No. 658,623. Patented Sept. 25, 1900.

W. T. EADES & E. ALLDAY.

CRAB WINCH.

(Application filed June 25, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

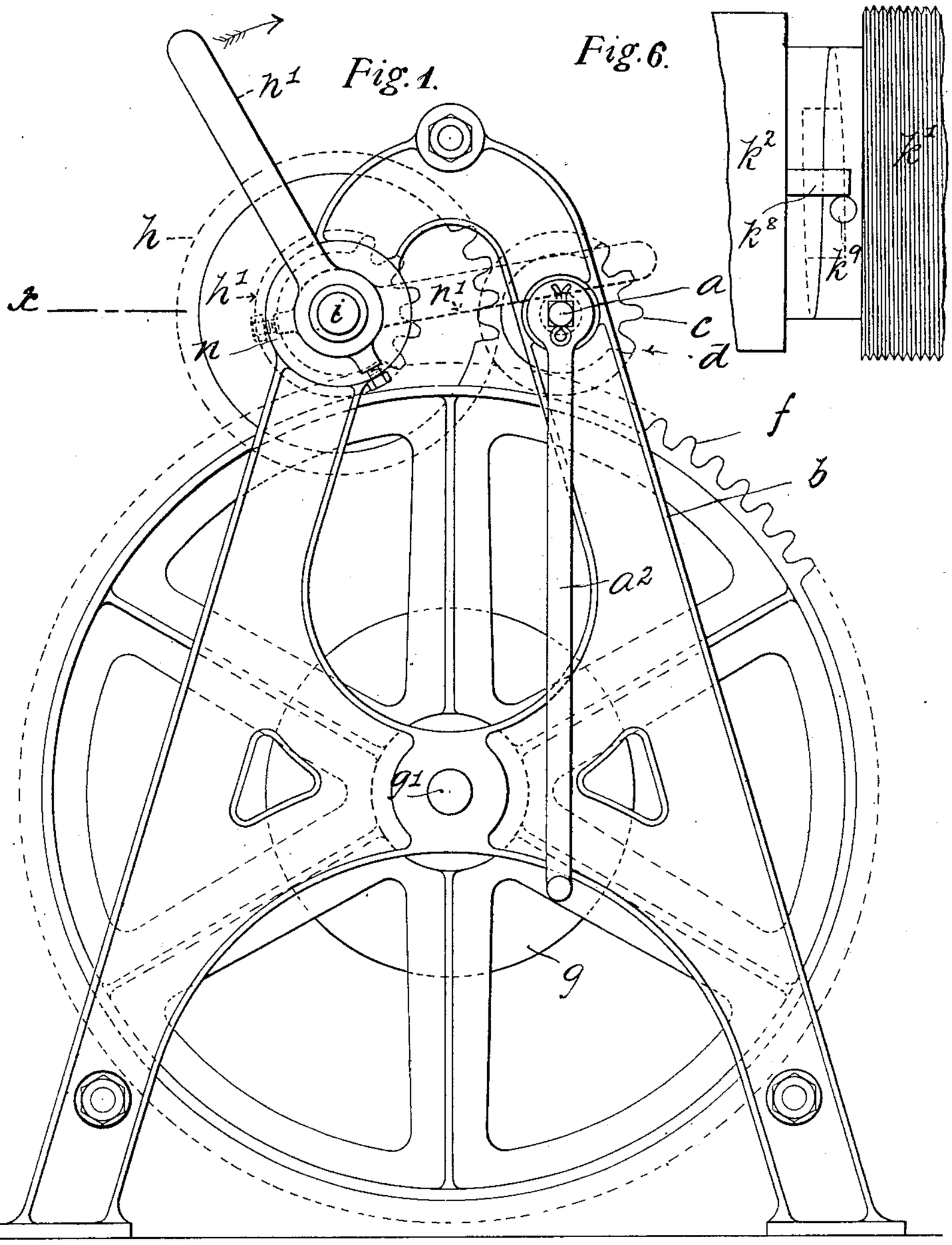

Fig. 6.

