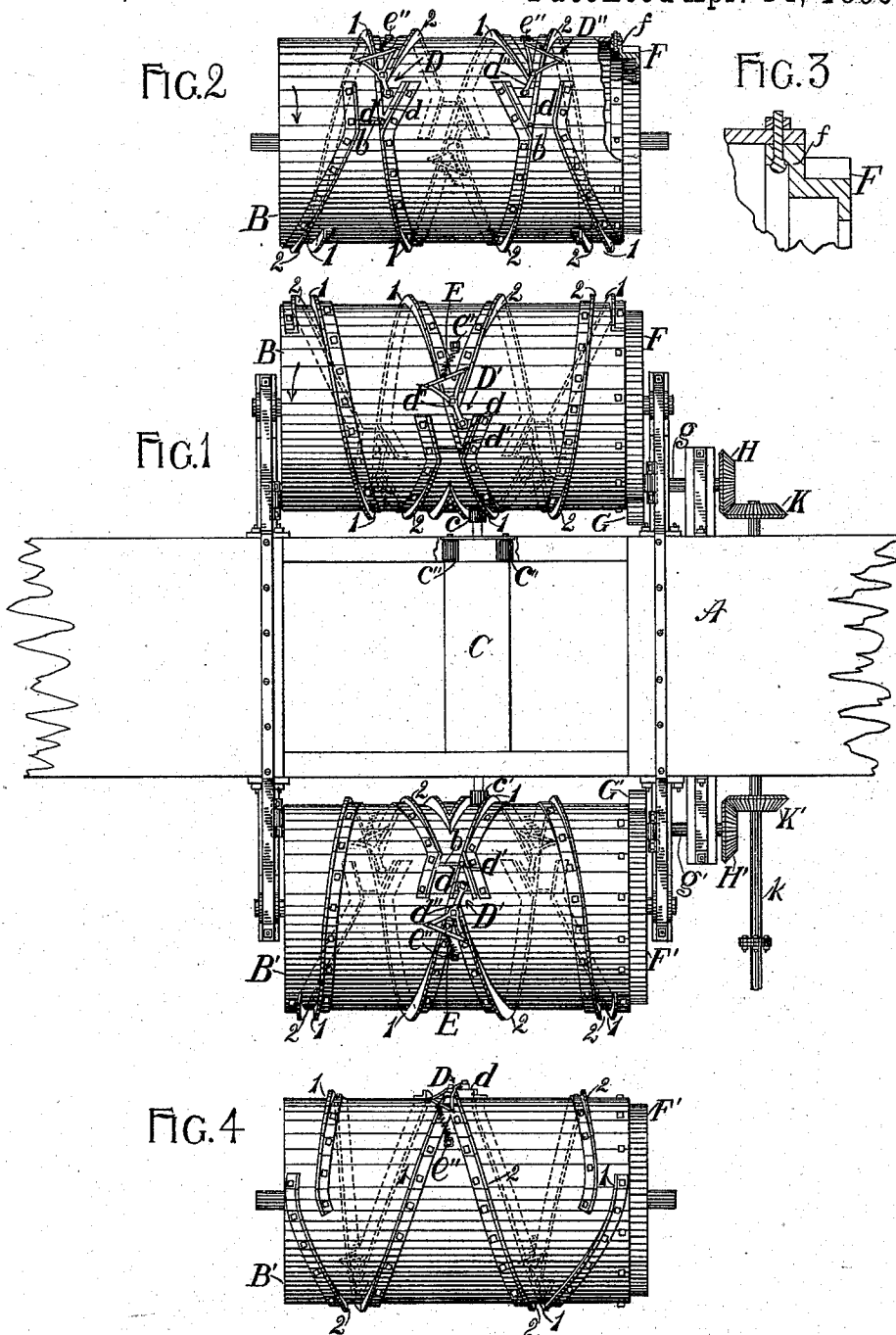


E. J. SHIRLEY & C. W. MERRILL.

HAY PRESS.

No. 558,216.

Patented Apr. 14, 1896.



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UNITED STATES PATENT OFFICE.

ELMER J. SHIRLEY AND CHARLES W. MERRILL, OF EL MODENA, CALIFORNIA;
SAID MERRILL ASSIGNOR TO SAID SHIRLEY.

HAY-PRESS.

