No. 679,535. Patented July 30, 1901.

E. Y. MOORE.

CARRIAGE FOR CRANES.

(Application filed Apr. 19, 1900. Renewed June 25, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

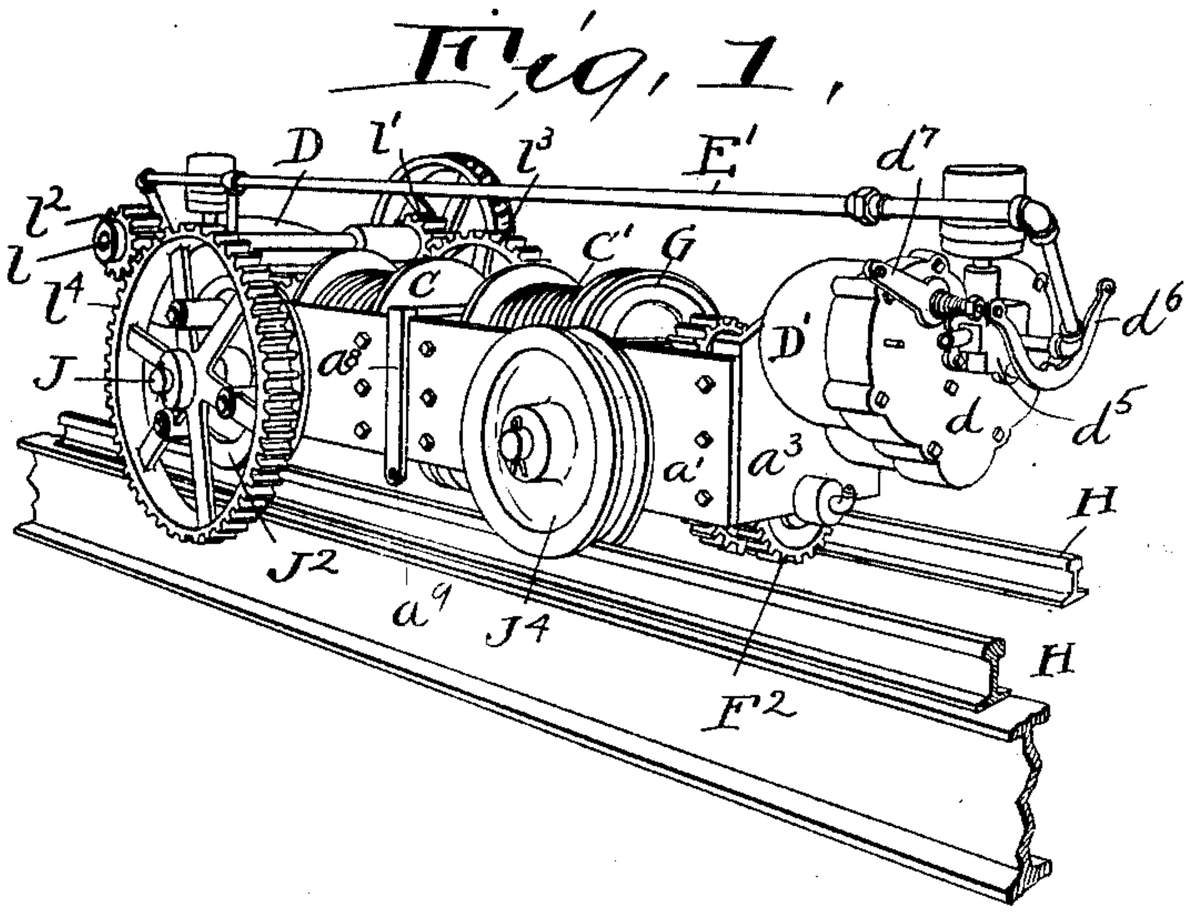
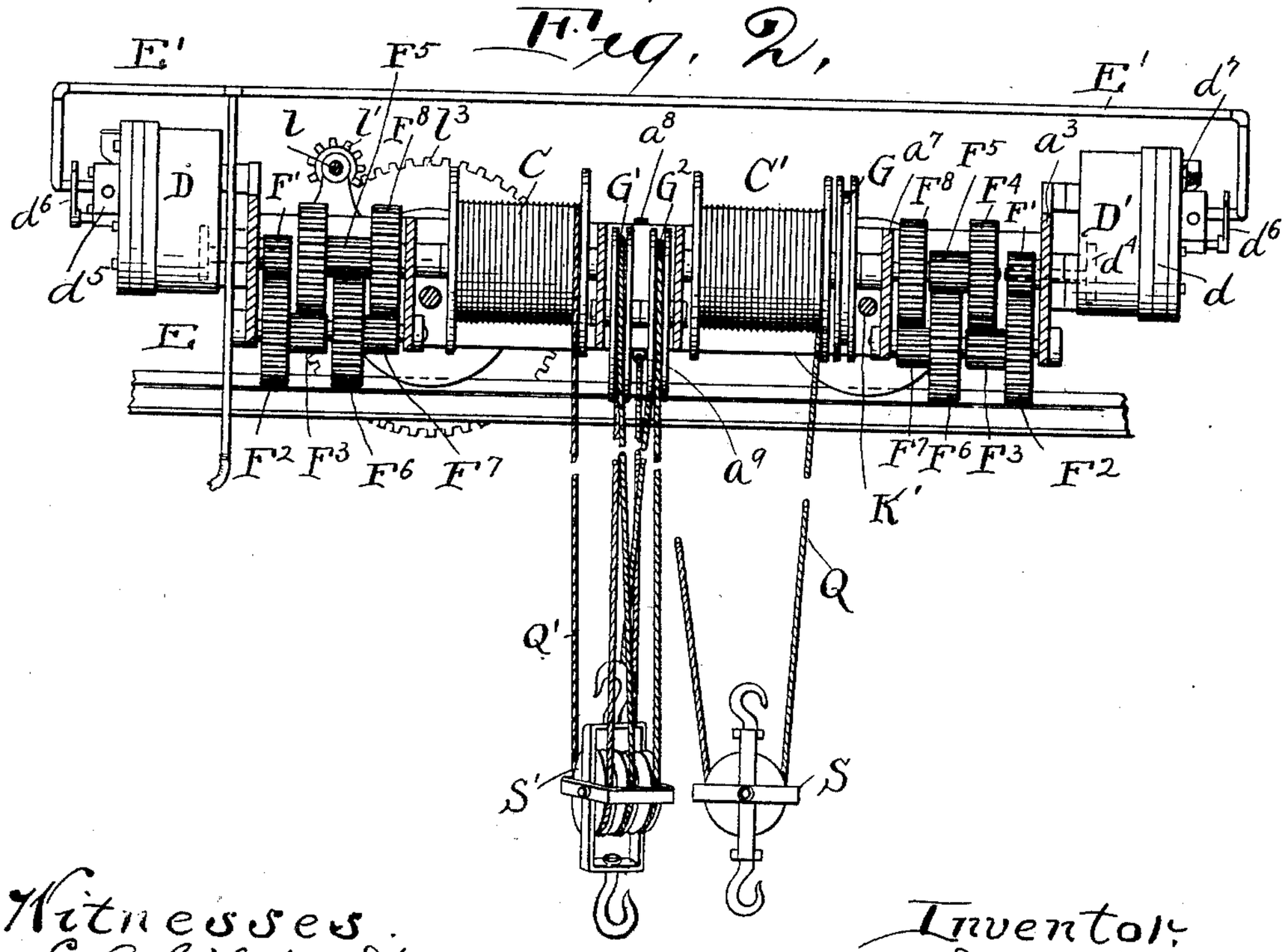


