

Mole Flow,

Patented Sept. 11, 1860.

Fig. 3

This diagram shows a perspective view of the mechanical assembly. It features a main frame with a base plate labeled 'A'. A horizontal bar 'I' is positioned at the top. A complex linkage system is shown, including a lever 'C' pivoted at 'C', a connecting rod 'd', and a roller 'B' at the bottom left. Other components labeled include 'A', 'B', 'C', 'D', 'E', 'F', 'G', 'H', 'I', 'J', 'K', 'L', 'M', 'N', 'O', 'P', 'Q', 'R', 'S', 'T', 'U', 'V', 'W', 'X', 'Y', 'Z', 'a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j', 'k', 'l', 'm', 'n', 'o', 'p', 'q', 'r', 's', 't', 'u', 'v', 'w', 'x', 'y', 'z', '1', '2', '3', '4', '5', '6', '7', '8', '9', '10', '11', '12', '13', '14', '15', '16', '17', '18', '19', '20', '21', '22', '23', '24', '25', '26', '27', '28', '29', '30', '31', '32', '33', '34', '35', '36', '37', '38', '39', '40', '41', '42', '43', '44', '45', '46', '47', '48', '49', '50', '51', '52', '53', '54', '55', '56', '57', '58', '59', '60', '61', '62', '63', '64', '65', '66', '67', '68', '69', '70', '71', '72', '73', '74', '75', '76', '77', '78', '79', '80', '81', '82', '83', '84', '85', '86', '87', '88', '89', '90', '91', '92', '93', '94', '95', '96', '97', '98', '99', '100'. The diagram illustrates the intricate mechanical design and the various components that make up the assembly.

J. A. C. Koberichmidt-
Ges. H. Sagnan.

L. S. C. Wall } by their Atty
Geo. Roberts }
Mills S. Carter } Wm D. Baldwin.

UNITED STATES PATENT OFFICE.

A. LITTLE O. WALL, GEORGE ROBERTS, AND M. S. CARTTER, OF DECATUR, ILLINOIS.

IMPROVEMENT IN PORTABLE CAPSTANS FOR MOLE-PLOWS.

Specification forming part of Letters Patent No. 30,015, dated September 11, 1860.

To all whom it may concern:

Be it known that we, A. LITTLE O. WALL, GEORGE ROBERTS, and MILO S. CARTTER, all of Decatur, in the county of Macon and State of Illinois, have invented certain new and useful Improvements in Portable Crabs or Capstans, (specially adapted for use in connection with a mole-plow, but applicable to various other purposes,) of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which make part of this specification, and in which—

Figure 1 represents an elevation of one side of a portable crab or capstan embracing our improvements, the parts being shown in the attitude they assume when the machine is raised upon its wheels. Fig. 2 represents a similar view of the same, but with the parts in the attitude they assume when the crab is lowered upon and anchored in the ground. Fig. 3 represents a view in perspective of the machine as seen from behind, with the parts in the same attitude, as in Fig. 1. Fig. 4 represents a view, partly in section, of the mechanism for throwing the upper and lower spools or barrels of the capstan into or out of gear, the parts being shown in the attitude they assume when the lower spool, or that through which the tractive power is applied, is in gear with the operating mechanism. Fig. 5 represents a similar view of the same, but with the parts in the attitude they assume when the upper spool, or that by which the machine is raised upon its supporting-wheels, is in gear with the operating mechanism.

The advantages accruing to the agriculturist from the use of underground drains are so manifest that they are now regarded as almost indispensable adjuncts to every well-improved farm. This of course has created a demand for machinery capable of constructing such drains in the cheapest and most expeditious manner, and the machines most generally used for this purpose are denominated "mole-plows." These plows usually consist of a colter attached to a strong beam and having a mole at its lower extremity of a size to accommodate the drain required. As this mole has to be forced through the ground at a depth varying with that of the drain, (but not infrequently

two or three feet below the surface,) it is obvious that a very great expenditure of power must be required. It is likewise absolutely essential to the convenient and successful operation of the machine by which the plow is forced through the ground that, while capable of being securely anchored and of exerting any required degree of force upon the plow, it should at the same time admit of being readily removed from place to place and quickly adjusted, in order to recommence work without undue loss of time.

