

W. S. LIVENGOOD.
BALING PRESS.
APPLICATION FILED FEB. 4, 1910.

976,474.

Patented Nov. 22, 1910.

4 SHEETS—SHEET 1.

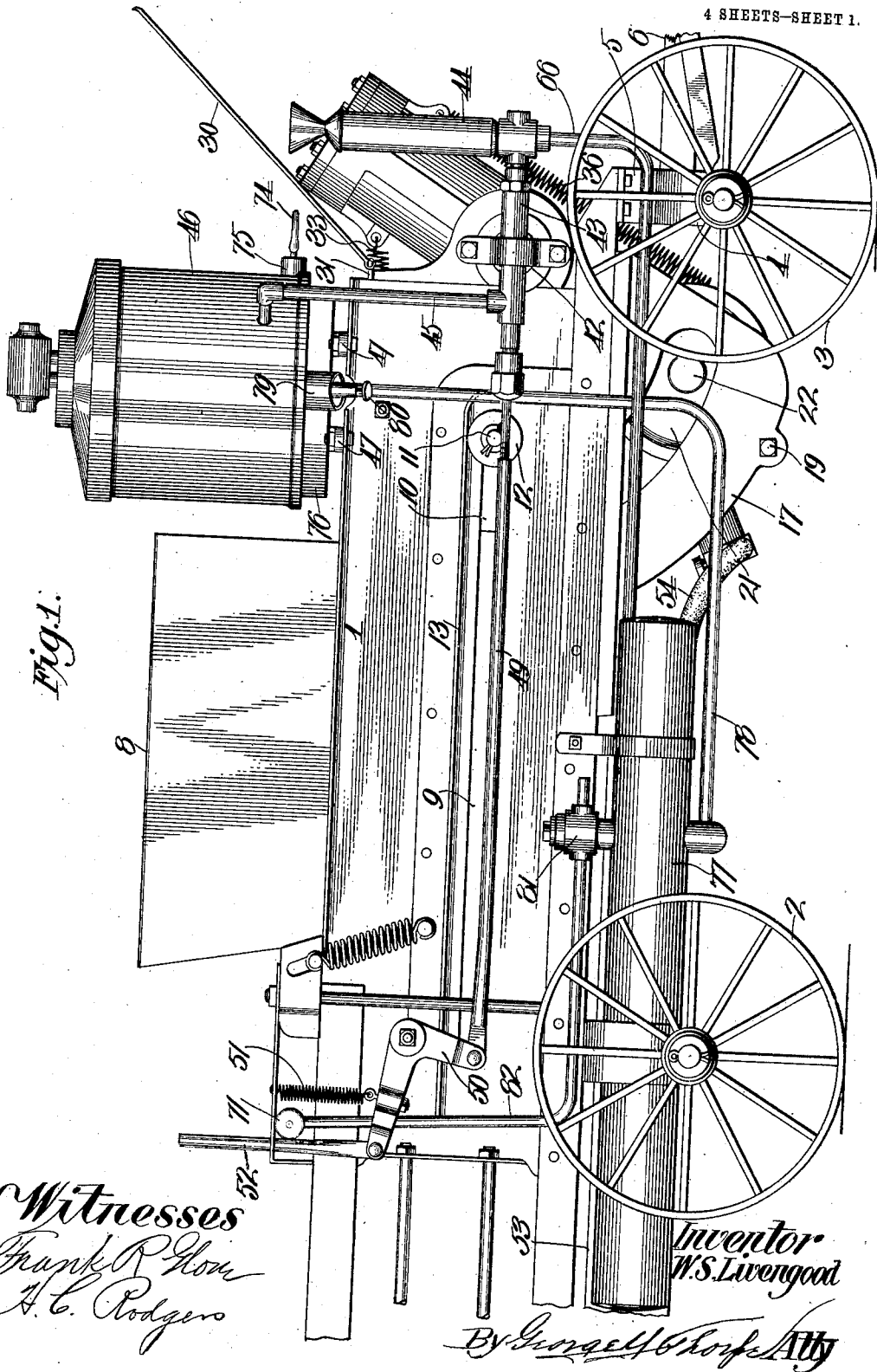


Fig. 1.

