Nov. 24, 1931. A. C. BARROWS ET AL 1,832,960

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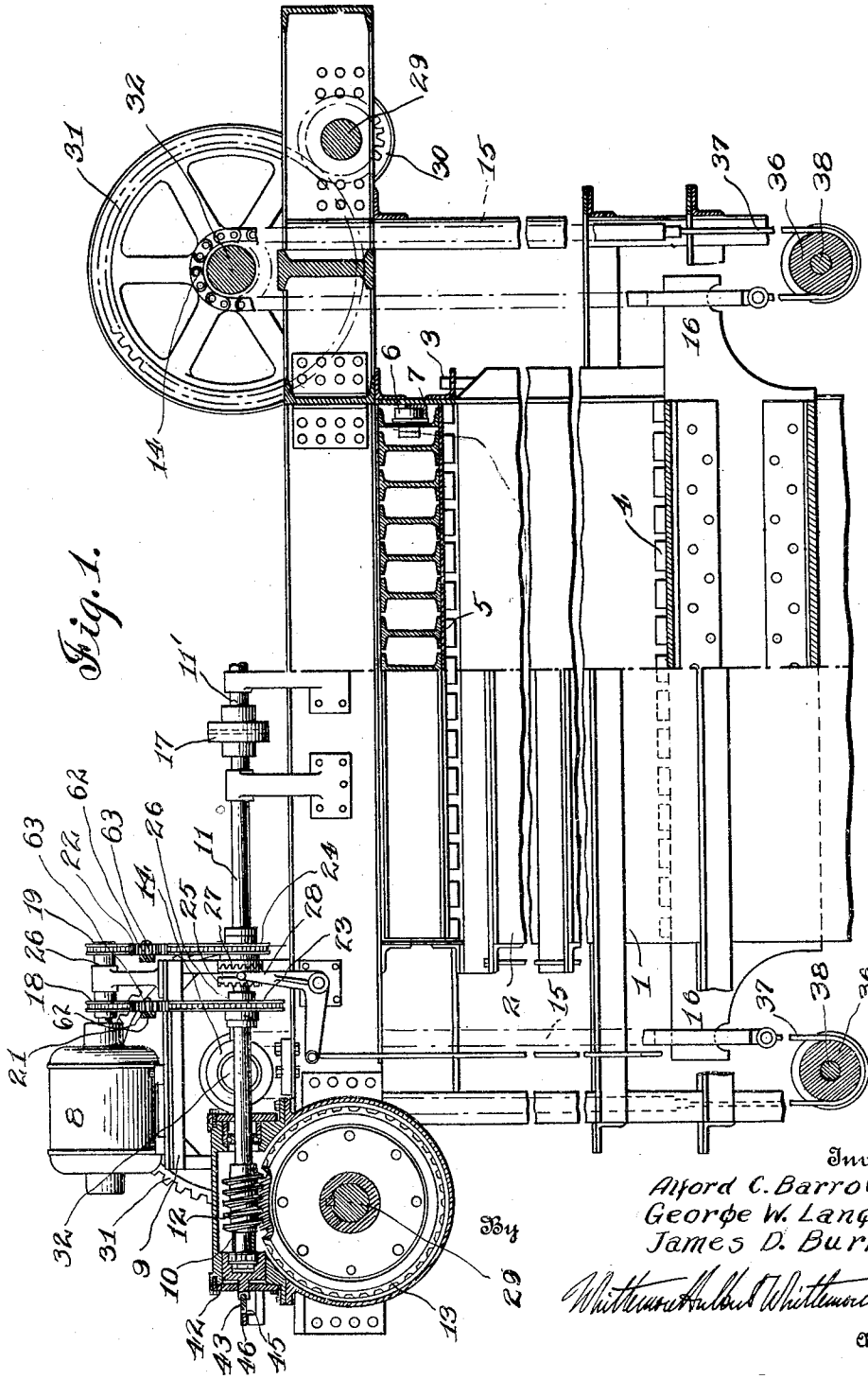


Fig. 1.