Our invention relates to that class of portable capstans in which the capstan is mounted upon a frame supported upon bent axles; and our improvements consists, first, in arranging a capstan consisting of two spools upon the same shaft upon the frame in such manner that the track-rope by which the plow is drawn may be attached to one spool, while the other may operate upon a system of cords, levers, and pulleys connected with the bent axles upon which the frame is mounted, by which means we attain a novel, useful, and convenient method of employing the whole power of the capstan in drawing the flukes out of the ground; secondly, in so constructing the front axle that it shall have a swiveling as well as an axial movement in its bearings, so that it may readily be turned in any required direction to facilitate the turning of the machine, while at the same time it holds the front of the frame securely at its greatest elevation from the ground, whereby (in addition to the advantages above enumerated) the anchoring of the crab is facilitated, as hereinafter more fully described; thirdly, supporting the truck upon wheels having their bearings in adjustable arms in such manner that the radius of the arc of a circle described by each wheel (or each axle) as the frame is raised or lowered upon its wheels may be varied at the will of the operator, as well as the angle of the machine with respect to the ground, by which means the machine can be made to preserve its horizontal position irrespective of the inequalities of the surface of the ground, and thereby avoid throwing the strain of the entire weight of one end of the machine upon one wheel while in the act of lifting the frame.

In the accompanying drawings the frame A of the machine is represented as supported upon wheels B, which have their bearings in adjustable arms b , which slide longitudinally in guides b' , secured to the bent parts of the axes C C', and are held in any required position by the set-screws b^2 , by which means the frame can be adjusted to any desired height from the ground. The rear axle, C', turns in bearings c' in the frame A in such manner that, while it cannot vary its position relative to the frame, it is free to turn on its axis in order to facilitate the raising and lowering of the machine. The front axle, C, on the contrary, turns in a single swiveling bearing, c , which has a spindle passing entirely through the frame and secured by a nut and washer; and as this bearing c turns freely on its axis the front axle has not only an axial but a swiveling movement as well, in order to facilitate the guiding of the machine. A semicircular piece of metal, c^2 , is firmly secured or connected to this axle in such manner that while the bent part of the axle is vertical—that is, when the machine is raised to its greatest height—the semicircle c^2 is parallel to and lies upon the top of the frame, as shown in Figs. 1 and 3. It may be held in this position, if desired, by means of a turning-latch, c^3 , arranged and operating in the same manner as the bearing c , before described. With the parts in the attitude shown in Figs. 1 and 3 this latch prevents the front of the frame from falling, but leaves the front axle free to swivel on its bearings c to facilitate the turning of the machine. When the latch is turned a quarter of a circle the parts are free to assume the attitude shown in Fig. 2.

The adjustable arms b , to which the supporting-wheels B are secured, have bent arms b^3 on their lower ends, to which cords, ropes, or chains are secured, which cords are also attached to the ends of two rocking levers, D, pivoted near their centers to the side pieces, A, of the frame, and united at top by a cross-bar, d , to secure the necessary degree of resistance to the lateral strains to which they are subjected, as well as their proper mutual co-operation. The cords d' are secured to the bent arms of the front wheels and to the lower ends of the levers D. The cords d^2 are attached to the bent arms of the rear wheels, and are attached to the upper ends of the rocking levers D after passing round the pulleys d^3 , which turn on an axle, d^4 , in the rear part of the frame. The cords d^5 connect the tops of the rocking levers with the upper spool of the capstan, hereinafter described.