Witnesses
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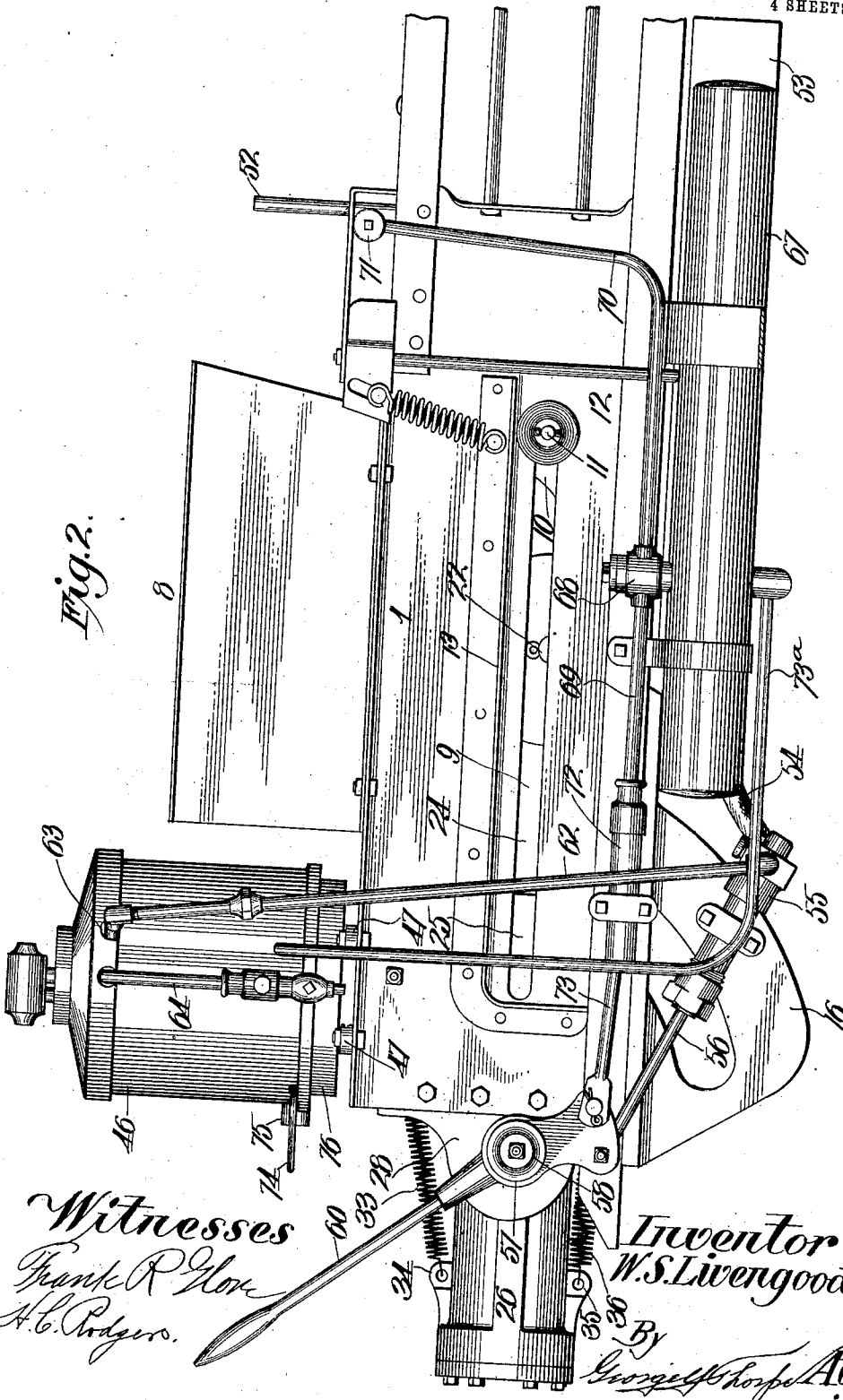
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4 SHEETS-SHEET 2

Fig. 2.



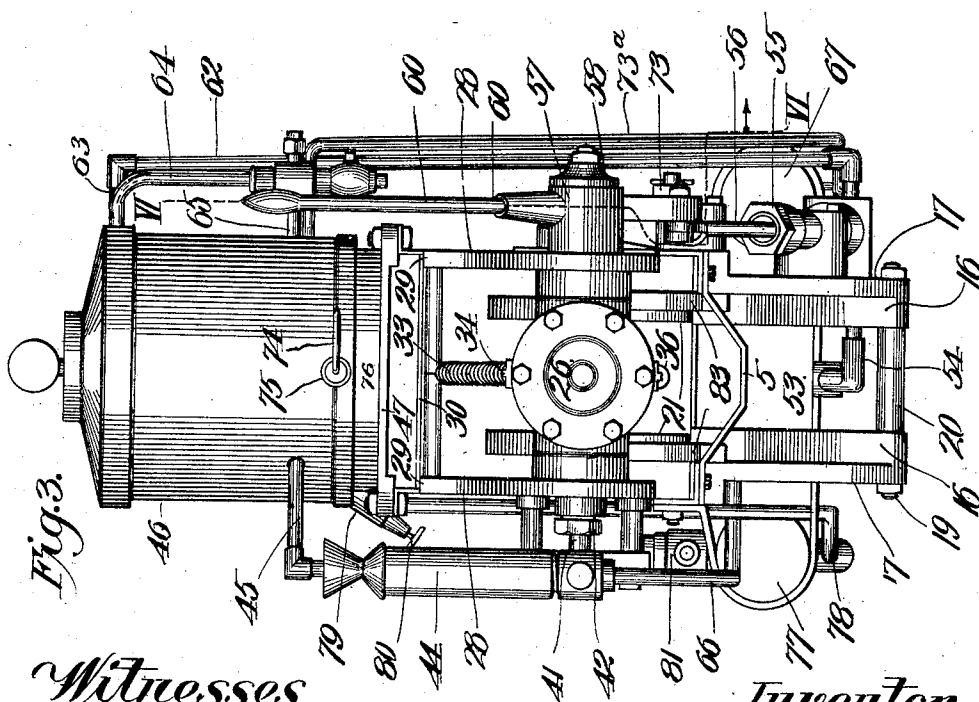
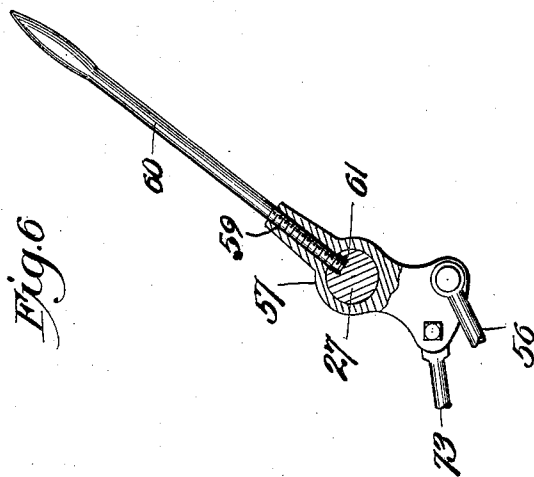
Witnesses
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4 SHEETS—SHEET 3.