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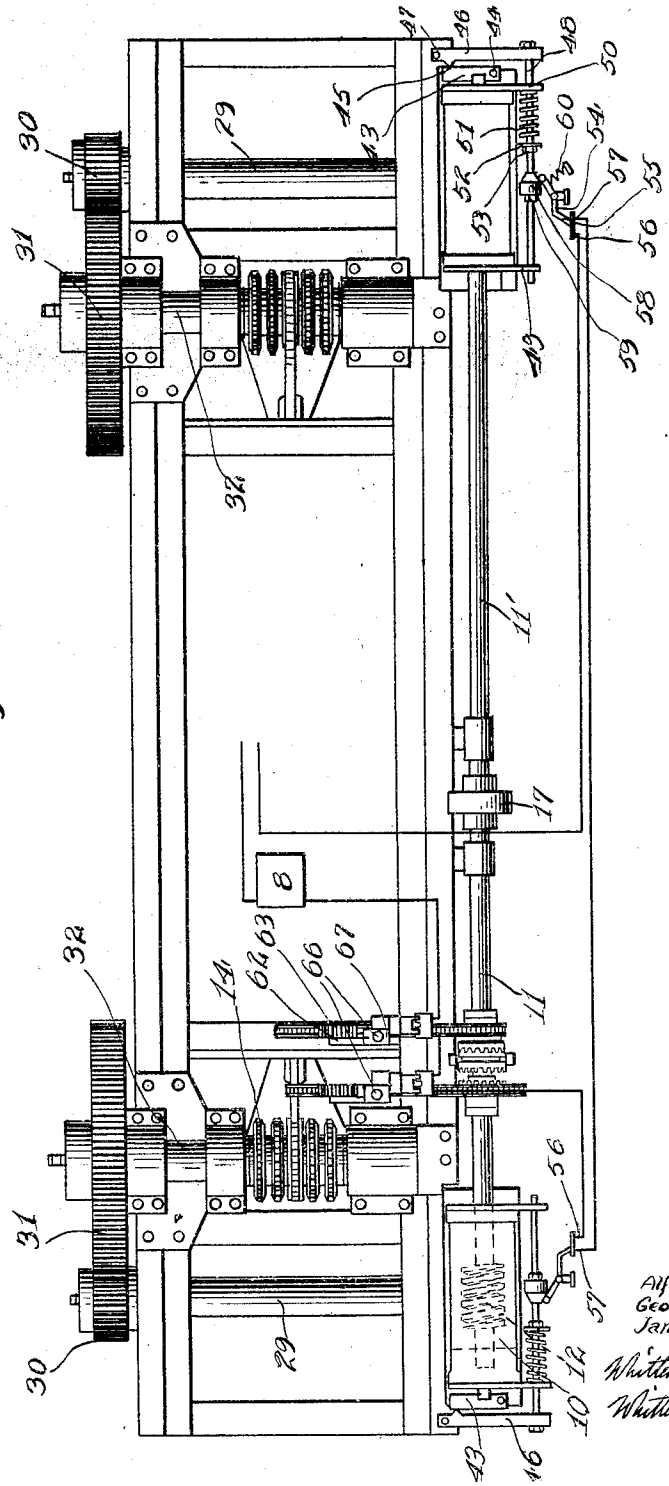


Fig. 2.

