No. 790,765. PATENTED MAY 23, 1905.

G. E. TURNER.

CONTROLLING MECHANISM.

APPLICATION FILED JULY 30, 1904.

2 SHEETS—SHEET 1.

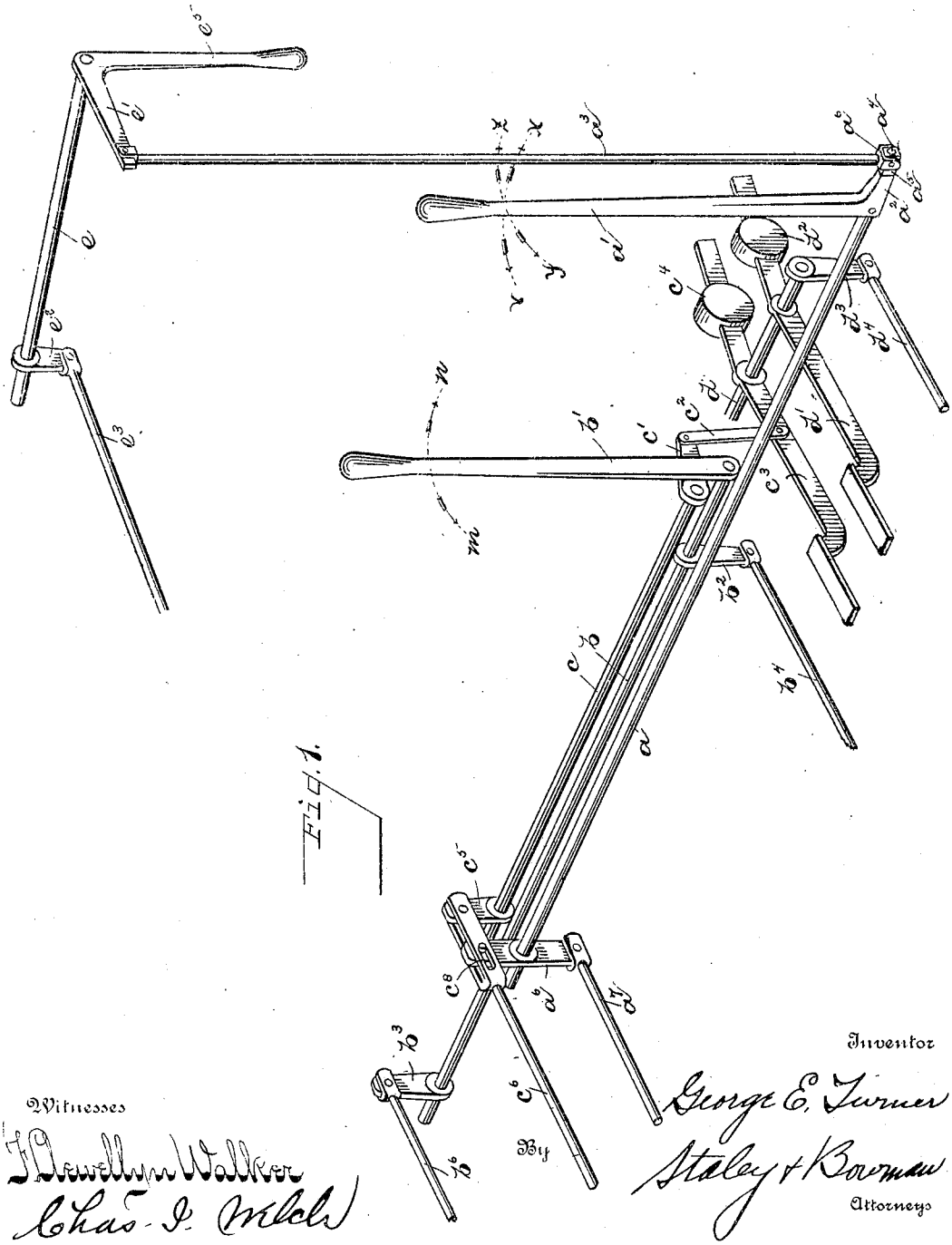

Fig. 1.

