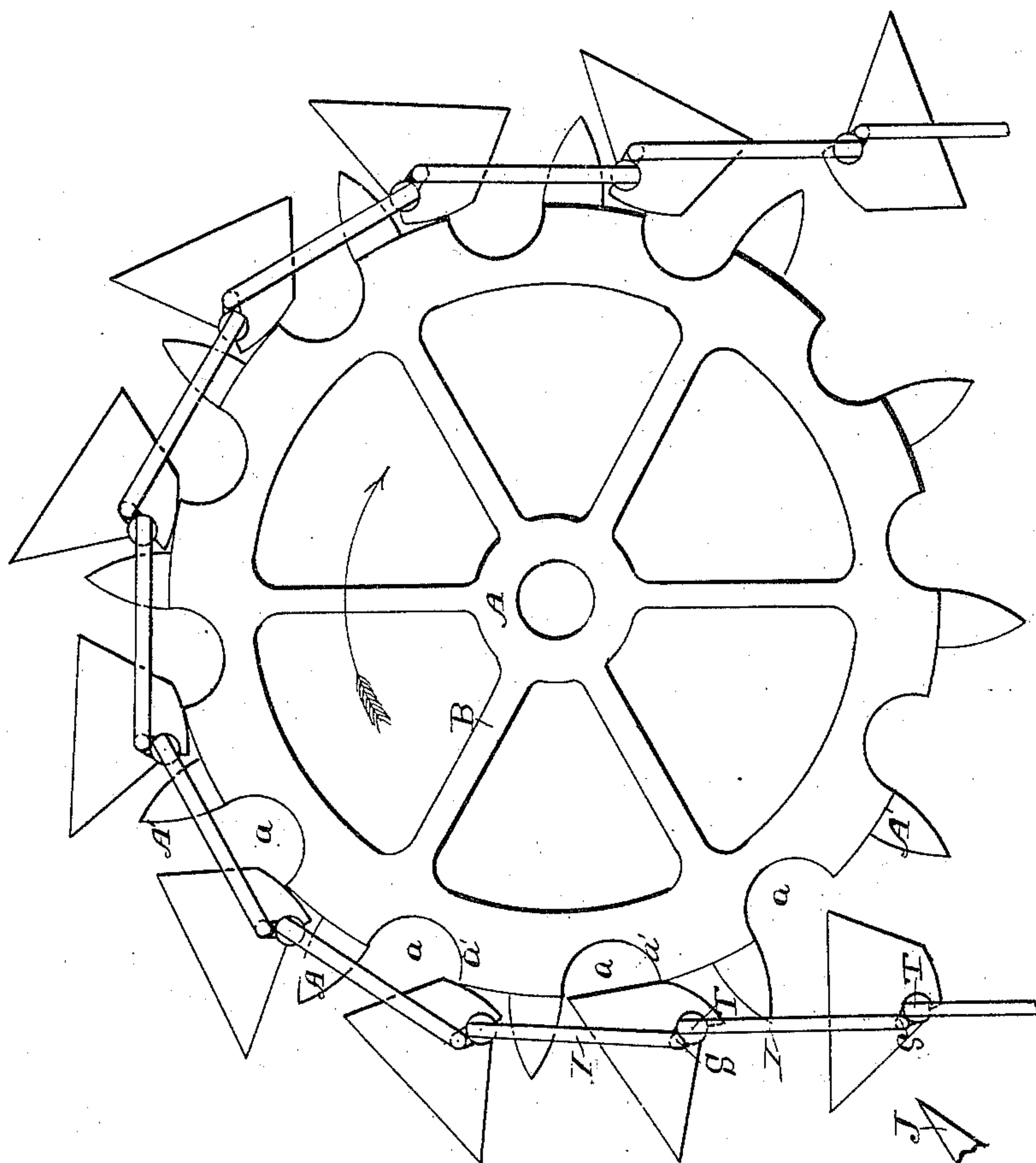
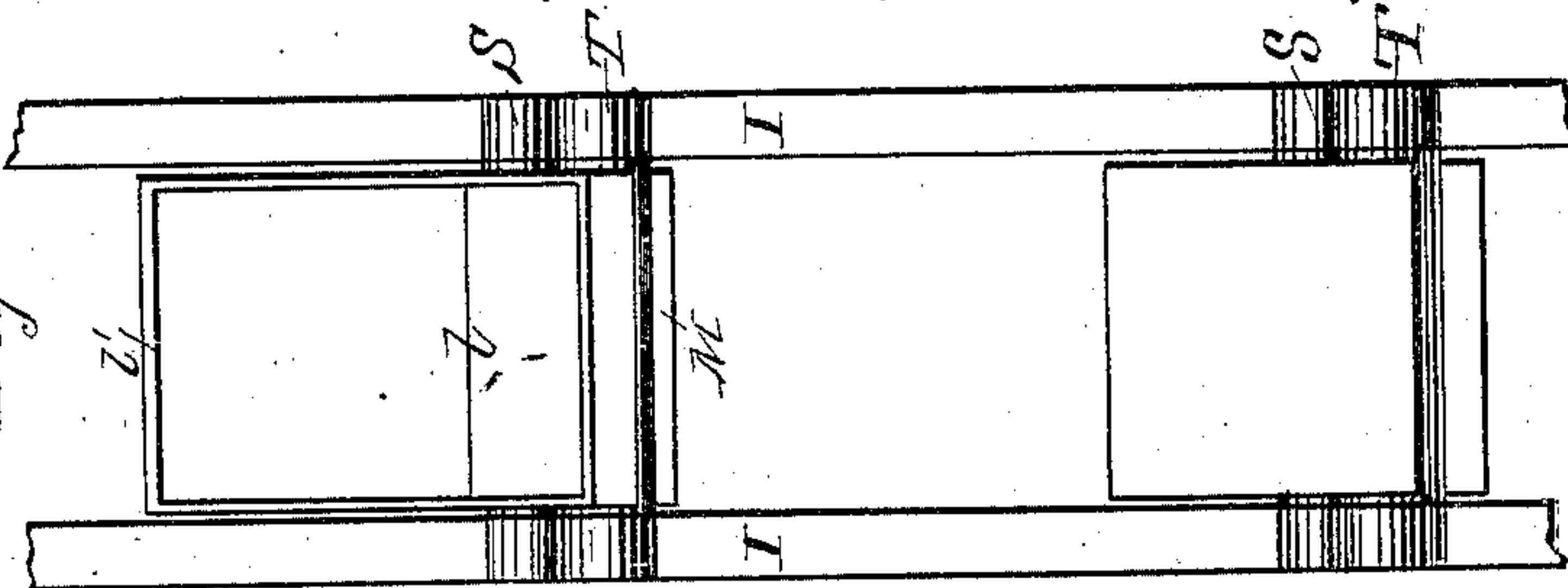


