A. F. HAINSWORTH.

CRANE.

APPLICATION FILED AUG. 18, 1917.

1,328,793.

Patented Jan. 20, 1920.

2 SHEETS—SHEET 1.

Fig. 3.

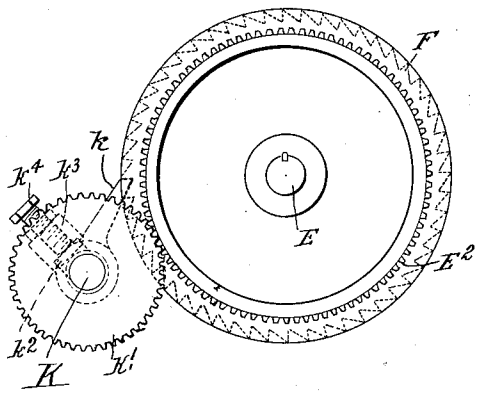


Fig. 1.

Fig. 2.

INVENTOR:

Arthur F. Hainsworth

By Bowman & Hayes

HIS ATTORNEYS.

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2 SHEETS—SHEET 2.

Fig. 4.

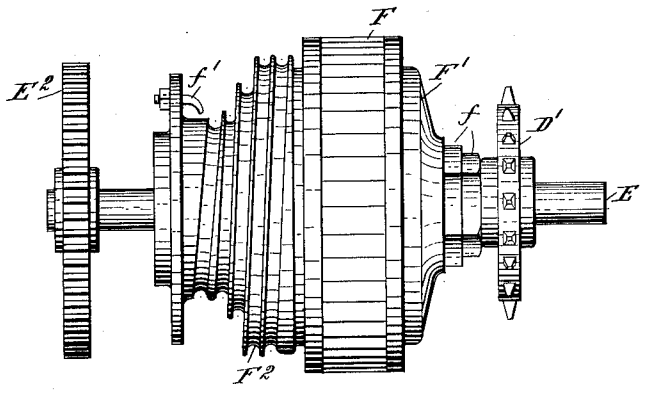
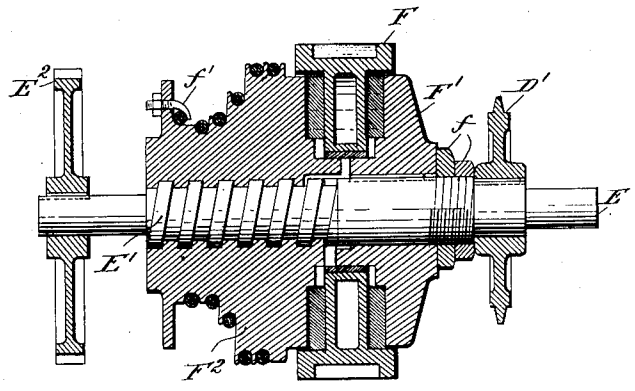


Fig. 5.



INVENTOR=
Arthur F. Hainsworth
By Cook & Hayes
HIS ATTORNEYS=

UNITED STATES PATENT OFFICE.

ARTHUR F. HAINSWORTH, OF LEEDS, ENGLAND.

CRANE.

1,328,793. Specification of Letters Patent. Patented Jan. 20, 1920.

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To all whom it may concern:

Be it known that I, ARTHUR F. HAINSWORTH, a subject of George V, King of England, and a resident of Ivy Dene, Bramley, Leeds, Yorkshire, England, have invented a new and useful Improvement in Cranes, of which the following is a specification.

My invention is for the raising and lowering of derrick or crane jibs and at the same time keeping the load practically level, thus saving power when lifting the jib.

The derrick or jib-raising barrel may be driven from the hoisting barrel by means of sprocket chains or toothed gearing giving the required ratio. As shown, a sprocket chain is used.

On the derrick or jib-raising barrel shaft is fitted a Weston plate or similar clutch brake which insures perfect safety of the jib and also makes it impossible for the jib to run down. The parts are arranged so that the amount of brake action on the clutch is in direct proportion to the load on barrel.

In order that my said invention may be more fully understood, I shall now proceed more particularly to describe the same, and for that purpose shall refer to several figures in the drawings forming a part hereof, the same letters of reference indicating corresponding parts in all of the figures.

Figure 1 is a side elevation of a machine constructed according to this invention.

Fig. 2 is an end elevation of the hoisting mechanism and the base which supports the jib.

Fig. 3 is a side elevation of the jib-raising barrel and pawl and ratchet wheel.

Fig. 4 is a side elevation of the derrick or jib-raising barrel, and

Fig. 5 is a longitudinal section thereof showing the screw to give thrust on friction plates of ratchet wheel.

A, is the hoisting barrel which is keyed to a shaft A^1 carried in a frame A^2. The shaft A^1 also has at one end of it a gear A^3 operated by a pinion A^4 carried on the power shaft from which power is derived to drive the mechanism. In this frame A^2 is mounted a shaft or rod a on which runs an idler pulley b^1. C is a clutch of ordinary construction by means of which the barrel A is connected to a sprocket D which turns on the shaft A^1, this construction being such that when the clutch is thrown in the proper direction the sprocket D will be rotated, otherwise the sprocket will run free. The clutch lever itself is mounted on the end of a rock shaft suitably mounted from one side of the frame A^2 and having at its farther end an arm c^1 attached to a lever handle c^2, these parts being constructed in any ordinary way so that by throwing the handle c^2 one way or the other the clutch will be thrown either in or out as occasion may require.