Witnesses
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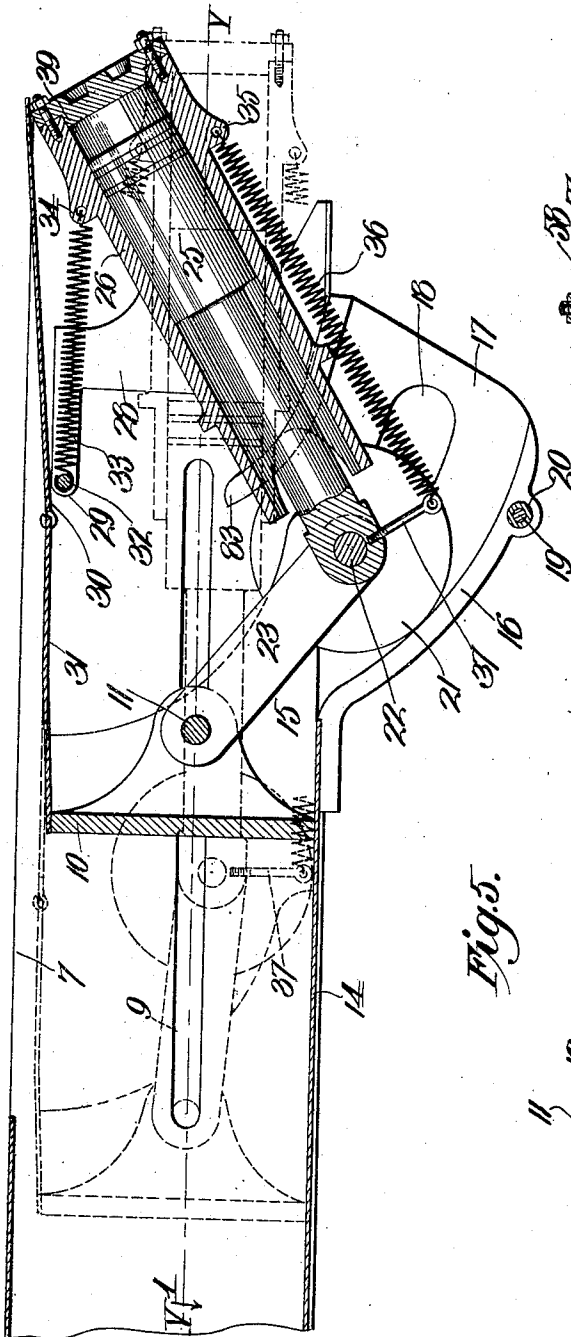


Fig. 4.

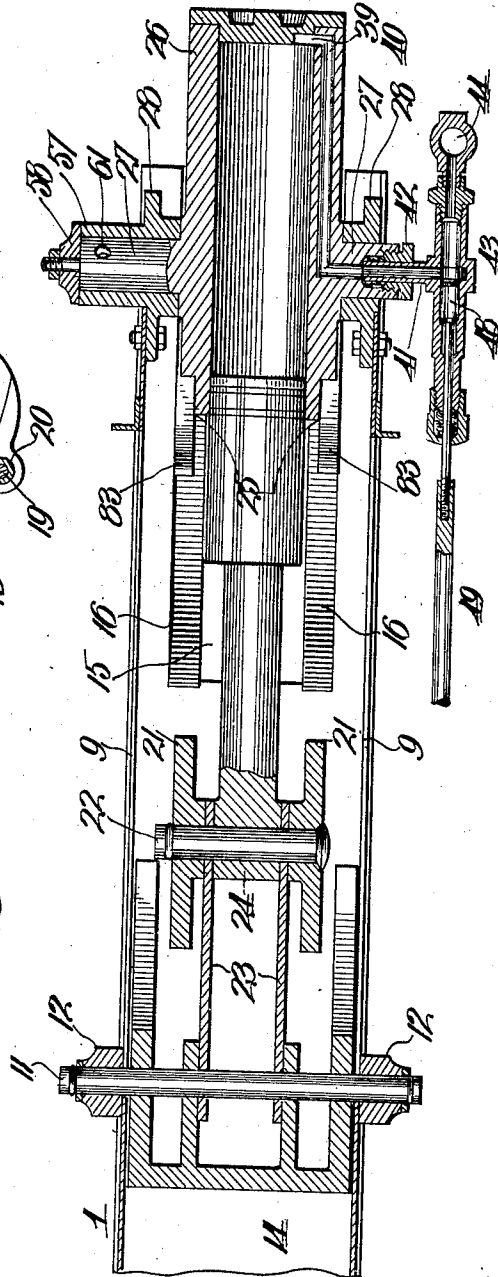


Fig. 5.

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UNITED STATES PATENT OFFICE.

WINFIELD S. LIVENGOOD, OF KANSAS CITY, MISSOURI.

BALING-PRESS.

976,474.

Specification of Letters Patent. Patented Nov. 22, 1910.

Application filed February 4, 1910. Serial No. 542,111.

To all whom it may concern:

Be it known that I, WINFIELD S. LIVENGOOD, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Baling-Presses, of which the following is a specification.