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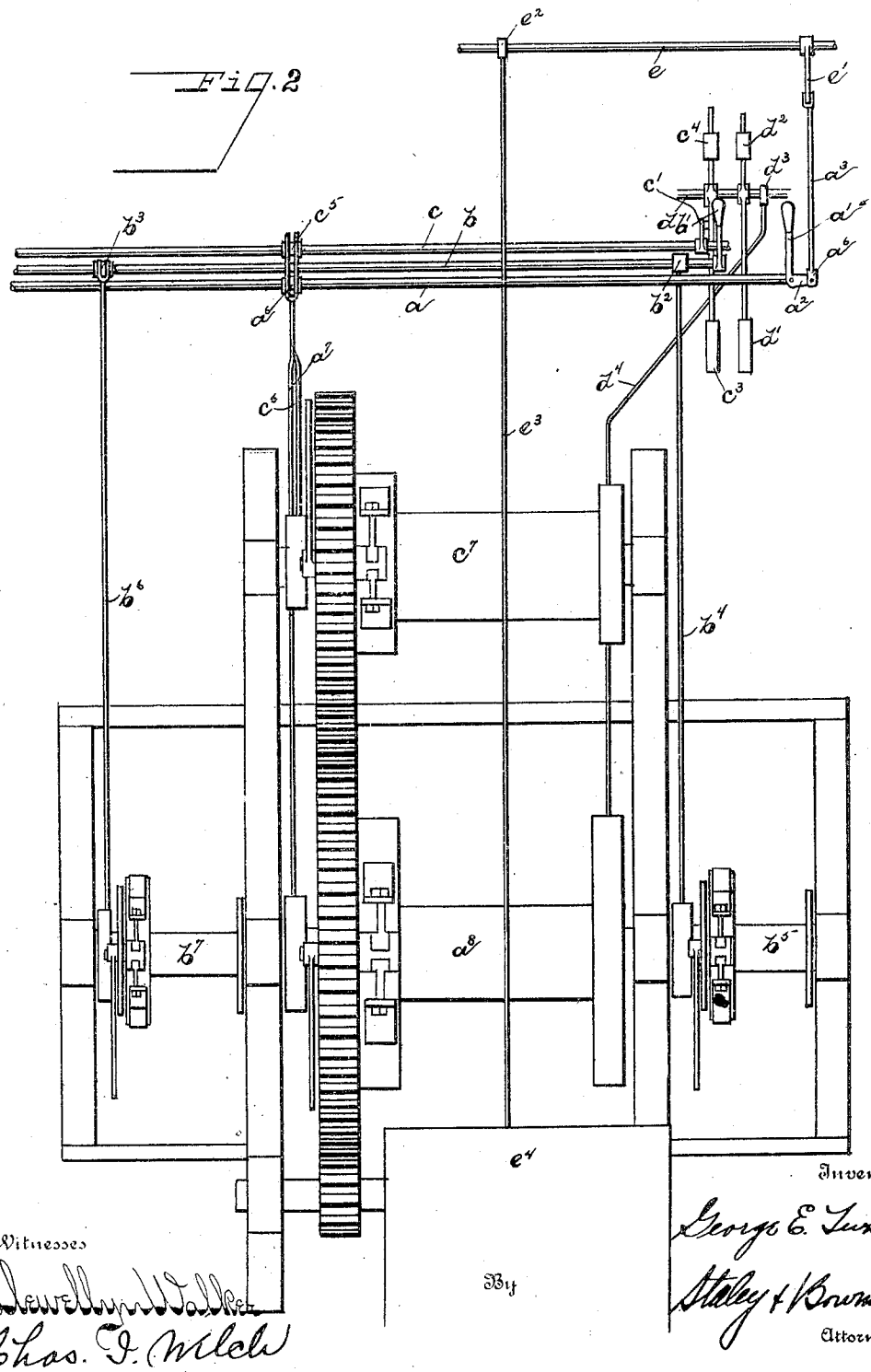
2 SHEETS—SHEET 2.

Fig. 2



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UNITED STATES PATENT OFFICE.

GEORGE E. TURNER, OF BELLEFONTAINE, OHIO.

CONTROLLING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 790,765, dated May 23, 1905.

Application filed July 30, 1904. Serial No. 218,812.

To all whom it may concern:

Be it known that I, GEORGE E. TURNER, a citizen of the United States, residing at Bellefontaine, in the county of Logan and State of Ohio, have invented certain new and useful Improvements in Controlling Mechanism, of which the following is a specification.

My invention relates to improvements in controlling mechanism especially adapted for steam-shovels, dredge-boats, &c.

The object of my invention is to increase the efficiency and safety of such constructions by providing mechanism whereby one person in a central location can control all the various necessary movements with a limited number of levers, and, further, to so connect such levers with the working parts that more than one operation may be accomplished by the movement of a single lever, and, further, so arrange the levers that they will not only be within the reach, but that they may be retained within the grasp, of the operator, thus bringing the machine under continuous and instant control.