Fig. 2.



Witnesses.
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Fig. 3.

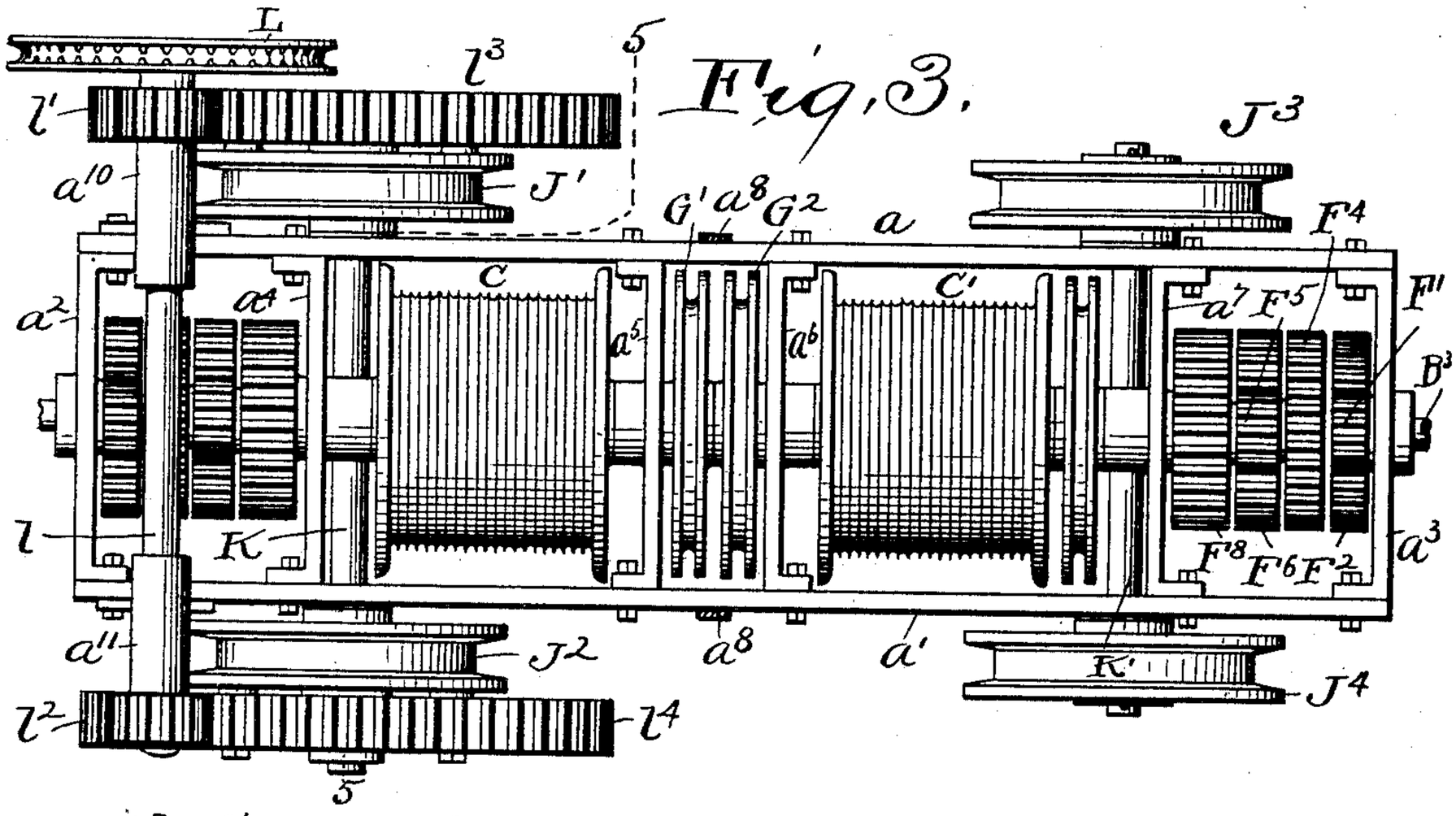


Fig. 4.