Near the center of the machine an upright frame, E, which supports the capstan, is erected. This capstan consists of a central shaft, F, which turns loosely in two spools or barrels, G H, the lower one, H, of which rests and turns upon a transverse beam, A', of the frame, while the upper one, G, rests and turns upon a floor, g , which separates the two. The shaft F passes through a hole in the cross-beam A', and is

free to move vertically or longitudinally for a short distance, this vertical movement being regulated by a hand-lever, f , which is forked at one end, and carries pins which take into a groove in the shaft, so as to leave it free to rotate and yet control its rising and falling. This may be done in any well-known way, and the one above mentioned will readily be understood by a reference to the drawings. The shaft F is rotated by means of a lever, I, secured to or fitting upon its upper end, and carries two ratchets, 2 and 3, which slide up and down with the shaft in slots 5 and 6 in the spools G H, each of which has a corresponding ratchet, 1 and 4, secured to it. The construction of the capstan, spools, &c., is clearly shown in Figs. 4 and 5.

The flukes K, projecting beneath the frame, are for the purpose of anchoring the crab, to enable it to have a hold upon the ground sufficient to resist the strains to which it is subjected while in operation.

The operation of the machine is as follows: Suppose the parts to occupy the position shown in Fig. 2—that is, with the crab anchored in the ground and connected to the plow by the rope J, in which case the shaft F will occupy the position shown in Fig. 4. To elevate the frame the hand-lever f is depressed and secured by any suitable detent. This lifts the shaft F and disconnects the ratchets 3 and 4 of the lower spool, H, and engages those, 1 and 2, of the upper spool, G, as shown in Fig. 5. This releases the track-rope J and allows it to slacken. If the shaft F be now rotated in the proper direction, the cord d^5 will be wound upon the upper spool, G, and the frame gradually elevated until the parts assume the position shown in Figs. 1 and 3. The front axle, C, is prevented from passing beyond a perpendicular line by the semicircle c^2 , the rear axle, C', by the stop c^4 . The machine, while in this attitude, can readily be transported from place to place. By turning the latch c^3 into the position shown in Figs. 1 and 3 the front axle will be securely held with its bent arms in a vertical position. When thus secured, if the cords d' , connecting the lower ends of the axle with the rocking levers D, be unloosened, the machine can be guided as readily as an ordinary wagon, the latch in no way interfering with its swiveling upon the center bearing, c .

When it is desired to anchor the crab the hand-lever f is released, the shaft falls into the position shown in Fig. 4, and the cords d^5 are slackened. By rotating the shaft, after first blocking the wheels, the rope J, which is attached to the plow, is wound up, the machine is drawn backward and gradually lowered by the axial movement of the axes C C', the flukes are forced into the ground, and by the time the parts assume the attitude shown in Fig. 2 the crab is securely anchored. By leaving the latch c^3 in the position shown in Figs. 1 and 3 the rear of the machine alone will descend, which arrangement may sometimes prove con-

venient in facilitating the entrance of the flukes into the ground. The arrangement of the bearings of the supporting-wheels in adjustable arms affords a ready means of adapting the machine to the inequalities of the ground without disturbing its horizontal position.

The advantages secured by the above arrangement of parts are so obvious to any one acquainted with the practical operation of these machines that a recapitulation of them is deemed unnecessary here.

We have described our machine as adapted to the making of underground drains, as we have contemplated its application chiefly to that purpose; but it is obvious that by removing the flukes and making a slight modification of the cords and levers it might as readily be adapted to the transportation of logs, stones, heavy machinery, &c.

We do not claim broadly, under this patent, mounting the frame which carries the capstan upon bent axles, nor elevating them by means of the power of the capstan; but,

Having thus described the construction and operation of our improved machine, what we

claim therein as new, and desire to secure by Letters Patent, is—

1. The combination of the spools G H and shaft F with the system of cords d' d^2 d^5 , levers D, and pulleys d^3 , when the whole are arranged together for joint operation substantially in the manner herein described, for the purpose set forth.

2. The construction of the front axle, C, with a swiveling bearing, c , in combination with the semicircle c^2 and turning-latch c^3 , when arranged together for joint operation substantially as and for the purposes set forth.

3. Supporting the wheels in adjustable arms b , when said arms are arranged and operate in relation to the bent axles, substantially as and for the purpose described.

In testimony whereof we have hereunto subscribed our names.

A. LITTLE ONE WALL.
GEORGE ROBERTS.
M. S. CARTTER.

Witnesses:

JAMES McWILLIAMS,
ISAAC FREESE, Jr.