With the above primary and other incidental objects in view my invention consists of the constructions and combinations of parts and mode of operation hereinafter described, and set forth in the claims.

Figure 1 is a perspective view of the lever system and connecting-links. Fig. 2 is a plan view, somewhat diagrammatic, of the various drums, clutches, and engine, lever system and connections.

Like parts are represented by similar reference characters in both views.

In proximity to the floor of the machine are located transverse rock-shafts a, b, c, and d, and overhead is a fifth transverse rock-shaft e. Pivotally secured at one end of the rock-shaft a, with its pivotal connection at right angles to the axis of the shaft, is a hand-lever a'. The lever a' has a lateral arm a^2, which is connected by a universal joint with a link a^3. The connection of the lever a' and link a^3 is preferably as follows: The arm a^2 terminates in a trunnion a^4, on which is mounted a block a^5, the axis of the trunnion a^4 being in line with that of the shaft a. The link a^3 is formed at its lower end into a stump a^6, which is pivotally secured to the block a^5, the axis of the pivotal connection being at right angles to the trunnion a^4. The link a^3 is connected at its upper end with the lateral arm c' on the rock-shaft c. There is also connected to the rock-shaft e a pendent arm e^2, to which is connected a link e^3, which controls the throttle of an engine e^4. (Shown diagrammatically in Fig. 2.) By the movement of the hand-lever a' laterally—*i. e.*, in the directions indicated by v or x—the shaft e, through the medium of the arm e' and link a^3, will be rocked and the arm e^2 will be moved forward as the lever a' is moved in the direction of v and back when a' is moved toward x, thus giving to the link e^3 a longitudinal movement, by which the engine e^4 is started, stopped, and the speed controlled. In the drawings a supplementary throttling-lever e^5 is shown on the shaft e; but such a lever is not essential to the operation.

It will be seen that upon the movement of the lever a' about its pivotal connection with the shaft a for the purpose of controlling the engine, as has been described, the shaft a remains unaffected. However, the lever a' is capable of movement forward and backward—*i. e.*, in the direction of y z—independently of the connections with the rock-shaft e and whereby the shaft a will be rocked. Secured to the shaft a is a cross-arm a^6, the lower end of which is connected with a link a^7, which in turn controls the clutch mechanism of the main hoisting-drum a^8, Fig. 2. The upper end of the cross-arm a^6 has a slotted connection with the connection to the clutch mechanism of the backing-drum, as hereinafter described.

Rigidly secured to the shaft b is a hand-lever b', a pendent arm b^2, and an upwardly-extending arm b^3. Connected to the arm b^2 is a link b^4, controlling the clutch mechanism of a swinging drum b^5, and a similar connection b^6 extends from the arm b^3 to the clutch mechanism of a drum b^7. By means of the lever b' the movement of the swinging boom of the derrick is controlled through the drums b^5 b^7.

It will be noted that the arms b^2 b^3, extending from the shaft b in opposite directions,

have reverse movements. Thus when the lever b' is pulled rearward (toward rear of boat)—*i. e.*, toward m—the arm b^2 will move forwardly and cause the drum b^5 to be engaged by its corresponding clutch mechanism. The arm b^3 will move rearward and move the link b^6, and the drum b^7 will be rendered entirely free from its clutch mechanism, and as the cable is reeled upon the drum b^5 the boom will be moved accordingly. The clutch mechanism is so adjusted that upon bringing the lever b' to the perpendicular position both drums b^5 b^7 will be released from their clutch mechanism and the boom stopped in any position. Upon movement of the lever b' forwardly or toward n the operation before described will be reversed, and the drum b^7 will be engaged with its clutch mechanism through the movement of the arm b^3 and link b^6, whereby the swinging boom will be moved in the opposite direction.