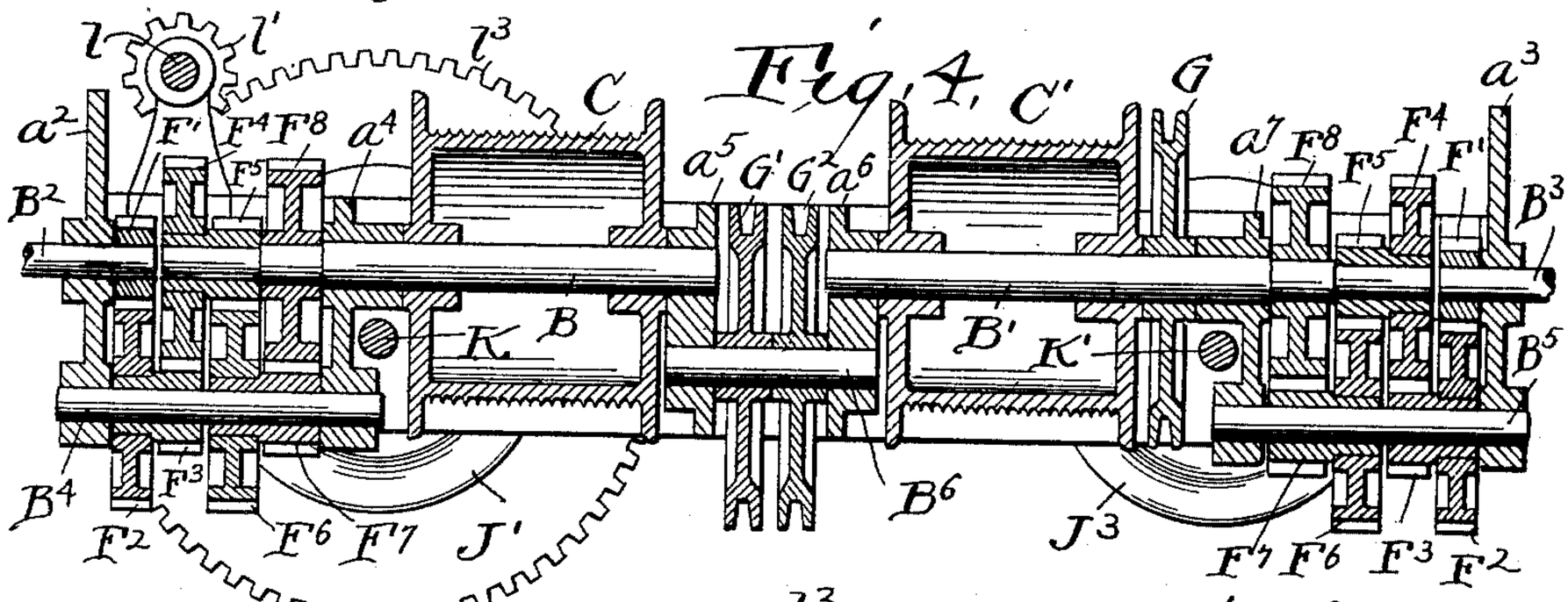


Fig. 5.