This invention relates to baling presses and more especially to baling presses of that class embodying a substantially horizontal baling case having a feed opening in its upper side and equipped with a reciprocatory plunger or head-block for compressing the baling material into bales, and my object is to produce a machine of this character having a toggle connection between a fixed point of the press and the head-block, composed of an extensible member and a non-extensible member.

A further object is to produce a press of the character last-mentioned, provided with means for effecting an application of power on the extensible member to unfold the toggle and increase the length of its extensible member, thereby giving a power or compression stroke which relatively initially is quick and long and finally slow and short, the first part of the stroke condensing baling material in the baling case and the last part compressing such condensed material.

A further object is to produce means for cooperating with the expansive force of the compressed baling material in simultaneously withdrawing the head-block or plunger and swinging the cylinder back to its original position and to refold the toggle.

Another object is to produce a press of this character carrying a steam generator for supplying the steam to the cylinder to operate the piston and means to control the supply of steam to the cylinder.

With these general objects in view and others as hereinafter appear, the invention consists in certain novel and peculiar features of construction and organization as hereinafter described and claimed; and in order that it may be fully understood reference is to be had to the accompanying drawings, in which—

Figure 1, is a side view of a baling press embodying my invention certain parts at the opposite side of machine which would show in the background being omitted to avoid confusion. Fig. 2, is a similar view

of the opposite side of the press certain parts at the opposite side of the machine which would show in the background being omitted to avoid confusion. Fig. 3, is a front view of the press. Fig. 4, is a central vertical longitudinal section of a part of the baling case and of the cylinder and head-block or plunger. Fig. 5, is a horizontal section taken on the line V—V of Fig. 4, when the cylinder is horizontal and the head-block or plunger has completed its power stroke. Fig. 6, is a section on the line VI—VI of Fig. 3.

In the said drawings where like reference characters identify corresponding parts in all the figures, 1 indicates a baling case of the ordinary type, by preference, and mounted upon a pair of rear wheels 2, and a pair of front wheels 3, the axle 4, of the latter being pivoted in any suitable manner, as by a king-bolt, not shown, to a transverse bar 5, secured to the front end of the baling case, a tongue 6 bearing the usual relation to the front axle for convenience in hitching a team whereby the machine may be drawn to and from the field of operation. The baling case is provided as usual with a feed opening 7, at the top flanked at the right side of the machine by preference, by a wall 8, to prevent overthrow in feeding. The machine will also be provided with the customary feed-table, not shown, from which baling material will be forked into the baling case by the attendant who will stand upon the baling case, rearward of the feed opening.

The side walls of the baling case are provided with a pair of longitudinal slots 9, of length corresponding to the reciprocatory action of the head-block or plunger arranged within the baling case in the customary manner, and said head-block is provided with a transverse pin 11, projecting through said slots and equipped externally of the case with track rollers 12 adapted to run upon the undersides of the external tracks 13, secured to the side walls.

The bottom 14 of the baling case is centrally bifurcated at its front end as at 15, and at opposite sides of said bifurcation are curved tracks 16, said tracks projecting inward from the lower margins of a pair of vertical plates 17 secured rigidly in any suitable manner to and forming a depending portion of the baling case, and said plates are provided, by preference, with

openings 18, to eliminate unnecessary weight and are connected near their lower ends by a tie-rod 19 and braced apart by a sleeve 20, mounted upon the tie rod and bearing at its opposite ends against the inner sides of tracks 16.

21 indicates wheels adapted to travel upon the tracks 16 and the bottom of the baling chamber and journaled upon a cross pin 22 pivotally connected by a pair of links 23, with the cross pin 11 of the head-block or plunger, and pivotally engaging pin 22 is the outer end of the stem 24 of reciprocatory piston 25 of a steam cylinder 26, said cylinder being adapted for operation in a vertical plane and being pivoted eccentrically on the curved tracks 16, preferably it is provided at diametrically opposite points with outwardly projecting trunnions 27 journaled in bearing plates 28, secured as shown or in any other suitable manner to the front ends of the side walls of the baling case, and said plates are provided at their upper edges with rearwardly projecting arms 29, which serve to prevent the pivoted end 30 of the apron 31 of the head-block or plunger from dropping down into the baling chamber below a horizontal position when the head-block or plunger attains the limit of its power or compression stroke.

32 is a cross rod connecting the arms 29 and forming an anchor for the rear end of a retractile spring 33 secured to a lug 34, formed on the upper side of the cylinder forward of the axis of operation thereof, a similar lug 35 on the cylinder diametrically opposite lug 34 being connected by a retractile spring 36 to a pin or projection 37 depending from the free end of the stem of the piston adjacent to pin 22. The spring 33 is adapted to coöperate with the expansive action of the compressed baling material in effecting the return of the cylinder to its original position and spring 36, is for the purpose of effecting the complete retraction of the toggle and the withdrawal of the head-block or plunger to its initial position, and in this connection it will be noticed by reference to Fig. 4, that when the head-block or plunger has attained the extreme limit of its power or compression stroke, the pin 22 of the toggle is below the horizontal plane of the pivot pin 11, of the toggle links 23 and that consequently the tendency of the toggle upon the return movement of the head-block or plunger is to contract, this action being of course made more positive and reliable through the action of the spring 33.

In the operation of the machine, the cylinder initially stands substantially as shown in Fig. 1 with the wheels 21 at the lower or front ends of tracks 16, and that said rollers as the toggle expands roll up the tracks

16 and gradually increase their distance from the front or closed ends of the cylinder, the movement in the line of the cylinder being slight as compared to their speed of upward travel on the tracks, so that the major portion of the stroke of the piston shall be reserved to effect the latter part of the movement of the head-block or plunger when the greatest resistance of the baling material is encountered and when the greatest force is necessary to overcome such resistance and compress the baling material.