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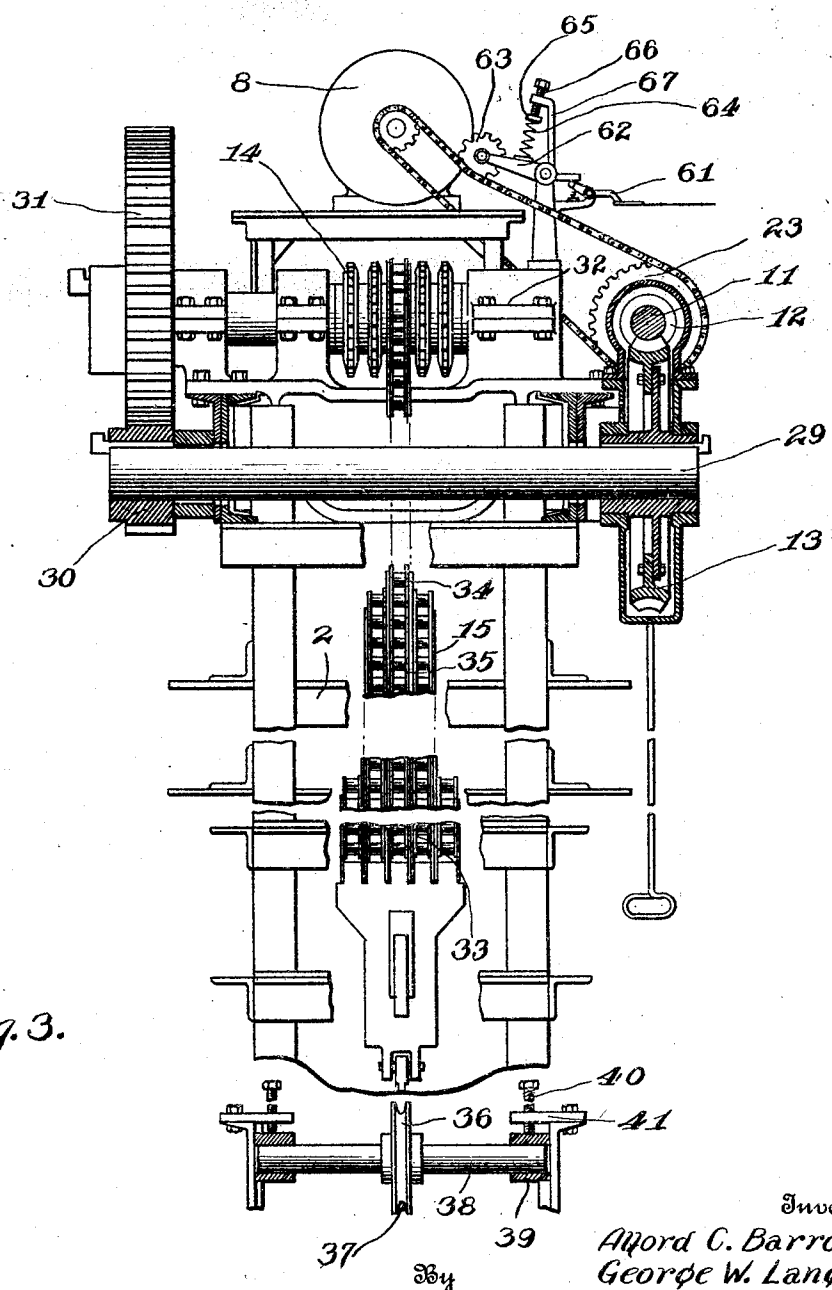


Fig. 3.

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UNITED STATES PATENT OFFICE

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BALING PRESS

Application filed February 3, 1927. Serial No. 165,653.

The invention relates to baling presses and has for some of its objects the provision of means for automatically stopping the compressing movement of the movable platen when the pressure at either of its ends reaches a predetermined limit; the provision of means for automatically stopping the compressing movement of the movable platen when the combined pressure at its ends reaches a predetermined limit; the provision of mechanism for driving the movable platen at different speeds including a flexible driving connection at each speed and means controlled by each flexible driving connection for automatically stopping the driving mechanism; the provision of an improved arrangement of driving wheel upon the frame of the press; and the provision of an improved flexible connection between the driving wheel and the movable platen. Other objects are to provide an upstroke baling press in which the movable platen may be advanced at different rates of speed during its travel and automatically held in its adjusted positions, and to provide for locating an upstroke baling press in a pit and at the same time locating the parts of the driving mechanism which might be affected by water above the pit.

With these as well as other objects in view, the invention resides in the novel features of construction and combinations and arrangements of parts as more fully hereinafter set forth.

In the drawings:—

Figure 1 is a side elevation partly in section of a baling press embodying our invention;

Figure 2 is a plan view partly in section and with the electric motor removed and the wiring and electric motor shown diagrammatically;

Figure 3 is a cross section on the line 3—3 of Figure 1.