SPECIFICATION forming part of Letters Patent No. 558,216, dated April 14, 1896.

Application filed July 29, 1895. Serial No. 557,410. (No model.)

To all whom it may concern:

Be it known that we, ELMER J. SHIRLEY and CHARLES W. MERRILL, citizens of the United States, residing at El Modena, in the county of Orange and State of California, have invented a new and useful Hay-Press, of which the following is a specification.

One object of our invention is to produce a hay-press which will be more rapid in its work than any heretofore known and in which the power required to operate the follower will be practically the same at all times; also, to provide improved means for moving the hay-press follower rapidly at the initial part of its stroke and slowly and with great power at the latter part thereof.

A further object of our invention is to provide means whereby a double-ended hay-press may be operated by a tumbling-shaft, which rotates in the one direction only, while the follower reciprocates and operates to compress the hay in both its forward and return movements, thus enabling us to use a rotary horse-power or an engine to operate the follower and to avoid waste of time which occurs in presses in which the follower operates to press the hay in one direction only and the loss of power which occurs when the driving machinery must be reversed to return the follower after each charge is compressed.

By our invention the movement of every part of the machinery of the press, except the reciprocating follower and the parts it carries, is constant and continuous in one direction.

Our machine comprises the combination of a cylinder provided with a screw-worm of varying pitch, a traveler arranged to project into the path of the worm, a guide for the traveler arranged parallel with the cylinder, and means for rotating the cylinder. By this combination of parts we move the traveler rapidly at the initial part of the stroke and slowly and with great power at the latter part of the stroke.

We do not wish it to be understood that we regard such a combination of parts, broadly, as our invention, for our invention consists in the hay-press hereinafter set forth and the machinery by which we operate the follower;

and also in the combinations hereinafter set forth and claimed.

A novel feature of our invention is the combination, with a cylinder having reversely-arranged intersecting worms, of switches at the intersections of such worms. Our switches are distinguished from ordinary switches in that they are provided with switch-blocks conformed to the face of the cylinder and arranged to slide lengthwise of the cylinder to open and close the gaps at the intersections of the worms. The blocks are not pivoted directly to the cylinder, but are pivoted to an arm which is pivoted to the cylinder, as hereinafter explained.

Our invention also comprises the combination of a cylinder provided with two reversely-arranged screw-worms broken at their intersections with each other, a traveler arranged to project into the path of the worms, a guide for the traveler arranged parallel with the cylinder, reversible switches arranged, respectively, at the intersections of the worms and adapted to close the break in either of such worms and respectively provided with switch-throwing means adapted and arranged to engage the traveler and to be operated thereby to reverse the switch after the traveler has passed the intersection, and means for rotating the cylinder.

Our invention also comprises the automatic switch.

Our invention also comprises various features of construction and combinations of parts hereinafter set forth and claimed.

The accompanying drawings illustrate our invention.

Figure 1 is a fragmental plan of a hay-press embodying our invention. A part of the frame is broken away to show the traveler on the end of the follower. Fig. 2 is a plan view of the reverse side of the cylinder shown at the top of the view in Fig. 1. A part is broken away to show the construction. Fig. 3 is a sectional view of a fragment of the end of the cylinder. Fig. 4 is an elevation looking toward the machine at the cylinder shown at the bottom of the view in Fig. 1. It is to be understood that the two cylinders are duplicates, and these several views practically illus-

trate one cylinder from three points of view. Fig. 5 is a fragmental sectional view and shows the cylinders in end elevation. A portion of the gearing is shown detached, having been broken away to show a pinion. Fig. 6 is an enlarged detail of one of the switches which are arranged to direct the traveler into its proper guideway. Each cylinder is provided with three like switches. Fig. 7 is a section of the switch on line 7 7, Fig. 6. Fig. 8 is a side elevation of a fragment of the feed-box of the baling-chamber and follower. Fig. 9 is a rear elevation of the spring-rest.

A indicates the hay-press chamber, which is of a form common in the class of hay-presses known as "double-ended" presses.

B B' are two cylinders which are arranged upon opposite sides of the press-chamber, at the middle thereof, and are exact duplicates of each other. Each cylinder is provided with two sectional screw worms or threads 1 2, of varying pitch, formed of spiral segments and wound around the cylinder in reverse directions to form runways, which cross each other and virtually form a screw-guideway wound around the cylinder from end to end in one direction and returned in the reverse direction and broken at the intersecting points to let the traveler pass along in each direction.