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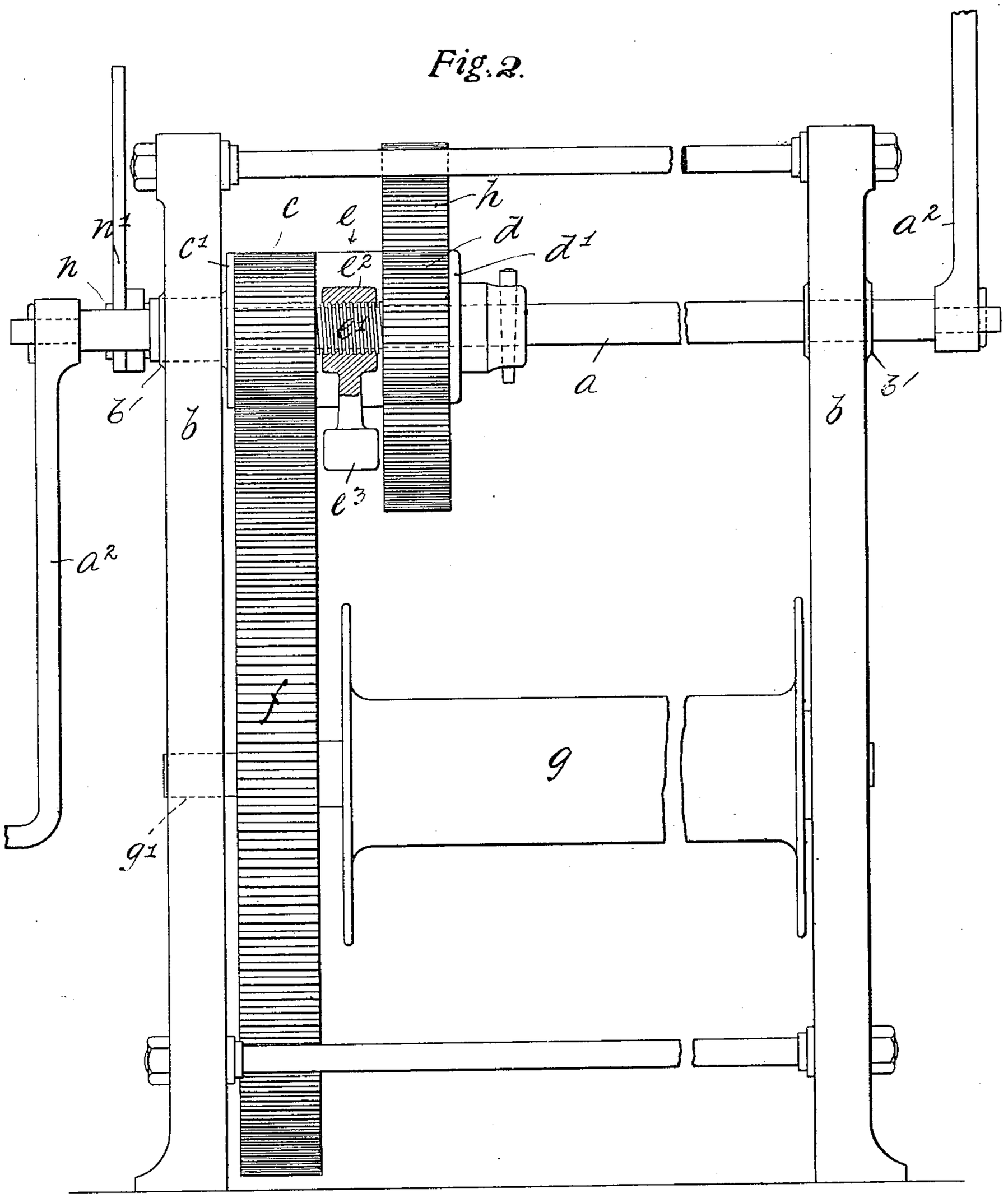
Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

Fig. 3.