The head of the cylinder is provided by preference, with an annular socket 39 in its inner side and communicating with the same is a steam port 40, which extends through one of the trunnions 27 of the cylinder and communicates with a pipe 41, a stuffing-box 42 being mounted on said pipe and in the outer end of said trunnion to prevent the escape of steam at the joint between said pipe and said port. Said pipe communicates at its outer end with a valve casing 43 connected at one end to an upwardly projecting exhaust pipe 44 and at its opposite end to a steam supply pipe 45 leading from the steam generator 46 of any suitable or preferred construction secured by preference upon a pair of cross bars 47, secured upon the side walls of the baling case forward of the feed opening and arranged within said casing is a reciprocatory valve 48, to cut off the supply of steam to the casing when withdrawn. Connected to the stem of said valve is a rod 49 pivoted at its rear end to one arm of a bell-crank lever 50, mounted on the side of the baling case, the other arm of said lever being connected by a retractile spring 51 to a fixed part of the case. The function of said spring is to hold the valve withdrawn and prevent steam from passing from the generator to the cylinder, and to open up communication between the cylinder and the exhaust-pipe. To reverse the position of said valve and cut off communication between the cylinder and the exhaust pipe and establish communication between the cylinder and the generator, a depressible rod 52 is pivoted to the bell-crank lever and extends upward at a point where it is convenient for the attendant, who stands upon it and depresses it, it being obvious that immediately he removes his foot, the spring 51 retracts and reverses the position of the valve.

Secured to the under side of the press between the rear wheels, as shown or in any other suitable manner, is a water tank 53, connected by pipe 54, to a suitable pump 55 secured as shown in Fig. 2, or otherwise to one of the plates 16, the stem 56 of the plunger of the pump being pivotally connected to the lower end of a rock lever 57, journaled on the trunnion of the cylinder at the opposite side of the press from the valve casing 43, a cap 58 secured at the outer end

of said trunnion retaining the lever in position. The upper arm of the rock lever is internally threaded at 59 to receive the threaded lower end of a handle 60, whereby said lever may be operated, and said handle when screwed downward its full distance engages a socket 61 in said trunnion in order that said lever shall be operated through the operation of the cylinder.

When the handle 60 is unscrewed sufficiently to withdraw it from said socket, said handle is manipulated manually to rock the lever for the purpose of pumping water from the tank 53 through pipe 54 into the pump and thence up through pipe 62, through the heating coil 63 in the generator where the water is heated and from said coil the water passes through pipe 64 and pipe 65 into the boiler where it is generated into steam and leading from the lower end of the exhaust pipe 44 back to the tank 53 is a pipe 66, this pipe being to return the condensation of the steam in the exhaust pipe 44 to the tank 53.

67 is a tank containing coal oil, by preference, and connected to the upper side of the same is a vertical pipe 68, with which communicates the rear end of a pipe 69, and the front end of a pipe 70, connected at its rear end to an air reservoir 71, extending transversely over the baling case rearward of the feed opening. Pipe 69 connects with an air pump 72, and the stem 73 of the plunger of said pump is pivoted to the lower end of the rock lever 57 so that the operation of said lever whether through the oscillation of said cylinder or by the manipulation of the handle 60, pumps air through pipe 69 into the upper part of the tank 67 and into the reservoir 71, the air stored in the reservoir being utilized to substantially equalize the pressure of the air upon the oil in said tank at all times so that said oil shall be forced at a uniform speed through the discharge pipe 73^a into the generator 46, where it is converted into vapor and passes through the discharge tube 74 into the mixer 75 to the burner 76, of any suitable or preferred type.

For the purpose of vaporizing the oil conducted into the generator by pipe 73^a, the following equipment is provided, 77 is a gasoline tank suitably supported at the opposite side of the baling press from the tank 67 and said tank is connected by a discharge pipe 78 to the burner 79 extending into the generator, having the function of a pilot light, and to generate sufficient heat to vaporize the fuel oil from the tank 67 circulating within the generator, that is to say, to vaporize such oil until the burner 76 is in full operation after which the valve 80 of burner 79 may be closed to cut off the supply of gasoline through pipe 78. To supply the gasoline to burner 79, tank 77

is provided at its upper side with a pipe 81 connected by a pipe 82 to the air reservoir 71 so as to utilize air from said reservoir in forcing gasoline to burner 79.

Initially the parts occupy the positions shown in Fig. 1, that is to say the extensible toggle connecting the head block with the baling case is folded and shortened to its fullest extent, and the rollers 12 movable with the head block are at the front ends of the slots 9, and the rollers 21 are in engagement with the front and lower extremities of tracks 16, the pivoted end of the apron being held at an angle of approximately forty five degrees by the front end of the oscillatory cylinder.