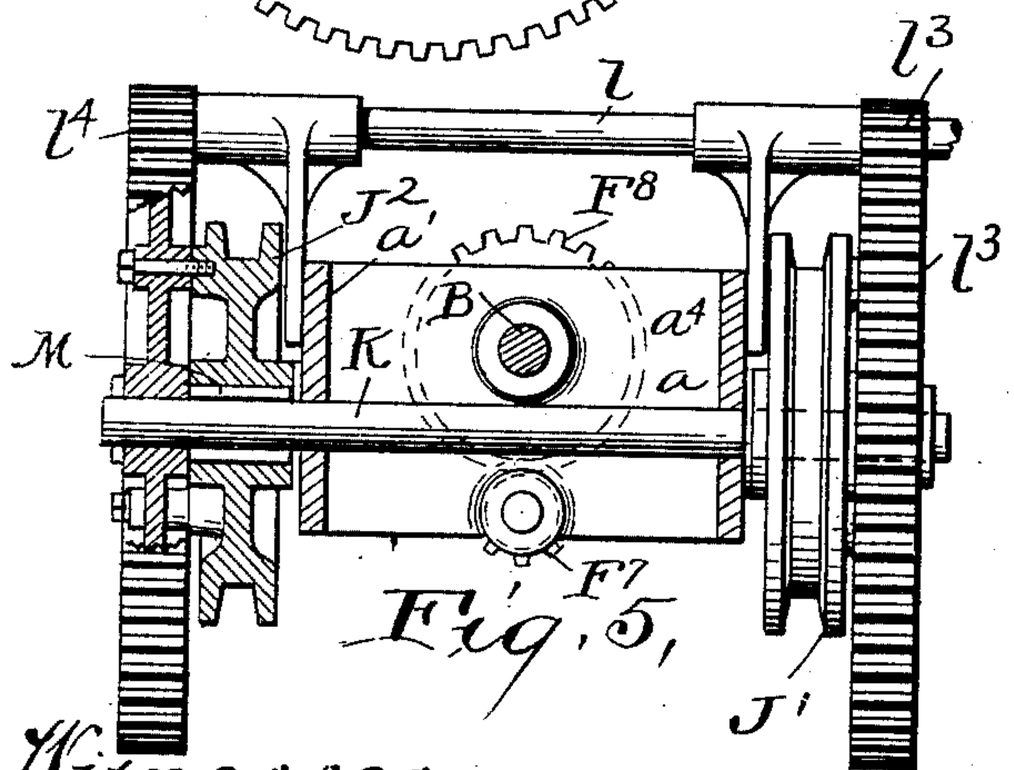
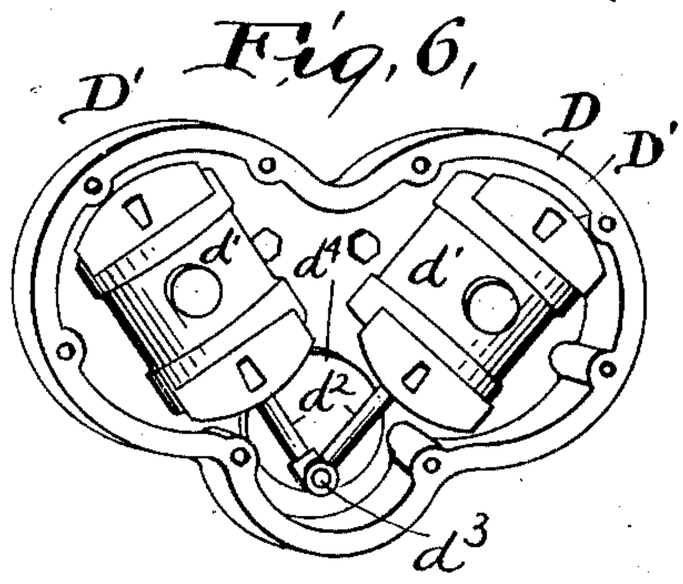


Fig. 6.



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UNITED STATES PATENT OFFICE.

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CARRIAGE FOR CRANES.

SPECIFICATION forming part of Letters Patent No. 679,535, dated July 30, 1901.

Application filed April 19, 1900. Renewed June 25, 1901. Serial No. 65,996. (No model.)

To all whom it may concern:

Be it known that I, EDWARD Y. MOORE, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Carriages for Cranes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention is for a carriage adapted to ride on the bridge of a traveling crane or the jib of a foundry-crane and elevate the load carried, the elevation being caused by engines driven by compressed air.

One of the objects is to provide such carriage in a form which shall be simple and cheap to make, while being of very strong construction and efficient operation.

Another object is to provide in a simple and compact carriage means for elevating the load at various speeds, whereby heavy loads may be drawn up slowly and light loads proportionately quicker. The great utility of this resides in its saving of air consumption and bringing a carriage of large capacity within the limit of the ordinary air-compressor. If but one speed of elevation were provided, it would be necessary in order that the carriage could handle the maximum load occasionally encountered for it to elevate the lighter loads (which occur far more frequently) at a much slower speed than necessary, thereby causing continual waste of air. On the other hand, a carriage wherein the heavy load could be elevated at the high speed desirable for light loads would not only be beyond the capacity of the usual air-compressor, but would subject the connecting-pipes and other parts of the apparatus to undesirable pressure.

In my crane I provide two winding-drums, and their elevating-cables may be arranged by suitable movable pulleys to elevate the loads at several speeds. The most common proportion of speeds I employ is one elevation at three times that of the other. By this construction a carriage may handle ten-ton loads at a speed of, say, five feet per minute and three-ton loads at a speed of fifteen feet per minute, with one-third of the air consumption and compressor capacity that is required in a one-speed crane which handles all loads up to ten tons at fifteen feet per minute. In the most of plants requiring occasionally a crane of ten-ton capacity the great majority of the loads are of the three-ton class, whereby the saving by my two or more speeds is evident.