Fig. 25.



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UNITED STATES PATENT OFFICE.

CHRISTOPHER W. LEVALLEY, OF ST. PAUL, MINNESOTA.

ELEVATOR-CHAIN.

SPECIFICATION forming part of Letters Patent No. 311,334, dated January 27, 1885.

Application filed July 26, 1884. (No model.)

To all whom it may concern:

Be it known that I, CHRISTOPHER W. LEVALLEY, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Elevator-chains, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a side elevation of a driving-wheel having my improved chain applied thereto. Fig. 2 is an edge view of the same. Fig. 3 is a side view of one of the buckets. Fig. 4 is a plan or top view of one of the buckets. Fig. 5 is a plan view of one of the links. Fig. 6 is an edge view of one of the links. Fig. 7 is a view of two of the links and buckets turned toward each other in proper position for detaching the links from each other. Fig. 8 is a view illustrating the method of applying the buckets to the links. Fig. 9 is a side elevation, partly in section, of a wheel and chain containing a modification. Figs. 10, 11, 12, 13, and 14 are details. Fig. 15 is a vertical transverse section of one of the links on line *x x*, Fig. 12. Fig. 16 is a side view of one of the links and one of the buckets in position for applying the bucket to the link. Fig. 17 is a side elevation, partly in section, showing another modification. Figs. 17^a, 18, 19, 20, 21, 22 are details. Fig. 23 is a view of two of the links and a bucket turned into proper position for applying it to the link. Fig. 24 is a side elevation, partly in section, of a wheel and chain containing another modification. Figs. 25, 26, 27 are details. Fig. 28 is a view illustrating the method of connecting the links and buckets together.

Similar letters of reference indicate like parts in all the figures.