C indicates a follower, which is provided with travelers *c c'*, arranged at its ends, respectively, to project toward the opposite cylinders into the paths of the worms. The chamber forms a guide for the travelers. The cylinders and chamber are parallel with each other.

D, D', and D'' on each cylinder represent reversible switches, which are arranged, respectively, at the crossings of the guideways to guide the traveler to cause it to follow along its proper course in describing its path from end to end of the cylinder and return. Each switch consists of a triangular switch block or gate *d*, which is fastened to the cylinder and arranged to slide along the cylinder to alternately close the breaks in the worms at the intersections thereof. It is fastened to the cylinder by means of a sliding bolt *d'* and a pivoted arm *d''*, which is pivoted to the switch-block *d* and to the cylinder. The switch-block is arranged to close the break in either of the worms, and when fully thrown to one side closes the break in one worm and when fully thrown to the other side closes the break in the other worm. *b* indicates a slot in the cylinder in which the bolt *d'* slides.

In order to prevent accidental operation of the switch and also to assist in throwing the switch, we have provided a switch-block throwing and holding spring E, which is fastened to the end of the arm opposite the switch-block and is arranged to be compressed when the block is at any point between its two fully-thrown positions. The fixed end of the spring is in a plane which cuts through the pivot of the arm at right angles to the axis of the cyl-

inder, so that after passing the dead-center in either direction it will throw the switch.

The switch-arm *d''* is pivoted to the cylinder by the pivot-bolt *d'''* and is fan-shaped at its rear end, so that when the switch-block is in its fully-thrown position at either limit of its movement to close either guideway its rear will project into the guideway which is left open by the switch. The spring E is arranged to hold the arm in position to cause the switch-block to close either guideway and open the other, and when the traveler comes along in the open guideway it engages with the oblique edge of the fan-shaped end of the switch-arm and operates to throw the switch-arm past the dead-center, and then the spring operates to fully shift the block to close the guideway along which the traveler has just passed and to open the return-guideway for the traveler on its return. On its return along the other guideway the traveler engages with the other oblique edge of the flaring end of the arm and shifts the block to its first position. The fan-shaped arm and spring constitute suitable switch-operating means adapted and arranged to engage the traveler and to be operated thereby to throw the switch after the traveler has passed the intersection. The block is thus alternately operated to close each guideway after the traveler has passed its crossing. Each crossing is provided with such a switch.

The switch block or gate is an A-skeleton, and the fan-shaped arm is pivoted to the skeleton at the center of gravity thereof by a pivot *d'''*, which is pivoted to the cross-bar *d''''* of the A, which is arranged at the center of gravity of the block, so that when the arm is swung by the traveler it will slide the block with as little friction as possible.

Each of the reverse screw members forming the guides is of varying pitch—that is to say, at one end of the cylinder the pitch of one member, 1, of the screw is acute and at the other end of the cylinder it is very slight, while the pitch of the other member, 2, of the screw is acute at that end and slight at the opposite end, as shown clearly in the drawings. Said screw members reduce in pitch toward opposite ends of the cylinder, so that at each stroke, as the traveler approaches the outward limit of its motion, the speed of the follower is reduced, and since the speed of the power-applying machinery remains the same throughout the stroke the power applied by the screw is greatly increased at the close of the stroke. By this means when the follower starts forward in either direction and the hay is comparatively loose in the press the motion of the follower is quite rapid; but as soon as the hay becomes compressed sufficiently to require considerable power to move the follower the spurs or travelers *c c'* of the follower are traversing that portion of the screws, respectively, which is of slight pitch, and although the speed of rotation of the cylinders is the

same at all times yet at the latter portion of the movement of the follower the cylinder makes one-half a rotation while the follower is moving only a few inches, thus completing the compression of the charge with practically the same expenditure of power in rotating the cylinders which is required at the beginning of the compression of the hay. As soon as the charge is compressed the follower starts on its return journey along the screw-worm and the operation just described is repeated.