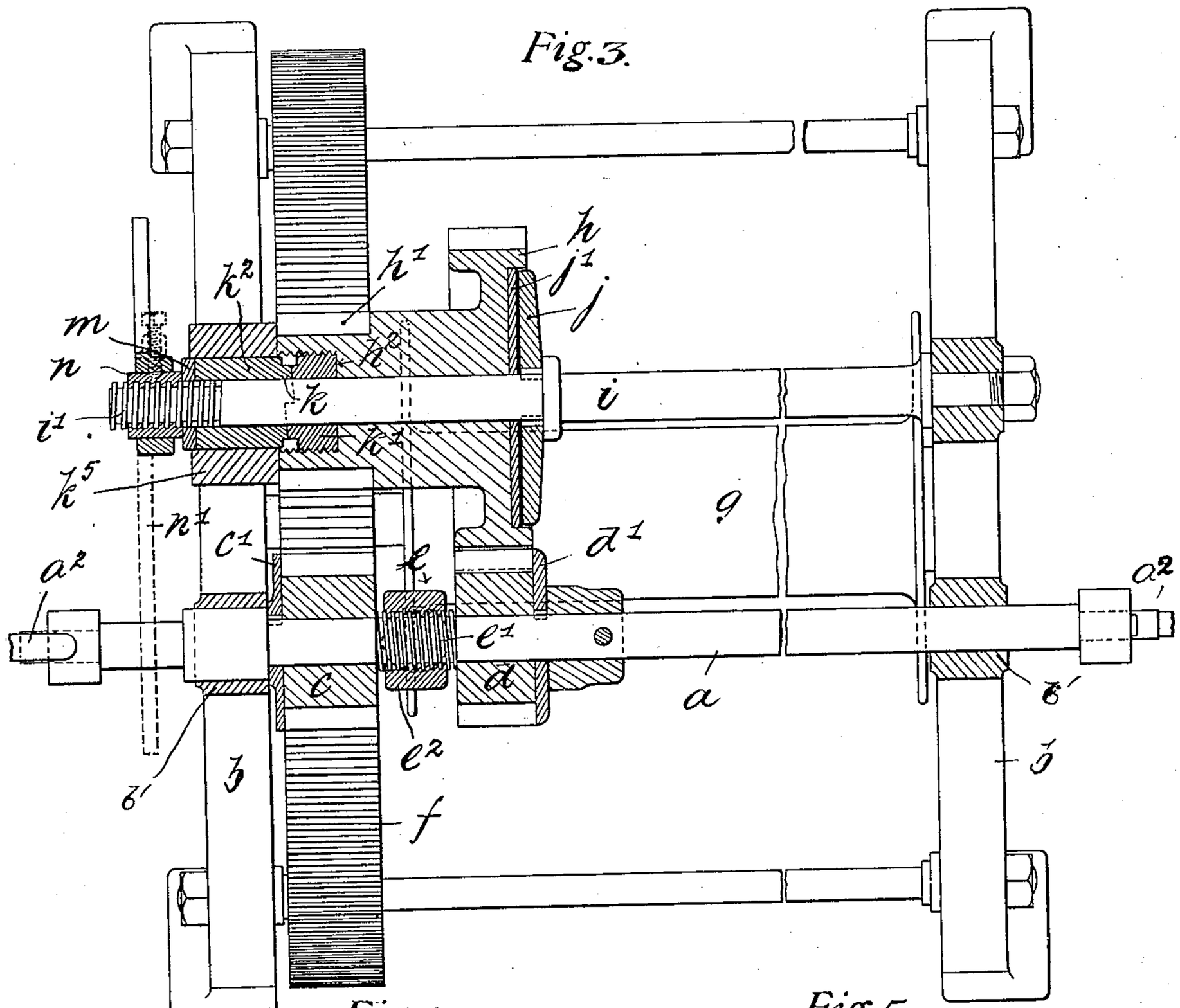


Fig. 4.