A is the hub, B the spokes, and C the flanges, of a grooved wheel of substantially the construction ordinarily used for driving chains by frictional contact, except that the flanges are farther apart than usual, there being a bottom or flat peripheral surface, D, between the bases of the flanges. Each link is composed of two side bars, E E, provided with downward projections or flanges F F, the outer faces of which are inclined toward the center of the link, so as to fit closely the longitudinal peripheral groove between the flanges C C of

the drive-wheel, an end bar, G, which is flattened or slabbed off at one side, as at *g*, or on both sides, and a hook, H, at the opposite end, constructed with a narrow throat, *h*, of such width as to permit the insertion of the end bar, G, of an adjacent link whenever two of them are turned into an unusual relative position, as indicated in Fig. 7, the relative sizes of the end bar and its seat in the hook being such that when the links are straightened out in ordinary working position they are not liable to accidental separation.

K is a bucket having substantially parallel sides, an inclined outer side or end, *l*, and a curved end *l'*.

*l*² is a wing projecting upwardly and rearwardly from the upper edge of the curved end *l'* of the bucket.

*l*³ is a spur or stop projecting laterally from the upper edge of the side K of the bucket. There may be one of these stops upon each of the sides of the bucket, if desired.

M *m* is a coupler or hook projecting downwardly from the bottom of the bucket, the throat *m* being of such width as to admit the end bar, G, when turned into proper position. This hook or coupler is about one-third the width of the bucket, and is placed at a point about equidistant from its sides, being of such width or thickness as to fit closely between the two prongs or forks of the hook H, as is plainly shown in Figs. 2 and 5, where that end of the link is shown as being made without any end bar connecting the two parts of the hook. By placing one of the buckets and one of the links in an unusual position, as shown in Fig. 8—that is, a position other than that occupied by the links and buckets when in working relation—the bucket may be mounted upon the link by passing the end bar, G, through the throat *m*. The bucket may then be turned into the position shown in Figs. 1, 2, and 7, after which another link may be added and a bucket applied to it, and so on until a chain is made up of the desired length.

When the chain is in operation, as indicated in Fig. 1, and moving in the direction indicated by arrow 1 of that figure, the weight of the curved part *l'* will keep the bucket in a practically horizontal position, so that it will carry its contents without spilling;

but when passing around the driving-wheel the contact of the part D of the wheel with first the wing l^2 and afterward the curved part l' will tilt the bucket into the position indicated in Fig. 1, which will discharge its contents, particularly if it be a liquid, in such manner that it will be caught by the chute J, and may be conducted thence to any desired point. When the buckets are passing down the other leg of the chain—that is to say, the right-hand side of Fig. 1, and thence through the water or whatever material may be at the lower end of the doubled chain—they will be righted up into a horizontal position, so that they will fill themselves, as will be readily understood without further explanation. It will be seen that the pivotal line of the bucket is nearer the front end l than the curved rear end l' , thus causing the buckets, whether empty or filled, to tilt backward until retarded by the stop l^3 , by reason of the greater portion of the weight of the bucket being upon the inside of the loop formed by the chain passing over the driving-wheel. The stop l^3 is so located that the bucket is in a substantially horizontal position when it comes in contact with the side bars of the link, in which position the bucket remains until it is tilted by the driving-wheel, whether grooved as above described or formed with sprocket-teeth, as will be hereinafter set forth. The form of the buckets and their arrangement upon the links are such that they are tilted by the driving-wheel and their contents discharged into the chute J before the bucket is raised to the horizontal line of the axis of the wheel.

As shown in the drawings, the coupler M m is of about the same external diameter as is the forked hook upon the chain-link; but, when preferred, the coupler may be made of an increased diameter, and the bucket may be made of such length that each coupler shall engage with the upper edge of the curved end of the bucket immediately below it, and thus prevent such bucket from turning over so far as to be accidentally disengaged from its supporting end bar, in which case it would be impossible to remove any bucket from the chain except by tilting the one above it so far that the upper edge of the curved end could swing through the notch or portion of the coupler which is cut away adjacent to the throat m ; but in practice I prefer the construction shown, because when the wing l^2 is employed to act as a stop by engaging the coupler or the link-hook above it, it can be so bent into the position shown in dotted lines, Fig. 7, as to permit the removal of the bucket to which it is attached, these buckets being made preferably of malleable iron. The stops l^3 and the wing l^2 act as stops to limit the rocking movement of the bucket and retain it in working position—that is, to prevent it from tilting so far as to permit the bucket to become detached from its supporting-link.

Referring particularly to Figs. 9 to 16, the

wheel is of substantially the same construction as that shown in the figures just described, and the bucket is of substantially the same construction, except that the stop l^3 extends farther down the side of the bucket, and except, further, that the seat or recess in the coupler M is somewhat larger in cross-section; but the chain-links in this modification are essentially different.

