Sheet 1 - 2 Sheets.

J. Jewsbury,

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FIG. 5

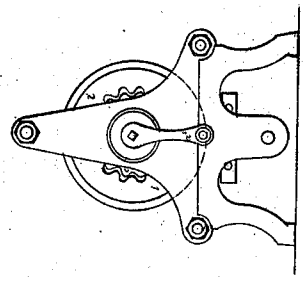

FIG. 6

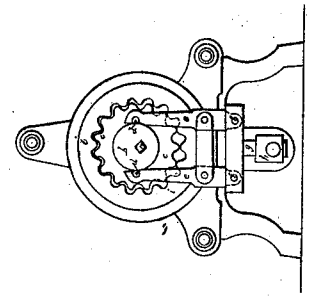

FIG. 3

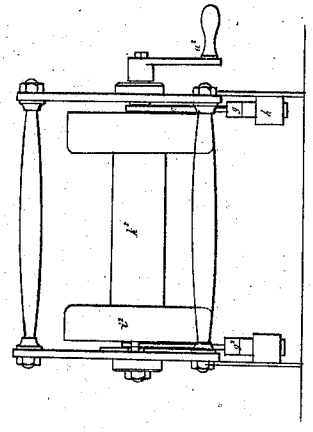

FIG. 4

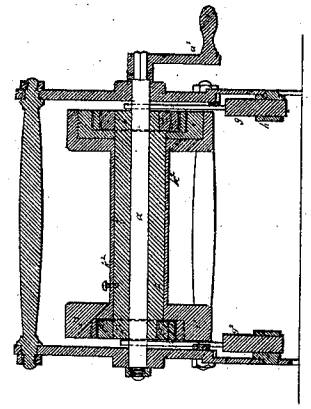

FIG. 1

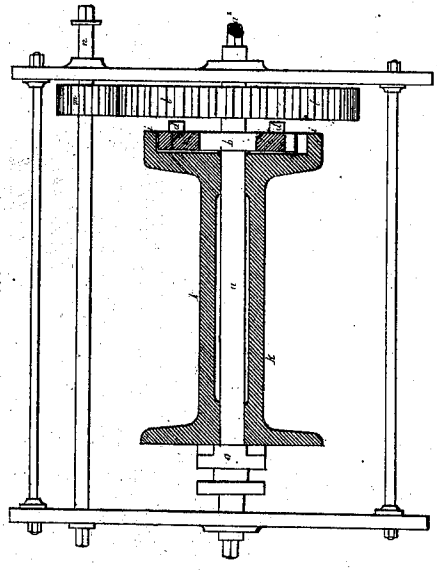

FIG. 7

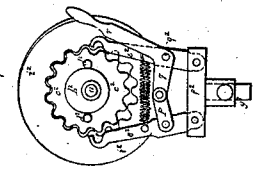

FIG. 2

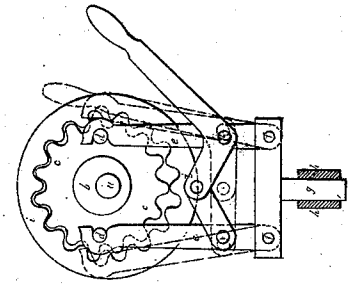

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FIG. 14

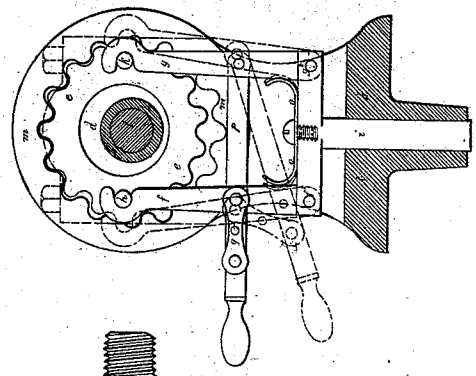


FIG. 13

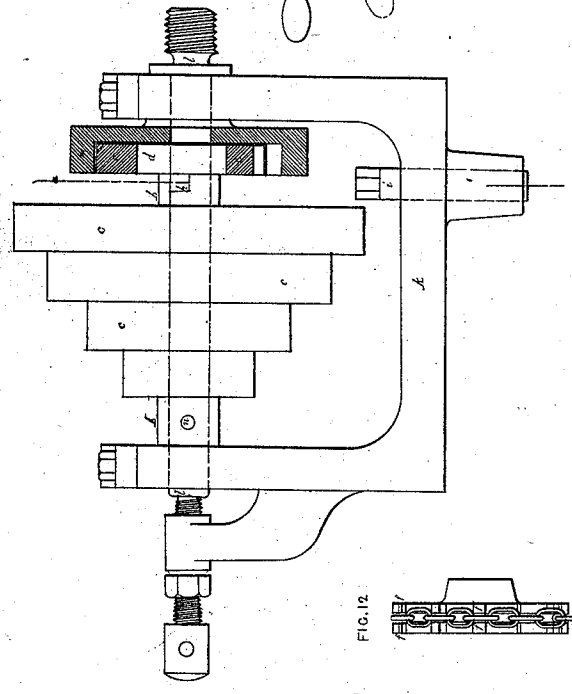


FIG. 12

FIG. 9

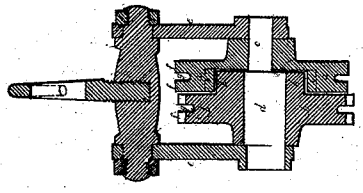


FIG. 11

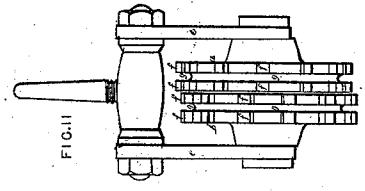


FIG. 8

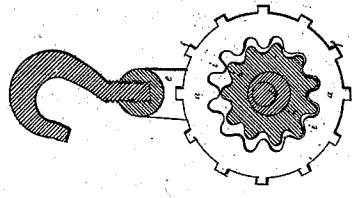
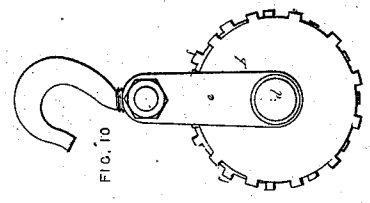


FIG. 10



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Letters Patent No. 100,769, *dated March* 15, 1870.

IMPROVEMENT IN HOISTING-MACHINES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, JOSEPH JEWSBURY, late of Kinver, now of Brook Fields, near Birmingham, England, have invented certain new and useful "Improvements in Machines for Raising Weights, which improvements may also be applied to other machinery;" and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings forming part of this specification.

My invention consists in constructing machines for raising weights and for other purposes with the mechanical arrangements hereinafter described, by which the motion communicated to a shaft or axis is reduced in speed and proportionately increased in force in a simpler manner than by the mechanical arrangements ordinarily employed for that purpose.