In the present instance we have shown our invention as applied to an upstroke baling press although it is apparent that our invention in some of its aspects is equally applicable to other types of baling presses such as a downstroke baling press. In an upstroke baling press in which the movable platen is moved upwardly to compress the material, the height of the baling chamber of the press is necessarily relatively great inasmuch as the material must be compressed upon one stroke of the platen instead of by a number of strokes, as in the case of a downstroke baling press. As shown in the drawings, the upstroke baling press has the baling chamber 1 having an upper open end through which the material to be compressed may be inserted. The upper portion of the baling chamber is provided with the hinged doors 2 which may be locked in closed position by suitable locking mechanism 3 during the compressing of the material and may be swung to open position after the material has been compressed to provide for tying the bales and removing the same. 4 is the lower platen and 5 the upper platen, the latter being carried by the rolls 6 upon the tracks 7 and being transversely movable relative to the baling chamber to positions either closing or opening the same and the former being movable upwardly within the baling chamber when the latter is in closed position to compress the material within the baling chamber.

Inasmuch as the upstroke of the lower platen 4 is necessarily relatively great, we have provided means for driving this lower platen at different speeds during its upward travel. Furthermore, the driving mechanism is so located that the parts thereof which might be damaged by water are located upon the frame of the baling press above the top of the pit into which the baling press extends, the top of the pit or the floor level being preferably slightly below the lower ends of the doors 2. In detail, 8 is an electric motor which is supported upon the auxiliary frame 9 at the upper end of the frame of the baling

press. 10 is irreversible drive mechanism also mounted at the upper end of the baling press frame and so constructed that the driving member can drive the driven member but the driven member cannot drive the driving member. This irreversible drive mechanism comprises the aligned worm shafts 11 and 11' which extend longitudinally of and above the upper end of the baling chamber and are suitably journaled upon the baling press frame, the worms 12 fixed upon the worm shafts and located near and preferably beyond the ends of the baling chamber and the worm wheels 13 meshing with the worms and located below the same. Each worm wheel 13 is connected by suitable gearing to a chain sprocket 14 which is located beyond the end of the baling chamber. The chain sprockets are connected by the chains 15 to the ends of the beam 16 carrying the lower platen 4. For driving the worm shafts 11 and 12 simultaneously and at different speeds according to the degree of compression of the material, we have provided the coupling 17 telescoping over the adjacent ends of the worm shafts and suitably non-rotatably connected thereto as by means of keys. We have also provided the driving sprockets 18 and 19 fixed upon the driving shaft 20 which as shown is directly connected to the power shaft of the electric motor 8. 21 and 22 are driving sprocket chains respectively running over the driving sprockets 18 and 19 and also the driven sprockets 23 and 24. The latter have different numbers of teeth and are freely journaled upon the worm shaft 11. 25 is a driven clutch member non-rotatably mounted upon the worm shaft 11 as by being keyed thereto and located between the driving clutch members 26 and 27 respectively upon the driven sprockets 23 and 24 and 28 is a suitable lever for longitudinally shifting the driven clutch member upon the worm shaft to alternatively engage the driving clutch members.

With the arrangement as thus far described, the lower platen may be moved upward during the first portion of its travel at a comparatively high rate of speed at which time the driving is accomplished through the driving sprocket 19, driving sprocket chain 22 and driven sprocket 24. The driven clutch member 25 may then be shifted longitudinally of the worm shaft 11 to bring this clutch member into engagement with the driving clutch member 26 at which time upward travel of the lower platen is continued at a slower rate of speed through the driving sprocket 18, the driving sprocket chain 21 and the driven sprocket 23. During the shifting of the driven clutch member, the irreversible drive mechanism holds the lower platen in its adjusted position.

To provide for the necessary diameter and size of the chain sprockets 14, forming the driving wheels for the chains 15, and at the same time to provide for a compact arrangement at each end of the baling press, we have arranged the chain sprockets 14 with their axes of rotation parallel to the ends of the baling chamber. This is accomplished by extending the worm wheel shafts 29 transversely of the baling press frame and extending the same from the front to the rear of the baling press. The rear ends of these shafts have secured thereto the pinions 30 which mesh with the gear wheels 31 secured to the rear ends of the shafts 32 upon which the chain sprockets 14 are secured, the shafts 32 extending parallel to the shafts 29 and the chain sprockets being secured to the shafts 32 intermediate their ends and preferably at the transverse central portion of the baling press. The chains 15 engageable with these sprockets are made flat and extend parallel to the ends of the baling chamber.