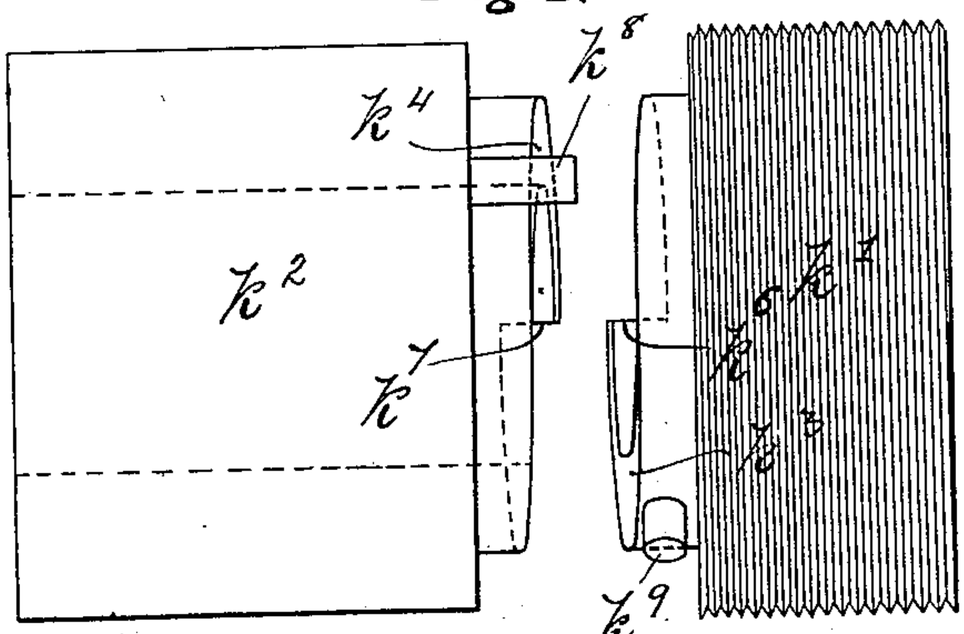
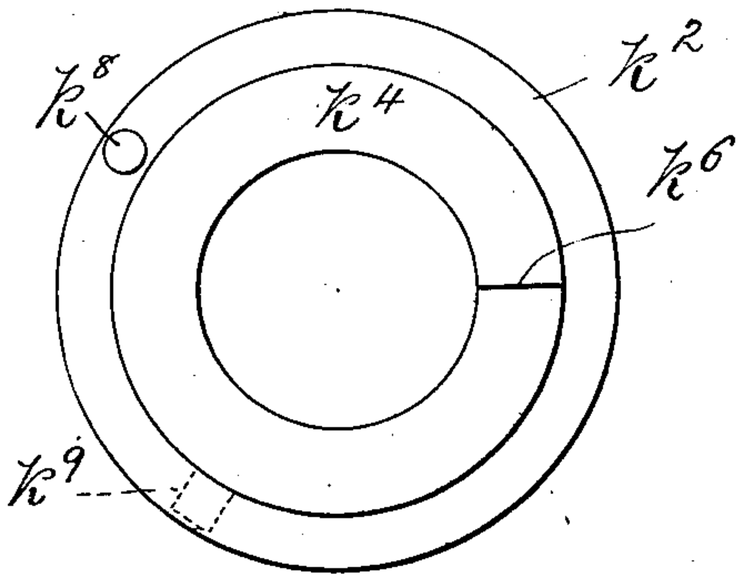


Fig. 5.



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WILLIAM THOMAS EADES AND EDMUND ALLDAY, OF BIRMINGHAM, ENGLAND.

CRAB-WINCH.

SPECIFICATION forming part of Letters Patent No. 658,623, dated September 25, 1900.

Application filed June 25, 1900. Serial No. 21,535. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM THOMAS EADES and EDMUND ALLDAY, engineers, subjects of the Queen of Great Britain, residing at Sydenham Road, Small Heath, Birmingham, England, have invented certain new and useful Improvements in Crab-Winches, of which the following is a specification.

This invention has relation to crab-winches and other hoisting and lowering appliances, and also to clutches to be employed in connection with the load-sustainers or brakes of such appliances.

Figure 1 of the accompanying drawings represents an end elevation of a two-speed crab-winch constructed, arranged, and provided with load-sustaining or brake mechanism in accordance with our invention. Fig. 2 represents a side elevation of the said winch with a detail part in section. Fig. 3 is a sectional plan of the winch, the section being taken upon the dotted line x, Fig. 1. Fig. 4 represents, upon an enlarged scale, a side elevation of the two elements of the load-sustaining clutch, while Fig. 5 is a front elevation showing the helical face of one of the said elements. Fig. 6 is another view of the said clutch, showing the parts in the positions they assume when the brake is on.

The same letters of reference indicate corresponding parts in the several figures of the drawings.