I construct a crab for raising weights as follows:

On an axis turned by a winch or otherwise an eccentric fixed, the said eccentric carrying a pinion which is loose on the eccentric and square shoulders, or pins on the said pinion engage in slots in an oscillating plate or arms; the pinion hence has no rotary motion. The said pinion is geared into an interior toothed wheel having one or more teeth more than the pinion.

On each rotation of the axis carrying the pinion the same is carried round the inside toothed wheel, and causes the said toothed wheel to advance to the extent of one or more teeth.

In order still further to increase the power of the machine, the arrangement described may be repeated, that is, the inside toothed wheel may carry an axis, on the end of which is a second pinion, incapable, like the first, of rotary motion. The second pinion engages with a second inside toothed wheel, which carries a hollow axis working on the axis of the first inside toothed wheel. The said second toothed wheel advances to the extent of one or more teeth during one rotation of the first toothed wheel.

The chain or rope by which the weight is to be lifted may be wound on the hollow axis of the second toothed wheel, or the said axis may carry a pinion engaging with a rack.

The application of my invention to pulleys for raising weights resembles in all essential respects its application to crabs already described.

In applying my invention to a lathe, I make an eccentric on the end of that part of the shaft carrying the driving-pulleys, the said eccentric carrying a pinion incapable of rotation. The said pinion engages in an inside toothed wheel on the end of the shaft of the lathe-head.