The means which we have shown for operating the cylinders B B', which are revolved in opposite directions, consists of the two spur-wheels F F', fixed, respectively, to the cylinders B B', two pinions G G', respectively mounted upon shafts g g' and arranged to mesh with the spur-wheels F F', beveled cog-wheels H H', secured upon the shafts g g', respectively, and beveled gear-wheels K K', meshing with the cog-wheels H H', respectively, and secured upon the tumbling-shaft k, which is connected with a horse-power or other suitable source of power. (Not shown.) Any other suitable means for operating the cylinders may be employed without departing from the spirit of our invention.

Each of the spur-wheels F F' is provided with a flange f, which fits inside of the cylinder to which the spur-wheel pertains and is bolted thereto, thus to cause the spur-wheel to rotate the drum when the spur-wheel is turned.

In practice the hay is fed into the baling-chamber behind the follower at the close of each stroke of the follower, and as the follower returns it compresses the hay, and this is repeated at the repeated movements of the follower in both directions and the baling is continuously and rapidly performed, limited only by the speed with which the hay can be fed into the machine and by the speed at which the cylinders B B' are rotated.

The worms overlap each other at their ends. The steep inclined portion of each worm or screw is arranged between the end of the cylinder and the slightly-inclined portion of the other worm or screw. This is true at each end of the cylinder, so that when the traveler has followed one worm or guide to the end of the cylinder it enters between the slightly-inclined end of the worm along which it has just been driven and the steeply-inclined end of the return-worm, and the further rotation of the cylinder causes the return-worm to engage the traveler upon the side opposite that which was engaged by the worm which has carried it to that end of the cylinder, and the traveler is thus driven in the reverse direction.

The traveler is provided at its end with an antifriction-roller. In the drawings the reference-letters c c', used to indicate the travelers, also point out the antifriction-rollers of the travelers. c'' indicates antifriction guide-rollers pivoted to the follower on opposite sides of the travelers and arranged to

travel in the guideway a in the baling-press frame. This serves as a guide for the traveler to hold the traveler in true position and to avoid friction.

e indicates the spring retaining rod, which is pivoted to the rear end of the fan-shaped switch-bar and extends through a flaring hole e' in the spring-rest e'', which is bolted to the cylinder.

Now, having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination of a cylinder provided with two reversely-arranged intersecting screw-worms; a traveler arranged to project into the path of the worms; a guide for the traveler arranged parallel with the cylinder; means for rotating the cylinder; and a reversible switch arranged at the intersection of the worms and provided with a switch-block conformed to the face of the cylinder and arranged to slide lengthwise of the cylinder.

2. The combination of a cylinder provided with two reversely-arranged screw-worms of varying pitch broken at their intersections with each other; a traveler arranged to project into the path of the worms; a guide for the traveler arranged parallel with the cylinder; reversible switches arranged respectively at the intersections of the worms; means for operating the switches; and means for rotating the cylinder.

3. The combination of a cylinder provided with two reversely-arranged screw-worms of varying pitch broken at their intersections with each other; a traveler arranged to project into the path of the worms; a guide for the traveler arranged parallel with the cylinder; reversible switches arranged respectively at the intersections of the worms; switch-operating means adapted and arranged to engage the traveler and to be operated thereby to throw the switch after the traveler has passed the intersection; and means for rotating the cylinder.

4. A press comprising the combination of the baling-chamber; two rotatable cylinders arranged on opposite sides of such chamber, and each provided with two reversely-arranged screw-worms of varying pitch broken at their intersections; reversible switches arranged at the intersections to close the breaks in such worms; means arranged to operate the switches; a follower arranged in the baling-chamber and provided with the travelers projecting into the path of the worms, respectively; and means for rotating the cylinders.

5. The combination of the rotating cylinder provided with the reversely-arranged screw-worms broken at their intersections; the traveler projecting into the path of the worms; means for rotating the cylinder; reversible switches arranged at the intersections of the worms to close the breaks in either of the worms; and means arranged to reverse the switches.

6. The combination of the cylinder pro-

vided with the intersecting worms broken at
their intersections; the switch-block fastened
to the cylinder and arranged to slide there-
along to alternately close the breaks in the
5 worms; the fan-shaped switch-arm pivoted
to the switch-block and to the cylinder; the
spring fastened to the end of the arm opposite
the switch-block and arranged to be com-
pressed when the block is at the point be-

tween its fully-thrown positions; the traveler 10
arranged to project into the path of the worms;
and means for rotating the cylinder.

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