The winch consists of a driving-shaft a, mounted within bearings b' of a suitable frame b and having winch-handles a^2, made fast to its opposite ends outside of the frame, while loosely mounted upon a part of the said shaft within the frame are the high and low speed driving-pinions c d, which are confined upon the shaft between a pair of fixed stop-collars or keyed-on abutment-plates c' and d', with a two-way clutch device e located between them, whereby either the one pinion or the other is operatively connected to the driving-shaft, according to the weight of the load to be raised or the speed at which the lifting is to be performed. This clutch may consist of a right-hand thread e', formed upon the part of the shaft between the two pinions and surrounded by a corresponding screw box or sleeve e^2, which is prevented from rotating by a counterpoise e^3, but is traversed along the shaft in one direction or the other, according to the direction in which the said shaft is rotated, by means of the winch-handles, and by either pinion being thus clamped between the end of the sleeve and its particular stop-collar it is made fast to and transmits power from the shaft.

The high-speed pinion c intergears directly with a large toothed wheel f, made fast on the winding-drum g, which works on another shaft g', carried by the frame, while the low-speed pinion d intergears with a toothed wheel h, loosely mounted upon a third and non-rotating shaft i, which has strung upon it the brake mechanism of the winch.

The toothed wheel h is connected with a pinion h', gearing also with the large toothed wheel f on the winding-drum, so that when the low-speed pinion is made fast to the driving-shaft by the clutch e motion is transmitted from it to the said wheel f through the wheel h and pinion h', the high-speed pinion meanwhile running idly around the driving-shaft.

The brake device consists of an opposed pair of friction-plates j j', the plate j being keyed to the non-rotating shaft i and the plate j' being made fast to the outer face of the toothed wheel h, which latter is capable of a sliding movement along the said shaft i for the purpose of taking its friction-plate into or out of contact with that upon the fixed shaft.

Fitted in a recess h^2 in the end face of the pinion h' is the fixed half k' of an expanding clutch k, consisting of a bush or sleeve encircling the shaft and screwed into the recess in the pinion, with which it rotates, while its outer end is formed into a laterally-advancing helix or circular incline k^3, opposed to and working against the similarly-formed helical face k^4 of the second clutch element k^2. This second part consists of a sleeve or bush, also surrounding the fixed shaft i, but loosely mounted thereon and arranged to have a sliding and rotating movement within a bearing k^5 in the main framing, while also located within the said bearing, but having only a sliding movement therein, is a feathered washer or plate m, which takes the

thrust of a nut in connection with the brake-lever. The terminations of the helices on the faces of the clutch elements have steps or shoulders k^6 k^7, which come together when a load is being raised and insure that the two parts of the clutch shall rotate with the other parts of the gearing. The clutch elements are also provided with stops for limiting their expanding action, which stops may be in the form of pegs k^8 k^9 at right angles to one another. (See Figs. 4, 5, and 6.)

The extreme end of the fixed carrier-shaft i is threaded at i', and the threaded part is encircled by a nut or interiorly-threaded boss n, which is made fast to the end of a brake-lever n', which is placed in the position represented in full lines in Fig. 1 when a load is about to be raised, and thus moves the inner face of the nut up to the pressure-plate m, the weight of the said lever, although only slight, being sufficient to insure that the helical faces shall be always fully engaged when a load is being raised. Thus assuming that a heavy load is about to be raised by the winch through the medium of the low-speed gear in order to insure that the load shall be sustained by the automatic application of the brake during any cessation of winding the brake-lever n' is thrown over from the position represented in dotted lines in Fig. 1 to that shown in full lines, by which means the nut is compelled to travel along the screwed end of the fixed spindle i and take its bearing against the pressure-plate m. So long as the wheel h and pinion h' are rotating in the desired direction for raising the load both the elements of the clutch rotate with them, and there is no change in their relative positions; but should there be any cessation of winding then as soon as the weight of the load begins to act upon the gearing and turn the gear-wheel backward the clutch elements are separated by the helical face of the member k' (which turns back with the pinion h') wiping over the opposed helical face of the other and relatively-fixed member k^2, whereby the brake elements k' and k^2 are forced apart, and hence the wheel and pinion are forced laterally inward, thereby thrusting the friction-plates j j' into close frictional contact, and the load is sustained.