Assuming that the generator is in operation, the attendant unscrews handle 60, until it is withdrawn from socket 61 and then manipulates said handle to pump water through the coil 63 and thence through pipe 64 into the boiler, and to pump air into the reservoir 71 and the tanks 67 and 77, and through the pressure of such air forces gasoline from the tank 77 to burner 79, valve 80 of course being opened in order that the gasoline may be ignited for the generation of the heat necessary to vaporize the fuel oil from tank 67, which after it is vaporized in the generator passes through pipe 74 and with air through the mixer 75 to the burner 76 where it ignites from the flame of burner 79, which is then, by preference, shut off by the closure of valve 80. The heat produced by the operation of burner 76 produces steam in the generator which steam when the operator opens valve 48 by forcing rod 52 downward by placing his foot upon it passing into the valve casing and thence into the cylinder and imposes an endwise pressure rearwardly on the piston thereof, and owing to the fact that the tracks 16 are struck from a center rearward of the axis of the cylinder, the rollers 21 are caused to travel upwardly upon said tracks and incidentally oscillate the cylinder in a vertical plane, it being noticed that by the time the piston makes approximately one-eighth of its stroke, the cylinder has been swung to a horizontal position and that rollers 21 are in engagement with the bottom of the baling case, it being further noticed that in the swing of the cylinder from its initial inclined position to the position shown in full lines Fig. 4, the head-block under the expansion or unfolding and slight elongation of the toggle has moved rearwardly within the baling case a distance about equal to two-fifths of its full stroke, and in this connection it will be further noticed that the overlying track rails 13 upon which rollers 12 travel, prevent the head block being lifted off the bottom of the baling case, the said rollers practically eliminating friction, it being also noted that by the time the rollers 12 at-

tain a position upon the bottom of the baling case the head block has made about four-fifths of its stroke.

The quick and relatively long preliminary part of the stroke of the head block takes place under a comparatively small expenditure of power, as the baling material in the baling case acted upon by the head block in such movement is loose, and offers but little resistance, it being obvious of course that as such material becomes more condensed and thereby offers increased resistance, the power exerted by the unfolding and elongating toggle is proportionately increased.

When the cylinder attains its horizontal position, and the toggle is completely expanded or unfolded, the direct pressure of the steam is utilized to effect the comparatively short remainder of the stroke of the head-block, that is to say, it is utilized to elongate or increase the length of the toggle after the same has expanded or unfolded, by continued rearward movement of the piston and through the same and the substantially aligned links 23 effect the completion of the power stroke of the head block, the head block forcing the compressed material beyond the customary retainers, not shown, for preventing the compressed material from following the head block in its return movement, it being understood of course that the pressure of such material is depended upon to assist in returning the head block and the connected parts to their original positions.

As a means for insuring the complete return of the parts to their initial positions, the springs 36 and 33 are employed, the first-named being chiefly instrumental in re-shortening the toggle and the other spring in effecting the complete refolding of the toggle. The downward movement of the toggle at the pivotal point of connection, 22, of its members, is insured, not only through the agency of spring 33, but because the links 23 when the toggle is completely expanded or unfolded, slope downwardly and forwardly slightly and also because of the use of a pair of tracks 83, which curve upwardly and rearwardly from the plane of the bottom of the baling case adjacent to the front end of slots 9, as said tracks in the recoil movement of the head-block are engaged by and tend to deflect the wheels 21, downwardly so that they shall travel downwardly and forwardly upon tracks 16.

It is to be understood, that the operator after supplying steam to effect the power stroke of the head-block, removes his foot from rod 52 to permit spring 51 to withdraw the valve and thereby close communication between the generator and the cylinder and open communication between the latter and the exhaust pipe 44.

While the latter part of the power stroke of the plunger is in progress, the operator

upon the press, forks a charge of hay from the table, not shown, into the feed opening, the apron preventing such charge of material from getting down behind the head-block and permitting it to drop into the baling case after the withdrawal of the head block has occurred. The operator then again depresses rod 52 to effect a second power stroke of the head-block. All succeeding operations are repetitions of those described.

It will be understood of course that after the lever is utilized to preliminarily charge the generator with water and oil as hereinbefore explained, its handle is screwed downwardly until it engages the socket 61 of the cylinder trunnion so that in all future operations of the cylinder the pump shall be automatically operated. In the recoil movement of the head block, the front extremity of the hinged end of the apron strikes the upper side of the cylinder, forward of lug 34 and is swung upwardly thereby until it eventually attains the position shown in Fig. 1.

From the above description it will be apparent that I have produced a baling press embodying the features of advantage enumerated as desirable and I wish it to be understood that I do not desire to be restricted to the exact details of construction shown and described as obvious modifications will suggest themselves to one skilled in the art.

Having thus described the invention what I claim as new and desire to secure by Letters-Patent, is:

1. In a baling press, a baling case, a reciprocatory head block therein, and a toggle connecting the head block with a fixed point of the baling case, the said toggle consisting of an oscillatory member, a member to oscillate with said oscillatory member and also movable endwise with respect thereto, and a link pivotally connecting said endwise-movable member with the said head block.

2. In a baling press, a baling case, a reciprocatory head block therein, and a toggle connecting the head block with a fixed point of the baling case, the said toggle consisting of an oscillatory tubular member, a piston arranged reciprocally in and provided with a stem protruding from the rear end of the tubular member, and a link pivotally connecting the rear end of the stem of the piston with the said head block.

3. In a baling press, a baling case, a reciprocatory head block therein, and a toggle connecting the head block with a fixed point of the baling case, the said toggle consisting of an oscillatory member, a member to oscillate with said oscillatory member and also movable endwise with respect thereto, a link pivotally connecting said endwise-

movable member with the said head block, means for applying endwise pressure rearwardly on said endwise-movable member, and guiding means whereby under such
5 pressure the toggle shall be caused to simultaneously expand and permitted to elongate.