To provide an economical construction of chain 15 it is made to have portions of varying strength so arranged that these portions will take care of the varying stresses to which they are subjected during the compressing of the material. As shown, each chain has the lower portion 33 which is formed of the greatest number of strands, there being five in the present instance, the upper portion 34 which has the least number of strands, there being one in the present instance, and the intermediate portion 35 having an intermediate number of strands, there being three in the present instance. Each chain sprocket 14 is a multiple sprocket so arranged that the middle sprocket section is engageable by the middle strand forming the upper portion 34 of the chain, this middle sprocket section with the adjacent sprocket sections being engageable with the strands forming the intermediate portion 35 of the chain and all of the sprocket sections being engageable with the strands forming the lower portion 33 of the chain. Upon the beginning of the upward movement of the lower platen 4 the load to which the platen is subjected is the minimum and at this time the chains which are connected to the ends of the lower platen have their weakest portions 34 engaging their driving sprockets and doing the work. Upon continued upward movement of the lower platen the load to which it is subjected is increased and at this time the intermediate portions 35 of the chains are doing the work. During the final portion of the upward movement of the lower platen when the load to which this platen is subjected is the greatest, the lower portions 33 of the chains, which are the strongest, are doing the work.

For positively returning the lower platen to its lowermost position, we have provided the idler wheels 36 and the flexible cables 37 which latter are connected to the ends of the chains and extend around the idler

wheels. These idlers wheels are mounted upon the shafts 38, the ends of which are journaled in the bearings 39 vertically adjustable in the frame of the baling press to maintain the proper tension of the cables and chains. The vertical adjustment is effected by the set screws 40 abutting the bearings and threadedly engaging the brackets 41 secured to the frame.

For the purpose of protecting the driving mechanism at either end of the baling press in the event that either end of the movable platen is subjected to too great stress as by reason of uneven distribution of the material being compressed or the inadvertent throwing of a solid body into either end of the baling chamber or the catching of either end of the platen or its beam, we have provided means for automatically stopping the compressing movement of the platen when the pressure at either of its ends reaches a predetermined limit. The control mechanism is the same at both ends of the baling press and makes use of the worm 12. In detail, 42 is an end thrust bearing at the outer end of the worm shaft and extending through the housing for the worm. The outer end of this end thrust bearing engages the lever 43, one end of which is pivoted at 44 upon the housing and the other end of which engages the fulcrum bearing 45 upon the lever 46. The fulcrum bearing is located near the end of the lever 46 which is pivoted at 47 upon the frame of the baling press. The other or free end of the lever 46 is connected to the pull rod 48 which, as shown, extends parallel with the worm shaft and is guided in the inner and outer brackets 49 and 50 respectively, both of which are secured to the housing. 51 is a coil spring surrounding the pull rod and abutting the outer bracket 50 and the washer 52 which is adjustable longitudinally of the pull rod by the nut 53 threaded upon this pull rod. By reason of this arrangement, the compression of the coil spring 51 may be varied to normally hold the pull rod 48 from longitudinal movement and consequently normally hold the worm shaft and its worm from longitudinal movement. Furthermore, the leverage is such that the coil spring may be relatively small. 54 is a rock arm of the switch having a contact member 55 adapted to bridge the terminals 56 and 57 of the wiring. This rock arm is engageable by the cam 58 preferably threaded upon the pull rod 48 and held in adjusted position by the nut 59 also threaded upon the pull rod. 60 is a coil spring for yieldably forcing the rock arm against the cam 58. With this arrangement it will be seen that if the pressure exerted upon either end of the movable platen reaches a predetermined limit which is controlled by the coil spring 51 the worm shaft will move longitudinally outward by reason of the worm traveling relative to the worm wheel, and this outward longitudinal movement will through the end thrust bearing 42, lever 43, lever 46, pull rod 48 and cam 58 swing the rock arm 54 of the switch to open the circuit of the electric motor 8, thereby stopping the press.