In unwinding the drum to lower the load under control of the brake while the winch-handles are stationary the driving-shaft is first turned by means of the handles in such a direction and to such an extent as will place the clutch-sleeve e in an intermediate position between the high and low speed pinions d and c, whereby both of said pinions are free to turn loosely on or independent of the driving-shaft a, and then the brake-lever n' is turned over in the direction indicated by the arrow in Fig. 1 to an extent sufficient to relieve the inward pressure of its nut against the feathered washer m, which allows the clutch elements to be separated by the pull of the falling load to the full extent permitted by the stops k^8 k^9, as shown in Fig. 6, and as soon as these stops come together the clutch is incapable of further applying the brake, as this function is transferred from the clutch to the screw-nut of the brake-lever, by means of which the unwinding of the drum is kept under perfect control, it being understood that after the clutch has fully expanded the brake becomes hand-controlled, and the brake-pressure created by screwing up the nut more or less by means of the lever is transmitted through the non-rotating washer and the two members of the clutch to the brake-wheel h, which is forced into contact with its braking-surface by the lateral thrust thus created.

We wish it to be understood that we do not limit ourselves to any particular form of stop for preventing the overexpansion of the clutch, and thereby transferring the brake-power to the nut, as we may employ a pin on the face of one part engaging in a slot on the other part or any equivalent device which will permit of only a limited movement between the two elements.

The application of our improved brake mechanism and to analogous lifting appliances differs in no essential respect from its application to a two-speed crab-winch, as herein described.

Having now fully described our invention, what we desire to secure by Letters Patent is—

1. In a hoisting apparatus, the combination with a winding-drum and means for rotating the same, of a fixed shaft, a brake-wheel loosely mounted and longitudinally movable on said shaft, said brake-wheel being geared to rotate with the drum, an expanding clutch comprising two parts rotatably mounted on said fixed shaft and movable thereon toward and from each other, one of the said clutch elements being rigid with the brake-wheel, stops for limiting the separation of the two clutch elements, a hand-brake nut screwed on the threaded end of the fixed shaft and having a bearing against the free element of the clutch, a weighted handle on the nut operating to normally hold the nut turned to thrust the clutch elements into engagement with each other, and means engaged by the lateral movement of the brake-wheel for controlling the rotation of the latter, substantially as and for the purpose specified.

2. In a hoisting apparatus, the combination with a winding-drum and means for rotating the same, of a fixed shaft, a brake-wheel loosely mounted and longitudinally movable on said shaft and geared to rotate with the drum, a friction-disk fixed on the face of the brake-wheel, a corresponding friction-disk fixed on the fixed shaft adjacent thereto, an expanding clutch comprising two parts rotatably mounted on said fixed shaft and movable thereon toward and from each other, one of said clutch elements being rigid with the brake-wheel, stops for limiting the separation of the two

clutch elements, a hand-brake nut screwed on the threaded end of the fixed shaft and having a bearing against the free element of the clutch, and a weighted handle on the nut operating to normally hold the nut turned to thrust the clutch elements into engagement with each other while the drum is being turned to raise a load, the arrangement being such that when the drum is released the clutch elements are automatically thrust apart and the friction-disks forced together to sustain the load, whereupon the contact between the disks, and hence the descent of the load, may be controlled by hand through the medium of the handle on the nut, substantially as described.

3. In a hoisting apparatus, the combination with a winding-drum and a gear-wheel arranged to rotate therewith, of a driving-shaft, two pinions *c* and *d* loosely mounted thereon, the pinion *c* gearing directly with the said gear-wheel and intermediate low-speed gearing connecting the pinion *d* with the gear-wheel, the said driving-shaft being threaded between the pinions *c* and *d*, a friction-nut engaging said threaded portion of the driving-shaft and adapted to be moved into frictional engagement with either of the said pinions by the rotation of the driving-shaft, said nut being provided with means for preventing its rotation, and an automatic brake mechanism for controlling said drum when it is released, the arrangement being such that when the driving-shaft is turned in one direction the nut will be forced into frictional engagement with the pinion *c* and cause the latter to directly rotate the drum and when turned in the other direction will force the nut into engagement with the pinion *d* and cause the latter through the intermediate speed-gearing to rotate the drum at a reduced speed, and when turned to move the nut to a point intermediate the said pinions will permit the latter to run free whereupon the brake will operate to control the drum, substantially as described.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

WILLIAM THOMAS EADES.
EDMUND ALLDAY.

Witnesses:
ARTHUR T. SADLER,
GAVIN RALSTON.