The motion of the pulley-shaft carries the pinion round the inside toothed wheel, and causes it and the lathe-shaft to advance through the distance of one or more teeth on each rotation of the pulley-shaft.

The lathe-shaft and pulley-shaft may be coupled together and made to rotate at the same speed by throwing out of gear the oscillating plate or arms which engage with the shoulders or pins of the pinion, and connecting the two shafts together by a pin or otherwise.

Having now explained the nature of my invention, I will proceed to describe, with refererence to the accompanying drawings, the manner in which the same is to be performed.

Figure 1 represents in elevation, partly in section, a simple form of crab constructed according to my invention.

Figure 2 represents an elevation of a portion of the same.

Like letters indicate the same parts in these figures.

An axis, *a*, carries an eccentric, *b*, upon which eccentric *b* is fitted a pinion, *c*.

This pinion *c* is loose upon the eccentric, and two pins, *d*, on the pinion *c*, engage in slots in the plates or arms *e*.

The said plates or arms *e* oscillate upon centers *f*, and are capable of rising and falling simultaneously by the stem *g*, on which they are supported, passing through the bracket *h* attached to the frame of the crab.

The oscillating arms *e*, by engaging with the pins *d*, keep the pinion *c* from performing a rotary motion, but leave it free to move in a vertical plane. It can hence be carried round on the eccentric *b*, the arms *e* oscillating on their centers *f* and the rod *g* rising and falling in the bracket *h*.

The pinion *c* engages with the inside toothed wheel *i*, which has one tooth more than the pinion *c*. On each rotation of the axis *a* the pinion *c* is carried round the toothed wheel *i*, and causes the said toothed wheel to advance to the extent of one tooth.

The inside toothed wheel *i* is fixed on the barrel or drum *k*, and communicates its rotary motion thereto, and the chain or rope by which the weight is to be lifted is wound upon the said barrel or drum.

The rotary motion communicated to the axis *a* by means of a winch at a^2 is thus communicated to the barrel or drum *k*, diminished in speed but increased in force.

The power of the crab may be still further increased by means of the toothed wheel *l* on the shaft *a*, with which wheel the pinion *m* on the axis *n* may be made to gear. The winch in this case is applied to the square end of the axis *n*, instead of at a^2.

The crab, figs. 1 and 2, may also be used as an ordinary crab by throwing the arms *e* out of gear with the pins *d* and coupling the barrel *k* to the shaft *a* by

means of the sliding clutch *o*. The rotary motion of the shaft *a* is in this case communicated directly to the barrel or drum *k*. The manner in which the arms *e* may be thrown out of gear with the pins *d* will be understood by reference to fig. 7 and to the description of the same.

Figure 3 is a side elevation, and

Figure 4 a vertical longitudinal section of another crab constructed according to my invention, the said crab being constructed for the exertion of greater power than that represented in figs. 1 and 2.

Figure 5 is an elevation of one end of the said crab.

Figure 6 is an elevation of the same end as fig. 5, but with the framing or end plate removed.

Figure 7 is an elevation of the working parts of the other end of the said crab, illustrating the manner in which the pinion is thrown into and out of gear with the oscillating arms both of this crab and that represented in figs. 1 and 2.

Like letters indicate the same parts in figs. 3, 4, 5, 6, and 7.

The axis or shaft *a*, to which motion is communicated by the winch a^2, carries an eccentric, *b*, on which is fitted a pinion, *c*, whose rotation is prevented by the pins *d* engaging with the oscillating arms *e* turning upon the centers *f*.

The rod *g*, carrying the arms *e*, is capable of rising and falling in the bracket *h*.

i is the inside toothed wheel in which the pinion *c* engages. By turning the winch a^2 a slow rotary motion is communicated to the wheel *i*.

The said wheel is fixed at one end of the hollow shaft *k*, the other end of which shaft carries a second eccentric, b^2, and on the said eccentric is a pinion, c^2.

This pinion c^2 is provided with pins d^2, which engage with arms e^2, and prevent the rotation of the said pinion.

The pinion c^2 engages in an inside-toothed wheel, i^2, which is fixed on the barrel or drum k^2.