We have also provided means for stopping the compressing movement of the movable platen when the combined pressure at the ends of this movable platen reaches a predetermined limit. This means includes the rock arms 61 of switches normally closing the electric motor circuit, these rock arms being built similar to the rock arm 54 and there being one rock arm for each speed drive mechanism so that the press may be automatically stopped regardless of the speed at which it is being driven. For operating the rock arms we provide means which is dependent upon the tightness of the flexible driving chain 21 or the flexible driving chain 22 depending upon which is doing the driving. These means are separate and each comprises a rock arm 62 having one end engageable with a rock arm 61 and the other end provided with an idler sprocket 63 for engaging the driving side of the chain. 64 is a coil spring having one end engaging the rock arm 62 and the other end engaging the abutment 65, this coil spring yieldably holding the idler sprocket 63 against the chain and in position such that the rock arm permits the rock arm of the switch to maintain the circuit closed. For varying the force with which the idler sprocket is held against the chain, we have provided the set screw 66 which threadedly engages the bracket 67 and abuts the abutment 65, this set screw thus determining the pressure that must be exerted by the driving side of the driving chain to swing the rock arm 62 to open the circuit of the electric motor and stop further compressing movement of the movable platen.

What we claim as our invention is:—

1. In a baling press, the combination of a baling chamber, a platen movable within said chamber to compress the material therewithin, and means for actuating said platen including drive wheels at the upper end of said chamber and chains extending between said drive wheels and platen and having portions thereof provided with different numbers of strands to take care of the varying loads to which they are subjected during the compressing of the material.

2. In an upstroke baling press, the combination of a baling chamber of relatively great height, a platen movable within said chamber to compress the material within said chamber, mechanical means for actuating said platen including multiple drive sprocket wheels, and chains connected to said platens and engaging said sprocket wheels, said chains having portions thereof formed of different numbers of strands to take care

of the stresses to which they are subjected during the compressing of the material.

3. In a baling press, the combination of a baling chamber, a platen movable within said chamber to compress the material therewithin, means for driving said platen including change speed mechanism, and means operated by said change speed mechanism to automatically stop said driving means when the total pressure to which said platen is subjected reaches a predetermined limit.

4. In a baling press, the combination of a baling chamber, a platen movable within said chamber to compress the material therewithin, means for driving said platen including change speed mechanism having a flexible drive connection for each speed, and means controlled by each flexible drive connection for automatically stopping the driving means when the total pressure to which said platen is subjected reaches a predetermined limit.

5. In a baling press, the combination of a baling chamber, a platen movable within said chamber to compress the material therewithin, means for driving said platen including an electric motor and change speed mechanism having a driving chain for each speed, a switch for each driving chain controlling the motor circuit, and means engageable with the driving side of each driving chain for opening the respective switch.

6. In a baling press, the combination of a baling chamber, a platen movable within said chamber to compress the material therewithin, means for driving said platen including an electric motor, change speed mechanism, and members connected to the opposite ends of said platen and operated from said change speed mechanism; means for normally closing the motor circuit, and means for automatically opening the motor circuit dependent upon the pressure to which either end of said platen is subjected and the total pressure to which said platen is subjected.

7. In a baling press, the combination of a baling chamber, a platen movable within said chamber to compress the material therewithin, a flexible member connected to said platen and having portions thereof provided with different numbers of strands to compensate for the varying loads to which they are subjected during the compressing of the material, and means for actuating said flexible member including a plurality of drive wheels corresponding in number to the number of strands and engageable with each of the latter when the platen is in a position wherein the material is compressed.

8. In a baling press, the combination of a baling chamber, a platen movable within said chamber to compress the material therewithin, a chain connected to said platen and formed of a plurality of strands progressively increasing in number to compensate for the varying loads to which the chain is subjected during the compressing of the material, and means for driving said chain including a drive shaft having a plurality of sprockets thereon corresponding in number to the number of strands and successively engageable with the latter during the compression movement of the platen.

In testimony whereof we affix our signatures.

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