The invention is more particularly explained hereinafter, and it may be best summarized as consisting of the combinations of parts herein described, and definitely specified in the claims.

In the drawings, which clearly illustrate my invention, Figure 1 is a perspective view of the carriage complete; and Fig. 2 is a sectional side elevation thereof, the section cutting just beyond the nearest side plate. Fig. 3 is an enlarged plan of the carriage, the operating-engines being removed. Fig. 4 is a vertical longitudinal section of the same, and Fig. 5 is a vertical transverse section thereof substantially on the line 5 5 of Fig. 3. Fig. 6 is a face view of one of the operating-engines at either end of the carriage, the covering plates being removed.

The frame of the carriage is in the form of an open vertical-sided box consisting of a pair of side plates a and a', connected by cross-plates. The outermost cross-plates a^2 a^3 form the ends of the box-like frame, and intermediate of these are the other cross-plates or separators a^4, a^5, a^6, and a^7. These ends and separators are each in the form of channel members, the end flanges lying against the inner faces of the side plates and being bolted thereto. Journaled in bosses formed on the separators are a pair of main shafts B B′ in alinement with each other, and rigidly secured on each shaft is a winding-drum, as C and C′. On each end of the carriage is a pneumatic driving-engine D and D′, which operates through reducing-gearing (to be hereinafter explained) the main shafts.

The specific construction of the driving-engine is not a part of the present application. It is substantially the engine shown in my prior applications, Serial Nos. 701,118 and 724,548, and there described and claimed. It consists, briefly, of a pair of oscillating cylinders d' and d', Fig. 6, which have piston-rods d^2, taking onto a crank-pin d^3 of a disk-crank d^4. This construction is inclosed in a suitable casing, and passages are made to these cylinders

for the admission and exhaust of compressed air through plates d, which cover the casing. Compressed air is admitted to both engines through a common supply-pipe E, to which a rubber hose is attached, and pipes E′, leading therefrom to valve-chests d^5, wherein a reversing-valve operated by a lever d^6 determines the amount of rotation and its direction. An additional lever d^7 operates to connect the passages with the outer air when desired, whereby the load may run down. The disk-cranks d^4, which the engines operate at each end of the carriage, are secured on the outer ends of a pair of short shafts B^2 and B^3, which are journaled in the ends a^2 and a^3 of the frame. On the inner side of these ends these shafts carry pinions F′, which are the first of a train of gears leading to the main shafts B and B′. This train of gears is as follows: The pinions F′ mesh with the gears F^2, which are rigidly secured to the hubs of pinions F^3. The pinions F^3, and hence the gears F^2, are loosely journaled on the axles B^4 B^5, which are secured at their ends in bosses on the frame ends a^2 a^3 and the outermost separators a^4 to a^7. The pinions F^3 mesh with the gears F^4 on the hub of the pinions F^5, (which latter are loose on the shafts B and B′,) and these pinions F^5 mesh with gears F^6 on the hub of the pinions F^7, also loose on the axles B^4 or B^5. The pinions F^7 finally mesh with the gears F^8, which latter gears are rigidly secured to the main shafts B B′. Thus the speed of rotation is reduced as desired between the engines and drum. The particular arrangement of this reducing-gearing on simply the driving and driven shafts and the axles B^4 and B^5 is very economical of space and material. Moreover, the pinions F^3 F^5 F^7 are all counterparts of each other, and likewise the gears F^2 F^4 F^6, carried thereby, and these gears can be forced onto or otherwise rigidly secured to the hubs of the pinions before the latter are put in place. This construction of elongating the hub of the pinion not only forms a very simple and satisfactory way of connecting the gear to it, but makes an enlarged bearing-surface on the shaft and is cheaper to construct than if the pinion and gear were cast integrally.

Secured at the center of the frame is a bar a^8, extending across the frame and down each side and having at its lower ends eyes a^9, which may receive a hook at the end of the elevating-cable. The cable may pass down direct from the winding-drum to the hook, or it may pass through a suitable sheave-block and then up to the eye a^9, as the cable Q through the block S in Fig. 2. In such latter arrangement there is one movable pulley, and the speed of elevation is half that of the rotation of the drum. In order to further reduce this speed, thereby allowing the drums to lift heavier loads, I provide on the carriage additional pulleys, over which the cables may play, so that the movable sheaves may carry as many pulleys as desired.