The motion of the winch a^2 is transmitted to the drum or barrel k^2, through the eccentric *b* and pinion *c*, to the inside-toothed wheel *i*; from the wheel *i*, through the hollow shaft *k*, to the eccentric b^2 and pinion c^2; and from the pinion c^2 to the wheel i^2 and barrel or drum k^2.

Each rotation of the winch a^2 causes the wheel *i* to advance one tooth, and each rotation of the toothed wheel *i*, hollow shaft *k*, and eccentric b^2, causes the wheel i^2 to advance one tooth.

When it is desired that the crab shall not have so great a power as that which it has when the parts are arranged as described, the arms e^2 may be thrown out of gear with the pins d^2 of the pinion c^2 when the said pinion c^2 is capable of rotation. By then connecting the barrel or drum k^2 with the hollow shaft *k* by means of a pin or screw passed through the former into the latter, or by connecting them in any other way, the said drum k^2 rotates with the hollow shaft *k*.

I will now describe, with reference to fig. 7, the manner in which the pinion c^2, figs. 3, 4, 5, 6, and 7, and the pinion *c*, figs. 1 and 2, are connected with and disconnected from the oscillating arms by which the rotation of the pinion is prevented.

The said arms are connected together by means of the link *p* and cranked lever *q*.

When the parts are in the position represented in fig. 7, the pinion c^2 being disengaged from the arms e^2 is free to rotate, and the rotation of the eccentric b^2 communicates no motion to the wheel i^2.

By lifting the handle *r* of the lever *q* vertically, the arms e^2, cross-piece f^2, and rod g^2 may be raised until the slots in the said arms e^2 are brought opposite to the pins d^2 of the pinion c^2. By then moving the handle *r* in a nearly horizontal direction from the pinion c^2, so as to make the said handle turn upon its joint q^2, the arms e^2 are made to approach one another, and the pins d^2 are made to engage in the slots in the arms e^2. The rotation of the pinion c^2 is thus prevented, and the rotation of the cam b^2 communicates a slow motion to the drum or barrel k^2.

The engagement of the arms e^2 with the pins d^2 may be maintained by means of a coiled spring between the two arms e^2.

Figure 8 is a transverse section of a pulley for raising weights, constructed according to my invention.

Figure 9 is a longitudinal vertical section of the pulley.

Figure 10 is a side elevation, and

Figure 11 a front elevation of the same.

Figure 12 is a portion of the pulley, with a piece of chain passing over it.

Like letters indicate the same parts in figs. 8, 9, 10, 11, and 12.

The pulley *a b* is made in two parts, of the same diameter.

The part *a* turns on the axis *c* and the part *b* turns on the eccentric part *d* of the said axis.

The said axis *c d* is fixed in the frame *e* of the pulley.

On the periphery of each of the parts *a b*, and near the faces thereof, radial projections or studs *f* are made.

In the middle of each part and between the studs or projections *f* a groove, *g*, is made.

The chain used with the pulley is temporarily fixed on the parts *a b* by each alternate link of the chain engaging between the studs or projections *f*, and in the grooves in the said parts, as will be understood by referring to the separate view, fig. 12.

On the inner face of the part *b* of the pulley a pinion, *h*, is situated, and in the face of the part *a* a hollow toothed wheel, *i*, is made, the said hollow toothed wheel *i* being provided with one tooth more than the pinion *h*.

An endless chain passes over the parts *a b* in the following manner: commencing with the chain on the near side of the part *a*, the said chain passes over the top of the part *a*, descends on the distant side of the said part *a*, and, descending below the pulley, returns, forming a loop in which a single pulley is placed, the said single pulley being attached to the weight to be raised. The returning chain ascends on the near side of the part *b*, and passing over the top of the same descends on the distant side of the part *b*, and passing downward below the pulley returns to the near side of the part *a*, the point from which the course of the chain was first described.

I will call the loop in which the single pulley works the pulley-loop, and the other loop the hand-loop. By pulling one or other side of the hand-loop the pulley *a b* is made to rotate.