I I are the side bars, and N N' the end bars. The end bar N is of such diameter that it can be readily passed through the throat m . The end bar N' is of much greater diameter, but instead of being round has a groove or recess upon one side adapted to receive and form part of a seat for the end bar N, the depth of the recess being such that when the parts are in position as indicated in Figs. 9, 10, and 16 the end bar N is held firmly in place between the wall of the groove and the inner wall of the coupler. The side bars, I I, are also provided with downwardly-projecting flanges F, to engage with the flanges C C of the drive-wheel.

In putting these links and buckets together to form a chain, I first insert one of the end bars, N, within the seat in the coupler, and then turn two links and a bucket into the relative position shown in Fig. 16, after which the end bar N' can be thrust endwise into the seat by the side of the end bar N, the side bars, I I, passing through the throat m , which is of a width a little greater than the thickness of these side bars.

When in operation, the buckets are filled and emptied in substantially the same manner as the buckets of the previously-described chain are filled and emptied, as will be understood from an examination of Fig. 9 without further explanation.

In the modification shown in Figs. 17 to 23 the driving-wheel is of the same construction as that above described. Each chain-link is a duplicate of the others.

O O are the side bars, each expanded upon its upper surface to form an ear or lug, o , each of which is provided with a seat to receive a journal of a bucket to be hereinafter described. One of these seats has a narrow throat, o' , cut down through the metal from the upper side.

P is the hook provided with a notch in its lip p .

p' is a lip or spur projecting upwardly from the base of the hook or from the end bar with which the hook is cast.

Q is the end bar provided upon its lower side with two notches, q q , and upon its upper side with a central notch, q' . These links can be connected with each other or disconnected from each other whenever they are turned at about right angles to each other, but are not liable to accidental separation when straightened out or in the position which they will assume in ordinary working.

K is the bucket having an inclined front

end, l , a curved rear end, l' , an upwardly and rearwardly projecting wing, l'' , and a stop, l''' , substantially like the buckets heretofore described.

5 R R' are trunnions or journals cast integrally with the bucket, and projecting laterally from its lower side or bottom, as indicated in Figs. 17, 19, and 20. By bending the wing l'' into the position shown in dotted lines in Fig. 23, 10 and then placing the bucket in about the position in which the bucket is shown in that figure, the trunnion R can be inserted in its seat in ear o , after which the trunnion R' can be inserted in its seat by thrusting it through 15 the throat o' . The bucket can then be turned crosswise of the link, as in Fig. 17, when the engagement of the wing l'' and the stop l''' respectively with the hook of the adjacent link and the side bars of its own link may prevent 20 the bucket from being accidentally unseated. In the modification shown in Figs. 24 to 28 the chain is mounted upon and driven by a sprocket-wheel having the hub A, spokes B, and teeth A', which may be of any usual or 25 approved construction, except that its periphery is formed with a series of semicircular or other shaped recesses a . Each of the chain-links consists of two side bars, I I, and two end bars, S T, the end bars being circular in 30 cross-section, but of different sizes. The bucket in this case is constructed with four walls, substantially as in the other figures, and the bottom is expanded, as at M, and is provided with two seats, thus forming a coupler to re- 35 ceive and unite the end bars of adjacent links. This coupler extends the full width of the bucket, being, therefore, about as wide as the end bars of the links are long. The smaller of the seats, m' , is of such size as to fit closely 40 the smaller end bar, S, and communicates with the larger seat, m'' , which is of such size as to fit closely the end bar T, the width of the throat m being about the same as the diameter of the smaller end bar, and the side bars are 45 as thick as will pass through the throat, but may be made of any desired width to insure the requisite strength.

In putting these links and buckets together the end bars S may be thrust through the 50 throats of the couplers and into their seats m' , after which the end bars T may be thrust endwise into the seats, the links and buckets being held in about the position shown in Fig. 28, the side bars passing through the throats 55 in the couplers.

When the chain and buckets are in any position which they will assume in ordinary working, it will be impossible to disengage or detach them from each other, and when the 60 buckets are moving in an upward direction, as indicated by arrow 1, Fig. 24, the buckets will be maintained with their upper edges in substantially horizontal planes by the reason of the relative positions of the seats in which 65 the end bars are supported. As the buckets traverse the sprocket-wheel their inner ends

will engage with the shoulders a' , and thus be tilted, as indicated in Fig. 24, after they have passed the chute J; but it will be seen that the inner upper corners of the buckets can 70 enter the recesses a , and thus preserve their horizontal position until after they have passed the chute, as will be readily understood by an examination of Fig. 24 without further explanation.