The rock-shaft c is operated by means of a lateral arm c', having a link connection c^2 with a foot-lever c^3, which is loosely pivoted on the shaft d and equipped with a counterweight c^4. The shaft c is further provided with an upwardly-extending arm c^5, pivotally secured to the link c^6, which controls the clutch mechanism of the backing-drum c^7. As before mentioned, the upper end of the cross-arm a^6 has a slotted engagement with the link c^6, as shown at c^8. The object of this construction is to permit the use of the foot-lever c^3 as an auxiliary device, as will be explained more fully hereinafter. If the hoisting mechanism is in engagement and it is desired to engage the backing mechanism without disengaging the hoisting mechanism, the foot-lever c^3 may be operated to set the backing mechanism, while the hoisting mechanism is held in engagement by the hand-lever a'. In the position shown in Fig. 1 the hand-lever a' is located intermediate of the points x y and the hoisting and backing mechanisms are both disconnected. It will be readily understood that if the hand-lever a' is moved toward x the pin-and-slot connection c^8 is such that the rod c^6 will be moved thereby and the backing mechanism set. If, however, the hand-lever a' is moved toward y for the purpose of setting the hoisting mechanism, the rod c^6 will be moved by the counterpoise c^4 and its connections, hereinafter more fully explained, and the backing mechanism be released. There is thus shown an automatic releasing of the backing mechanism whenever the hoisting mechanism is set by moving the hand-lever a' toward y. The connection, however, explained hereinafter, is such that the foot-lever c^3 may be operated after the hoisting mechanism is set to set the backing mechanism also. However, both the hoisting and backing drum mechanism are capable of being operated so as to throw automatically the one into operation simultaneously with the disengagement of the other through the operation of the lever a'. Secured to the shaft d is a foot-lever d', similar to the foot-lever c^3 and equipped with a counterweight d^2. A pendent arm d^3 on the shaft d has a link connection d^4 with brake devices on the hoisting-drum a^8, whereby said drum may be controlled upon the release of the clutch mechanism.

Referring to Fig. 1, the operator would take his place at the side of the shafts a b c nearest the observer, grasping the lever b' in the left hand and the lever a' in the right, and stand in such position as to easily reach the levers c^3 and d' with his left foot, maintaining his right foot for his support. Without changing position or releasing his hold on the hand-levers he may control all operations as follows: To start the engine, he would move the lever a' in the direction of v, which through the link a^3 would rock the shaft e and operate e^3 to admit steam to the engine-cylinder. In describing the cycle of operation I shall assume that the starting-point is one where the boom is over the dump—that is to say, the dipper has been dumped—and the operator of the machine desires to begin a new operation. To swing the boom to the point of operation—that is, to a place where the dipper will scoop out the soil or other substance—which I shall assume is to the right, he would move the lever b' rearward or toward m, which would cause the clutch mechanism of the drum b^5 to be set and the chain reeled about the drum b^5 and holding it in such position until the boom has reached the proper place for operating the dipper. He would then return the lever toward the vertical, in which position both drums b^5 and b^7 are disengaged and the movement of the boom will ordinarily stop. It should be remembered, however, that a dredge-boat does not always lie perfectly level, and therefore after hoisting the dipper when the operator desires to hold the dipper in proper position for dumping he moves the lever b' past the center, so as to insure the boom being held and preventing the weight of the chains and dipper moving the boom before dumping; but in this operation of moving the boom to its proper operating position there is no necessity of moving the lever b' past the center, since the descent of the dipper has been controlled by the foot of the operator on the brake-lever d', and the dipper itself contacting against the water or surface to be dredged will have little or no tendency to throw the boom out of the position to which it has been moved. To set the hoisting mechanism, the lever a' while still in the position to which it was moved for starting the engine is pulled rearwardly or toward y, which sets the hoisting mechanism. The speed of the engine may be increased during the hoisting operation by varying the lateral

position of the lever a'. The lever a' preferably lies out of plumb when the power is cut off, and in connecting up the engine the lever a' is moved laterally, so that it stands nearly vertical. Consequently during the movement of the lever a' toward y and z the lever a' is in nearly a vertical position, and the speed of the engine may be increased or decreased by moving it to or from the vertical. In this way the operator easily learns to regulate the speed of the engine by observing the position of the lever a' with reference to the vertical. To return the boom to its original position, the lever b' is moved forwardly toward the point n until the desired position is reached, when the boom is stopped by moving the hand-lever b' past the center and quickly returning it to the vertical for the purpose heretofore explained. The backing mechanism is set by moving the lever a' toward z by means of slot-and-pin connection.

In all ordinary operations the cycle of movement is controlled by the two hand-levers a' and b' and the foot-lever d'. The arrangement shown is particularly desirable for this reason and because the operator, maintaining his support on his right foot, can use his left foot to operate the foot-lever d' for all ordinary operations, and when an unusual operation is required he can use the left foot to operate the foot-lever c^3. The two foot-levers are so located that the foot-lever d' stands in close proximity to his left foot and the lever c^3 is located a short distance from it, but within easy reach of his left foot.