4. In a baling press, a baling case, a reciprocatory head block therein, and a toggle connecting the head block with a fixed point
10 of the baling case, the said toggle consisting of an oscillatory tubular member, a piston arranged reciprocally in and provided with a stem protruding from the rear end of the tubular member, a link pivotally connecting
15 the rear end of the stem of the piston with the said head block, and means for supplying steam to the cylinder forward of the piston.

5. In a baling press, a baling case, a reciprocatory head block therein, and a toggle connecting the head block with a fixed point
20 of the baling case, the said toggle consisting of an oscillatory tubular member, a piston arranged reciprocally in and provided with a stem protruding from the rear end of the tubular member, a link pivotally connecting
25 the rear end of the stem of the piston with the said head block, a steam generator carried by the baling case, a valve-casing communicating with the said generator cylinder and the atmosphere, and a valve in said casing
30 for cutting off communication between the generator and the cylinder.

6. In a baling press, a baling case, a reciprocatory head block therein, and a toggle connecting the head block with a fixed point
35 of the baling case, the said toggle consisting of an oscillatory tubular member, a piston arranged reciprocally in and provided with a stem protruding from the rear end of the tubular member, a link pivotally connecting
40 the rear end of the stem of the piston with the said head block, a steam generator carried by the baling case, a valve-casing communicating with the said generator cylinder
45 and the atmosphere, a valve in said casing for cutting off communication between the generator and the cylinder, and a foot-controlled lever for operating the valve to close
50 communication between the cylinder and the atmosphere and open communication between the cylinder and the generator.

7. In a baling press, a baling case provided with longitudinal slots in its side
55 walls, a reciprocatory head block in the baling case, means movable with the head block and projecting outwardly through said slots; and a toggle connecting the head block with a fixed point of the baling case,
60 the said toggle consisting of an oscillatory member, a member to oscillate with said oscillatory member and also movable endwise with respect thereto, and a link pivotally connecting said endwise-movable member
65 with the said head block.

8. In a baling press, a baling case, a reciprocatory head block therein, and a toggle connecting the head block with a fixed point of the baling case, the said toggle consisting of an oscillatory member, a member
70 to oscillate with said oscillatory member and also movable endwise with respect thereto, and a link pivotally connecting said endwise-movable member with the said head block; means whereby pressure shall be im-
75 posed on the front end of the endwise-movable member, and means for causing said last-named member under the imposition of such pressure, to simultaneously move rearward and swing upward and incidentally
80 cause the oscillatory member to swing in the same direction, and also cause the link to swing upward at its front end and move endwise rearwardly and the head block to travel rearwardly within the baling case.
85

9. In a baling press, a baling case, a reciprocatory head block therein, and a toggle connecting the head block with a fixed point
85 of the baling case, the said toggle consisting of an oscillatory member, a member to oscillate with said oscillatory member and also
90 movable endwise with respect thereto, a link pivotally connecting said endwise-movable member and the said head block, means whereby pressure shall be imposed on the
95 front end of the endwise-movable member, means for causing said last-named member under the imposition of such pressure, to simultaneously move rearward and swing upward and incidentally cause the oscillatory
100 member to swing in the same direction, and also cause the link to swing upward at its front end and move endwise rearwardly and the head block to travel rearwardly within the baling case, and means for yield-
105 ingly resisting said swinging movement.

10. In a baling press, a baling case, a reciprocatory head block therein, and a toggle connecting the head block with a fixed point
110 of the baling case, the said toggle consisting of an oscillatory member, a member to oscillate with said oscillatory member and also movable endwise with respect thereto, a link pivotally connecting said endwise-
115 movable member and the said head block, means whereby pressure shall be imposed on the front end of the endwise-movable member, means for causing said last-named member under the imposition of such pressure,
120 to simultaneously move rearward and swing upward and incidentally cause the oscillatory member to swing in the same direction, and also cause the link to swing upward at its front end and move endwise rearwardly
125 and the head block to travel rearwardly within the baling case, means for yieldingly resisting said swinging movement, and yielding means for resisting endwise movement of said endwise-movable member.

11. In a baling press, a baling case having
130

the front end of its bottom bifurcated and provided with a pair of downwardly and forwardly-curved tracks at opposite sides of said bifurcation, an oscillatory cylinder mounted for oscillation in a vertical plane at the front end of the baling case, a piston in and having a stem protruding beyond the open or rear end of the cylinder, a head block reciprocally mounted in the baling case, a link pivotally connecting the head block with the rear end of the piston stem and adapted to swing in a vertical plane, a pair of wheels journaled coincidently with the pivotal point of connection between the link and the piston stem, and means to apply endwise pressure on the front end of the piston within the cylinder and thereby force said piston rearward and cause said wheels to travel upward on said tracks and rock the rear end of the cylinder upward and force the head block rearward and finally enter the baling case and travel rearwardly therein to continue the rearward movement of the head block.

12. In a baling press, a baling case having the front end of its bottom bifurcated and provided with a pair of downwardly and forwardly-curved tracks at opposite sides of said bifurcation, an oscillatory cylinder mounted for oscillation in a vertical plane at the front end of the baling case, a piston in and having a stem protruding beyond the open or rear end of the cylinder, a head block reciprocally mounted in the baling case, a link pivotally connecting the head block with the rear end of the piston stem and adapted to swing in a vertical plane, a pair of wheels journaled coincidently with the pivotal point of connection between the link and the piston stem, means to apply endwise pressure on the front end of the piston within the cylinder and thereby force said piston rearward and cause said wheels to travel upward on said tracks and rock the rear end of the cylinder upward and force the head block rearward and finally enter the baling case and travel rearwardly therein to continue the rearward movement of the head block, and a pin-and-slot connection between the head block and the baling case for guiding and limiting the travel of the former in both directions.