As the principal value of having two drums is to provide means for efficiently raising different-sized loads, one drum or the other being used, as circumstances render expedient, I intend to use one drum either directly to the load or through one movable pulley or through two movable pulleys, while for the other drum I provide two or more idle sheaves, whereby it may be used with a pulley-block carrying at least three sheaves, thus reducing the speed six times or more and allowing that much heavier load to be elevated.

On the shaft B′, I loosely journal the sheave G. When the cable passes directly from the drum to the load or passes from the drum through a single movable tackle-block to the eye in one of the bars a^8, this sheave G is out of use. When, however, I wish to obtain a speed of elevation one-third or one-fourth that of the rotation of the drum, I pass the cable from the drum through one of the sheaves of the movable pulley-block over the sheave G and secure its other end to the tackle-block or pass it through another sheave of the tackle-block and secure it to one of the eyes a^9, as the case may be. For the other drum I provide two sheaves G′ and G^2, which I loosely journal side by side on the axle B^6, carried by the two innermost separators a^5 a^6. At this end of the carriage the cable Q′ passes from the drum C through the first sheave of the tackle-block S′, around the pulley G′, through the second sheave of the tackle-block around the pulley G^2, and is then secured directly to the tackle-block or passed through a third sheave of the tackle-block, and thence to the eye a^9, carried by the frame. Five or six plies, respectively, of cable are thus provided, elevating the load at one-fifth or one-sixth the speed of rotation of the shaft B. There is thus provided in a very compact and simple form a carriage which in the form shown in the drawings may elevate loads at six different speeds, whereby such speed may be chosen as will make the constant air-pressure provided elevate any load in the quickest time possible, thus effecting a large saving of air over that which would result in a carriage of the same capacity if but one speed of elevation were attainable. Additional sheaves may be added on the axle B^6, reducing the speed, as desired.

The carriage is supported on its track H by four wheels J′ J^2 J^3 J^4, which wheels are journaled loosely on a pair of axles K and K′, extending across the frame and through the side plates thereof. The carriage is driven along its track in the direction desired by a suitable operating-chain, (not shown,) which passes over a wheel L on a shaft l, which is journaled in a pair of brackets a' a'', bolted to the side plates of the frame. This shaft carries on each side of the frame pinions l' l^2, which mesh with spur-gears l^3 and l^4, which

are bolted to the wheels J′ J². Thus when the chain lying over the wheel L is drawn in one direction or the other the carriage is correspondingly moved, as desired. Fig. 5 shows the wheels having roller-bearings M between their hubs and the axle, which is the preferred construction.

Having described my invention, I claim—

1. The combination, with a unitary crane-carriage and means for shifting it bodily, of a pair of independent winding-drums carried thereby, and a pair of similar independent engines for operating said drums, and idler-sheaves carried by said carriage, and a pair of tackle-blocks and elevating-cables running from said drums to the tackle-blocks, one of said cables passing around more idler-sheaves than the other cable whereby with equal speed of rotation different speeds of elevation are attained, and pipes adapted to lead from a common supply jointly to said engines whereby they are caused to operate at the same speed, substantially as described.

2. The combination of a unitary crane-carriage and means for moving it bodily, of a pair of winding-drums carried by the carriage, a pair of independent pneumatic engines connected each with one of said drums, a single supply-pipe leading to the two engines whereby they are adapted to operate at the same speed, and sheaves carried by the frame over which winding-cables may pass whereby with equal speeds of rotation different speeds of elevation may be obtained, substantially as described.

3. In a crane-carriage, in combination, a box-like frame built up of a pair of side plates and intermediate separating-plates, which intermediate plates have flanged ends by which they are bolted to the side plates, supporting-axles mounted in the side plates, and wheels on said axles, and a rotatable drum between the side plates and mounted in the separating-plates, substantially as described.

4. In a crane-carriage, in combination, a frame having side plates and transverse plates, a rotatable drum mounted between the side plates, and loose sheaves between the side plates and mounted in transverse plates with their axes in the same vertical plane with that of said drum, substantially as described.