As will be understood by those familiar with the art of dredging, there are times when it is desirable to set the backing mechanism while the hoisting mechanism is held in engagement—in other words, to operate both the hoisting and backing mechanism simultaneously. My construction is such that this can be readily done, for if the operator has set the hoisting mechanism by moving the hand-lever a' toward y the counterpoise c^4, connected with the lever c^3, will cause the link c^6 and arm c^5 to be oscillated automatically. If, however, the operator now operates the foot-lever c^3 with his left foot, he can throw the backing mechanism into operation by reason of the slot c^8 permitting the link c^6 to be oscillated without engaging the pin. In this way by holding the hand-lever a', with the hoisting mechanism properly set, and by operating the foot-lever c^3 with his foot he can operate the hoisting and backing mechanism simultaneously.

Throughout the description of the construction reference has been made to a series of drums and clutch mechanism driven from a single source of power; but it is to be understood that the invention is not to be limited to that particular kind of mechanism, but might be utilized to control a series of engines or motors in various parts of the structure.

Having thus described my invention, I claim—

1. In a dredging-machine, the combination of power mechanism and backing mechanism, hoisting mechanism, devices for coupling said power mechanism to said hoisting and backing mechanism, a single lever for operating simultaneously said coupling devices, and means for permitting a movement of one of said coupling devices independent of the other.

2. In a dredging-machine, the combination of power mechanism, hoisting and backing mechanism, a single controlling-lever for all of said mechanism, and an auxiliary controlling device for said backing mechanism independent of said controlling-lever, substantially as described.

3. The combination of power mechanism with three kinds of mechanism to be operated upon by said power mechanism, a single controlling device for both the power mechanism and one of the kinds of mechanism operated thereon on one side of the operator, controlling mechanism for the other mechanism on the other side of the operator and within reach of the operator while operating the first controlling mechanism, for the purpose specified.

4. The combination of power mechanism, auxiliary devices operated thereby, a single controlling device for the power mechanism and one of the auxiliary devices upon one side of the operator, and controlling mechanism for the other auxiliary devices located within reach of the operator while in a position for operating the first controlling mechanism.

5. The combination of power mechanism, hoisting, swinging and backing mechanism operated by said power mechanism, a single controlling device for the power mechanism and the hoisting mechanism, and means for releasing the backing mechanism automatically when the hoisting controlling device is operated, for the purpose specified.

6. The combination of power mechanism, hoisting, swinging and backing mechanism, controlling mechanism for the power and hoisting mechanism, a single controlling-lever connected therewith on one side of the operator, controlling mechanism for the swinging mechanism on the other side of the operator, and controlling mechanism for the backing mechanism within the reach of the foot of the operator when the other controlling mechanism is being operated by said operator.

7. The combination of power mechanism, different kinds of auxiliary devices operated thereby, a controlling device for the power mechanism and said auxiliary devices located at a point on one side of the operator, an additional controlling mechanism for one of said auxiliary devices within the reach of the op-

erator while in a position for operating said first-mentioned controlling device but adapted to permit an automatic release of its auxiliary device through said first-mentioned controlling mechanism.

8. The combination of power mechanism, a plurality of auxiliary devices operated thereby, a controlling device for two of said auxiliary devices and said power mechanism, additional controlling devices for the others, and connecting mechanism between said controlling devices for automatically releasing one of the auxiliary devices whenever one of the others is operated.

9. The combination of power mechanism, a plurality of auxiliary operating devices adapted to be connected therewith, a single controlling-lever for the power mechanism and two of said auxiliary operating devices, a universal-joint connection between said controlling-lever and the controlling mechanism for the power mechanism, and means also connected with said controlling-lever for automatically releasing one of said auxiliary devices whenever another auxiliary device is connected with the power mechanism through said controlling-lever, for the purpose specified.

10. The combination of power mechanism, swinging, hoisting and backing mechanism operated thereby, a single controlling-lever for said power and hoisting mechanism located on one side of the operator, controlling mechanism for the swinging mechanism on the other side of said operator and within his reach when the first controlling-lever is within his grasp, controlling mechanism for said backing mechanism within the reach of the foot of the operator when in position for operating the other controlling devices, and a fourth controlling device within the reach of the other foot, for the purpose specified.

In testimony whereof I have hereunto set my hand this 25th day of July, A. D. 1904.

GEORGE E. TURNER.

Witnesses:

JOHN E. WEST,

KARL S. KUMLER.