I do not wish to be limited to the exact 75 sizes or proportions of any of the parts shown in the drawings; but prefer to make the bottoms of the buckets and the front inclined sides of such thickness that the water will run 80 out and be discharged upon the chute as the buckets traverse the wheel in an upward direction, and if it be found in practice that they will not do this satisfactorily when moving at the desired rate of speed the extent to 85 which the buckets are tilted may be increased by making the flanges of the wheel to project a less distance from the bottom D of the groove; but under ordinary circumstances I believe that the construction shown will operate satis- 90 factorily.

What I claim is—

1. An elevator-bucket provided with a seat adapted to receive the end bars of chain-links, 95 substantially as set forth.

2. The combination of the grooved driving-wheel, the rectangular links, and the buckets pivoted upon the end bars of the links, sub- 100 stantially as set forth.

3. In an elevator, the combination of rect- 105 angular links, and buckets provided with couplers adapted to receive end bars of adjacent links, and to vibrate thereon, substantially as set forth.

4. In an elevator, the combination, with a 110 wheel having a longitudinal peripheral groove, of a chain, and buckets pivoted upon the chain, and adapted to engage with the groove of the wheel, and to be tilted thereby, substantially 115 as set forth.

5. The combination of the grooved wheel, the centrally-open chain-links, the buckets pivoted to the chain-links, and stops upon the buckets to limit their vibrations upon the chain-links, substantially as set forth. 120

6. The combination of the grooved wheel, the open chain-links, and the buckets pivoted to the chain-links, and adapted to engage with the bottom of the groove in the wheel, and provided with stops adapted to engage with 125 the side bars of the chain to limit the vibration of the buckets, substantially as set forth.

7. The combination of the rectangular links having the flattened end bars, and the forked hooks, with the buckets mounted upon the 130 end bars between the forked hooks, substantially as set forth.

8. A chain-bucket having an open hook with a narrow throat adapted to receive and be supported upon a flattened end bar of a 135 drive-chain, substantially as set forth.

9. The combination, with the grooved driv-

ing-wheel, of the chain, and the buckets mounted upon and vibrating about the end bars of the chain, and having the stops and the wings to limit their vibrations, substantially as set forth.

10. The combination, with the grooved driving-wheel, and the chute J, of the chain and the buckets pivoted to the chain so that the inner ends of the buckets engage with the driving-wheel, and are tilted to discharge their contents after passing the chute, substantially as set forth.

11. The combination, with the centrally-open rectangular links having the flattened end bars and divided hooks, of the buckets provided with the narrow-throated hooks adapted to receive the flattened end bars, and with the stops which limit the vibrations of the bucket, substantially as set forth.

12. The combination of the driving-chain, the buckets adapted to be coupled to the chain when placed in an unusual position, and stops which retain the buckets in working position, substantially as set forth.

13. The combination of a chain-link, an elevator-bucket pivoted upon the chain-link, its pivotal line being nearer one end than the other, whereby the greater part of the weight of the bucket is to one side of the connection with the link, and a stop which limits the tilting of the bucket, substantially as set forth.

14. The combination of a driving-wheel, a chain which passes around said wheel, eleva-

tor-buckets pivoted upon the link of a chain, its pivotal line being nearer one end than the other, whereby the greater part of the weight of the bucket is upon the inside of the loop formed by the chain passing around the wheel, and a stop which limits the tilting of the bucket, the said wheel being adapted to tilt the bucket and discharge its contents, substantially in the manner described.

15. The combination of a driving-wheel, a chain composed of open rectangular links, and buckets pivoted upon the links and lying across the line of the chain, said wheel being adapted, substantially as set forth, to engage with one end of the bucket and tilt the same to discharge its contents before the bucket passes the horizontal line of the axis of the wheel, substantially as set forth.

16. The combination of the driving-wheel, a chain composed of open rectangular links, and buckets pivoted to the links and lying across the line of the chain, said wheel being adapted, substantially as set forth, to engage with one end of the bucket and tilt the same to discharge its contents, the end of the bucket with which the chain engages being rounded or curved, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CHRISTOPHER W. LEVALLEY.

Witnesses:

A. L. FAULKS,

GEO. S. BENNETT.