5. In a crane-carriage, a box-like frame consisting of a pair of side plates, a pair of end plates, and four intermediate separating-plates, a pair of driving-engines each secured on the outer side of one of the end plates, a pair of alined driving-shafts journaled in the said separators, drums on said shafts, gearing between the outer separators and the end plates connecting the engine-shafts with the drum-shafts and changing the speed of rotation thereof, and a revoluble sheave carried by an axle supported by the innermost separators, substantially as described.

6. In a crane-carriage, in combination, an open box-like frame consisting of side plates and cross-plates for ends and intermediate separators, an engine secured to the end plate, an axle carried by the end plate and the separator, an idle gear and pinion on said axle, a pinion on the engine-shaft meshing with said gear, and a gear supported axially of the engine-shaft meshing with the pinion on the axle, a main shaft journaled axially of the engine-shaft in two of the cross-plates of the frame, the last gear of the train being secured to this shaft, and a winding-drum on this shaft, substantially as described.

7. In a crane-carriage, in combination, a frame including the side plates a a', and the cross-plates a^3 a^7 a^6, a main shaft journaled in the plates a^6 a^7, a drum on said shaft, a driving-engine secured on the outer side of the cross-plate a^3, the shaft of said engine being alined with the main shaft, an axle supported by the plates a^3 a^7 parallel with the main shaft, and a train of reducing-gearing leading from the engine-shaft to gears on said axle, thence to gears loose on the main shaft, thence to other gears on said axle, and finally to a gear rigid with said main shaft, and a drum carried by said main shaft between the cross-plates a^6 a^7, substantially as described.

8. In a crane-carriage, the combination of a box-like frame consisting of side plates and cross-plates, the main shaft journaled in said cross-plates, a winding-drum carried by said shaft, a driving-engine having its shaft in alinement with the main shaft, an axle supported parallel with the main shaft, reducing-gearing between the engine-shaft and the main shaft carried by said two shafts and said axle, said gearing consisting of a series of intermeshing pinions and gears, which gears are rigidly connected with other pinions meshing with successive gears, the connected gears and pinions being one surrounding the hub extending from the other whereby a long bearing-surface is obtained, substantially as described.

9. In a crane-carriage, the combination of the frame consisting of side plates and cross-plates between the side plates and having flanges at their ends which are bolted to the side plates, a main shaft journaled at said cross-plates, a drum carried by said main shaft, an engine secured to the outer side of an end cross-plate and having its shaft projecting through the cross-plate, an axle carried by said cross-plates parallel with the main shaft, a train of intermeshing reducing-gearing connecting the engine-shaft with the main shaft and carried by said shafts and said axle, supporting-axles carried by the side plates of said frame, and supporting-wheels on said latter axles, substantially as described.

10. In a crane-carriage, in combination, a frame consisting of side plates and transverse separating-plates, a pair of main shafts in alinement with each other independently journaled in a pair of adjacent separating-plates, independent driving-engines for operating said drums, an idler shaft or rod car-

ried by the separating-plates mentioned out of alinement with the main driving-shafts, one or more sheaves on said idler shaft or rod and winding-drums on said main shafts, substantially as described.

11. In a crane-carriage, the combination of a frame consisting of a pair of side plates and end plates, and four intermediate separating-plates, a pair of main shafts journaled in said four separating-plates in alinement with each other, winding-drums on said shafts, an idler axle or shaft mounted in the centermost separators parallel with but out of alinement with the main shafts, one or more sheaves on said idler-shaft, a pair of pneumatic engines mounted on the outer sides of the end plates, a pair of idler-shafts carried by said end plates and the adjacent separators, reducing-gearing partly carried by said last-mentioned idler-shafts and connecting the engines with the main shafts, the reducing-gearing and the drums and the sheaves being thus contained between the side plates of the frame, a pair of supporting-axles passing through said side plates, and wheels on said axles, and means for revolving one or more of said wheels to cause the carriage to travel bodily as a whole, substantially as described.

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

EDWARD Y. MOORE.

Witnesses:

ALBERT H. BATES,

H. M. WISE.