The effect of the fixed eccentric *d* is to cause the pinion *h* to roll round within the inside-toothed wheel *i*, the teeth of the said pinion engaging during the rolling motion with the teeth of the wheel *i*, but as the wheel *i* has one tooth more than the pinion *h*, the said pinion *h* performs a complete rotation during the time that the inside-toothed wheel *i* is performing a rotation less the length of one tooth; hence the part *b* of the pulley advances one tooth upon the part *a* during each rotation, and the chain passing over the part *b* is consequently being paid out or drawn in somewhat faster than that part of the chain which passes over the part *a*. The pulley-loop is thereby slowly lengthed or shortened, and the single pulley supported in it slowly raised or allowed slowly to descend.

The action of the parts of the pulley differs in no essential respect from the action of corresponding parts in the crab already described. In the crab the first motion is given to the axis and eccentric, the pinion on the eccentric being kept from rotating. In the

pulley the first motion is given to the drum or pulley, the eccentric being fixed and the pinion rotating upon it.

Figure 13 is a side elevation of a lathe-head constructed according to my invention, the holding-arms or levers being removed, and

Figure 14 is a section of the lathe-head, taken through the line *a* of fig. 13.

Like letters indicate the same parts in these figures.

On the hollow shaft *b* carrying the speed-pulley *c*, I place an eccentric, *d*, on which is fitted the pinion *e*.

The said pinion *e* is made incapable of rotation by the engagement of the slotted arms or levers *f g* with the pins *h* on the said pinion *e*.

The stem *i*, to the top of which the arms or levers *f g* are jointed, rises or falls in the bed *k* of the lathe. On the end of the lathe-spindle or shaft *l* is an inside-toothed wheel, *m*, with which the pinion *e* engages, the said wheel having one more tooth than the pinion *e*.

By the motion of the pulley-shaft *b* the pinion *e* is carried round the wheel *m*, and the lathe-shaft *l* is made to advance through the distance of one tooth on each rotation of the said pulley-shaft *b*. A slow rotary motion is thereby communicated to the said lathe-shaft.

The lathe-shaft *l* and pulley-shaft *b* may be coupled together and made to rotate at the same speed by throwing the arms or levers *f g* out of gear with the pins *h*, and connecting the said shafts together by means of the pin *n*, passed through them, or in any other convenient way.

The holding-arms or levers *f g* are engaged with and disengaged from the pins *h* of the pinion *e* in the following manner:

The said arms or levers turn on centers f^2 g^2, and are pressed outward, when at liberty to move, by the spring *o* between them.

The lever *g* is jointed to the end of the lever *p*, and the lever *f* is jointed to the lever *p* by means of the link *q*. The lever *p* is on one side and the link *q* on the other side of the arm or lever *f*.

When the lever *p* and link *q* are in the positions represented in fig. 14, a pin, *r*, is passed through them, and the said lever and link fastened together, and the levers *f g* thereby held in gear with the pinions *h h*.

By removing the pin *r* and depressing the lever *p* into the position indicated in dotted lines, the levers *f g* can turn on their centers, and are pressed outward and disengaged from the pins *h* by the spring *o*, as indicated in dotted lines. The pinion *e* is then at liberty to rotate with the pulley-shaft *b*.

This arrangement of the holding-arms or levers may be applied to the crabs hereinbefore described.

Although I have only described and illustrated my improvements in machines for raising weights in connection with crabs and pulleys, yet my said invention may be applied to other machinery for raising weights.

Having now described the nature of my invention and the manner in which the same is to be performed, I wish it to be understood that I do not limit myself to the precise details herein described and illustrated, as the same may be varied without departing from the nature of my invention; but

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

1. The wheels *i* and *c* and eccentric *b*, combined and operating together substantially as and for the purposes set forth.

2. Preventing the rotation of the wheel or pinion *e*, by means of the oscillating arms *e* or other suitable device, substantially as set forth.

3. The application to crabs and other hoisting or lifting-machinery of the said wheels and eccentric, substantially as and for the purposes set forth.

4. The application of the said wheels and eccentric to turning-lathes, substantially as and for the purposes set forth.

JOSEPH JEWSBURY. [L. S.]

Witnesses:
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EDWARD CAPERN.