13. In a baling press, a baling case, a reciprocatory head block therein, and a toggle connecting the head block with a fixed point of the baling case, the said toggle consisting of an oscillatory member, a member to oscillate with said oscillatory member and also movable endwise with respect thereto, and a link pivotally connecting said endwise-movable member with the said head block, means whereby pressure shall be imposed on the front end of the endwise-movable member, means for causing said last-named member under the imposition of such pres-

sure, to simultaneously move rearward and swing upward and incidentally cause the oscillatory member to swing in the same direction, and also cause the link to swing upward at its front end and move endwise rearwardly and the head block to travel rearwardly within the baling case, a spring for reversing the endwise movement of the endwise-movable member, and a spring for reversing the oscillatory movement of the cylinder and cooperating in effecting the downward and forward travel of the wheels on said tracks and the return of the head block to its initial position.

14. In a baling press, a baling case, a reciprocatory head block therein, and a toggle connecting the head block with a fixed point of the baling case and consisting of an oscillatory cylinder, a piston reciprocally arranged within the cylinder and a link pivotally connecting the head block to the piston rearward of the cylinder, in combination with a valve casing communicating with the cylinder forward of the piston, an exhaust pipe and a steam-supply pipe communicating with the valve casing at opposite sides of the point of communication of the latter with the cylinder, and a valve within said casing and adapted in one position to close communication between the said supply pipe and the cylinder and leave unobstructed communication between the cylinder and exhaust pipe or to open communication between the supply pipe and the cylinder and close communication between the latter and the exhaust pipe.

15. In a baling press, a baling case, a reciprocatory head block therein, and a toggle connecting the head block with a fixed point of the baling case and consisting of an oscillatory cylinder, a piston reciprocally arranged within the cylinder and a link pivotally connecting the head block to the piston rearward of the cylinder, in combination with a valve casing communicating with the cylinder forward of the piston, an exhaust pipe and a steam-supply pipe communicating with the valve casing at opposite sides of the point of communication of the latter with the cylinder, and a valve within the said casing and adapted in one position to close communication between the said supply pipe and the cylinder and leave unobstructed communication between the cylinder and exhaust pipe or to open communication between the supply pipe and the cylinder and close communication between the latter and the exhaust pipe, a foot-controlled lever for operating the valve and yielding means for reversely operating the valve.

16. The combination in a baling press, of a baling case, a head block reciprocally arranged therein, an oscillatory steam cylinder arranged for movement in a vertical plane at the front end of the press, a piston there-

in, a link pivotally connecting the rear end of the piston with said head block, a steam generator mounted upon the baling case, a valve casing communicating with the cylinder forward of the piston thereof and with said steam generator, a valve for controlling the passage of steam through said valve casing to the cylinder, a water tank, a pump connected thereto and to the steam generator, and means whereby the oscillation of the cylinder shall operate said pump and pump water from said tank to said generator.

17. The combination in a baling press, of a baling case, a head block reciprocally arranged therein, an oscillatory steam cylinder arranged for movement in a vertical plane at the front end of the press, a piston therein, a link pivotally connecting the rear end of the piston with said head block, a steam generator mounted upon the baling case, a valve casing communicating with the cylinder forward of the piston thereof and with said steam generator, a valve for controlling the passage of steam through said valve casing to the cylinder, a water tank, a pump connected thereto and to the steam generator, means whereby the oscillation of the cylinder shall operate said pump and pump water from said tank to said generator, and means for throwing the pump out of gear with the cylinder to permit the former to be operated independently of the latter.

18. The combination in a baling press, of a baling case, a head block reciprocally arranged therein, an oscillatory steam cylinder arranged for movement in a vertical plane at the front end of the press, a piston therein, a link pivotally connecting the rear end of the piston with said head block, a steam generator mounted upon the baling case, a valve casing communicating with the cylinder forward of the piston thereof and with said steam generator, a valve for controlling the passage of steam through said valve casing to the cylinder, a liquid-fuel tank carried by the press, a burner forming

a part of the steam generator, a pipe connecting the said tank with said burner, an air pump connected to said tank, and means whereby the oscillation of the cylinder shall operate said pump and force air into said tank and the contents of the latter to said burner.

19. In a baling press, a baling case, a head block reciprocally arranged therein, a toggle connecting the head block with a fixed point of the press and consisting of an oscillatory member, a member to oscillate with and also move endwise with respect to said oscillatory member and a link pivotally connecting the rear end of the endwise-movable member with the said head block, in combination with a lever pivoted coincidently with the axis of oscillation of said oscillatory member, one or more pumps pivotally connected to said lever, and means for locking said lever in rigid relation to the cylinder.

20. In a baling press, a baling case, a head block reciprocally arranged therein, a toggle connecting the head block with a fixed point of the press and consisting of an oscillatory member, a member to oscillate with and also move endwise with respect to said oscillatory member and a link pivotally connecting the rear end of the endwise-movable member with the said head block, in combination with a lever pivoted coincidently with the axis of oscillation of said oscillatory member, one or more pumps pivotally connected to said lever, and an adjustable handle carried by said lever and adapted when adjusted in one direction to lock the lever in rigid relation with the said oscillatory member so as to oscillate therewith and when adjusted in the opposite direction to leave said lever free for independent oscillation.

In testimony whereof I affix my signature, in the presence of two witnesses.

WINFIELD S. LIVENGOD.

Witnesses:

HELEN C. RODGERS,
G. Y. THORPE.