The sprocket D is connected by a suitable chain d with a sprocket D^1 mounted on the end of the jib-raising barrel shaft E. This shaft E is shown in detail in Fig. 5. The shaft itself is partly threaded as at E^1 and carries at its farther end a gear E^2. On the shaft E and free to move with relation thereto is a ratchet F which is separated from the sprocket D^1 by means of a friction piece F^1 keyed to the shaft together with a nut and set nut f of usual character, this construction being such that the part F^1 serves as an abutment against which the ratchet may be held by means of the drum or barrel F^2. This drum F^2 is threaded on its interior so that the pull from the jib raising rope moves it along the screw and jams it hard against the friction piece. The drum in moving in this direction has automatically thrown the pawl k, to be hereinafter referred to, into gear so that the ratchet is held and consequently the jib is prevented from running down. Upon the rotation of the shaft E in the same direction, however, the tendency will be for the drum to be moved away from contact with the ratchet.

G is the jib. It carries at its upper end a pulley g over which runs the hoisting rope g^1 which passes down and around the hoisting drum A. From the top of the jib G runs downward a rod H carrying at its lower end a fork h in which is mounted a pulley J. Around this pulley passes the jib-raising rope j. One end of this rope is attached to a hook f^1 mounted on the drum F^2 while the other end is fixed to the base which supports the jib. The drum is provided with a series of grooves, preferably arranged as shown in the form of a helix so that at certain portions of the wind more rope will be drawn up than at other portions.

The ratchet wheel F is engaged, at times, by a pawl k carried by a hub mounted on the shaft K, said hub having an interiorly threaded sleeve k^3 receiving a set screw k^4

bearing at its inner end on a plate k^2 interposed between the inner end of said screw and hub and said shaft K, so that by turning in the said set screw k^4, the said pawl k will be frictionally connected with said shaft so as to turn therewith, this construction, however, permitting said shaft to turn independently of said pawl. The shaft K is mounted on the frame A^2 near one end and in the standard A^5 at the other end, the said standard A^5 also carrying one end of the shaft E. On the shaft K, near the standard A^5, is mounted a pinion k^1 in mesh with the gear E^2 on the jib shaft E, so that the shaft K will be given a movement from the said shaft E and will tend to give a corresponding movement of the pawl k. Owing, however, to the frictional engagement between the said pawl k and its shaft K this movement will be only a limited and non-positive one, the construction being such that the pawl will be held against the ratchet wheel F when the pinion k^1 is rotated in one direction by the gear E^2, while when the movement of said gear E^2 is reversed said pawl will be thrown out of engagement with the said ratchet wheel F.

In practice the ropes g^1 and j are wound reversely upon their respective barrels so that, for example, while the rope g^1 is being wound up, the rope j is being released. Thus the load carried by the rope g^1 may be maintained at a substantially horizontal position, and when the rope g^1 is lowered the jib may be raised.

The clutch C is used to engage or disengage the sprocket D as occasion may require.

It will be seen that the ratchet is firmly held by the pawl as the jib drum is lowering, and hence becomes the stationary element of a friction clutch of which the part F^2 is a member, and when the shaft E is rotated in the other direction the part F^1 which is keyed to the shaft E causes the ratchet to move in the same direction with it, throwing the pawl out of engagement with the ratchet by means of the pinion k^1 and separating F^2 from the ratchet. Thus in the lowering of the jib the pawl is driven into mesh with the rotating wheels, while in the hoisting of the jib the pawl is automatically thrown out of mesh.

Other forms of clutch of this general character may be substituted for that shown and other changes in the construction of the apparatus may be made without departing from the spirit of my invention.

What I claim as my invention is —

1. In a crane, the combination with a jib, of a jib drum, a hoisting drum having a disconnectible gearing connection with said jib drum so that said drums may be simultaneously rotated, if desired, or so that said hoisting drum may rotate independently of said jib drum, a shaft on which said jib drum is mounted, and with which shaft said drum has a screw threaded connection, a friction piece splined to said shaft, and a ratchet wheel interposed between said drum and said friction piece.

2. In a crane, the combination with a jib, of a jib drum, a hoisting drum having a disconnectible gearing connection with said jib drum so that said drums may be simultaneously rotated, if desired, or so that said hoisting drum may rotate independently of said jib drum, a shaft on which said jib drum is mounted, and with which shaft said drum has a screw threaded connection, a friction piece splined to said shaft, a ratchet wheel interposed between said drum and said friction piece, a gear wheel rotating with said jib drum shaft, a pinion with which said gear wheel meshes, a shaft carrying said pinion, and a pawl having a frictional connection with said last-named shaft and which may be thrown into or out of engagement with said ratchet wheel according to the direction of rotation of said jib drum shaft.

3. In a crane, the combination with a hoisting drum, of a jib drum having a disconnectible gearing connection with said hoisting drum so that said jib drum may be operated simultaneously with said hoisting drum or independently thereof, a shaft on which said jib drum is mounted and with which it has a screw connection so that it may be moved endwise of said shaft, a ratchet wheel mounted on said jib drum shaft and having a clutch connection therewith so that it may rotate with said shaft or independently thereof, a pawl coöperating at times with said ratchet wheel to prevent rotation of the same, and means, operated from said jib drum shaft, whereby said pawl may be thrown into or out of engagement with said ratchet wheel.

ARTHUR F. HAINSWORTH.