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2,494,033

AUTOMATIC BALER TENSION

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Fig. 1.

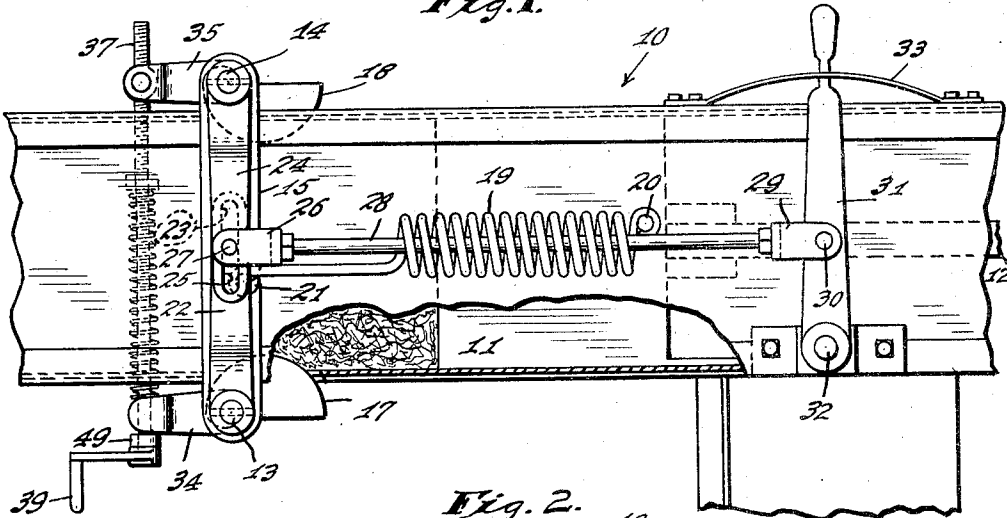


Fig. 2.

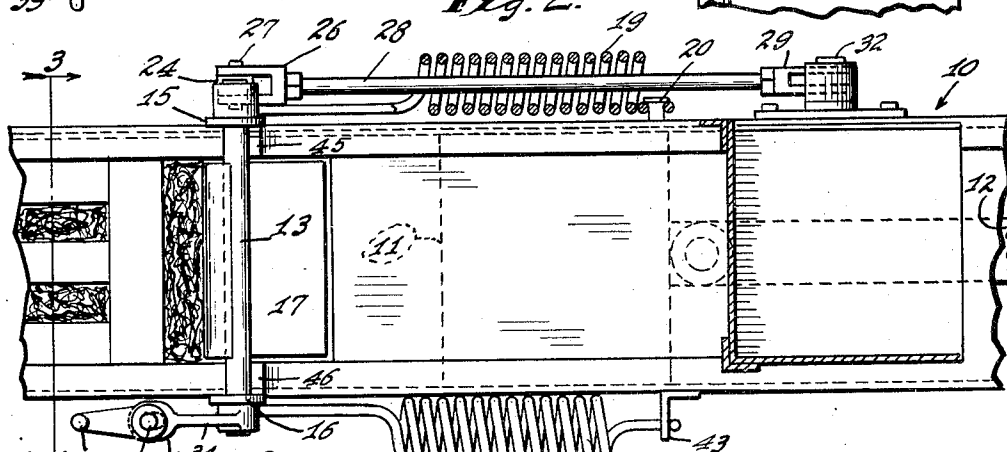
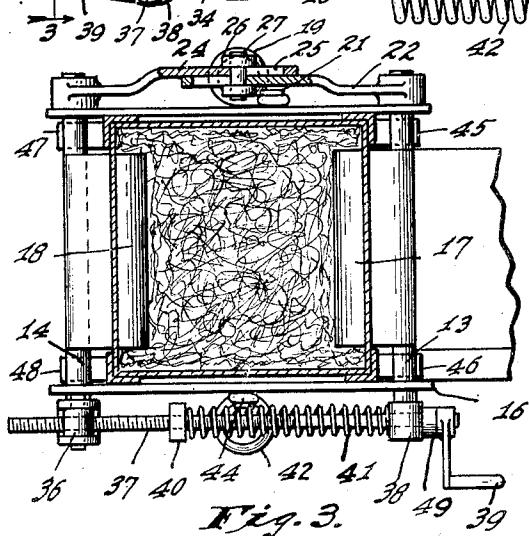


Fig. 3.

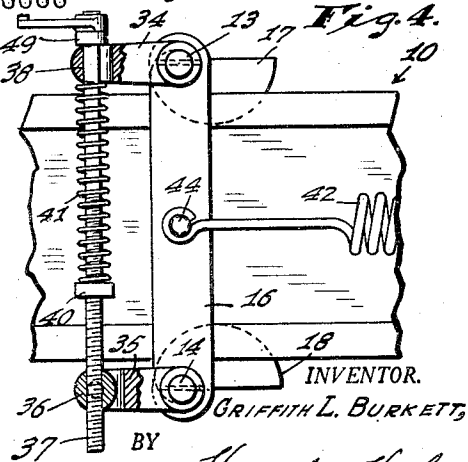


Fig. 4.

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AUTOMATIC BALER TENSION

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15 Claims. (Cl. 100—23)

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The object of the present invention is to provide means, in a baling machine, for automatically maintaining the "tension" of the machine, and providing for manual control of variations in that "tension." In the art, the term "tension" refers to the degree to which the material being baled is compressed as it passes through the machine. According to the present invention, means is provided setting up a resistance to the passage of material being baled past a given point in the baling chamber; and that means is of such character that, as the pressure behind it builds up to a predetermined value, which value is variable by manually controlled means, the obstructing means will be shifted to permit the passage of such material. The invention also contemplates the provision of means for pre-setting the degree of projection of the obstructing means into the baling chamber, and means for predetermining the point in its path of movement at which the obstructing means will be relieved. Further objects of the invention will appear as the description proceeds.

To the accomplishment of the above and related objects, my invention may be embodied in the form illustrated and described in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that change may be made in the specific construction illustrated and described, so long as the scope of the appended claims is not violated.

Fig. 1 is a plan view of a fragment of a baling machine with which my automatic tension has been associated, parts being broken away for clarity of illustration;

Fig. 2 is a side elevation of such mechanism, parts being shown in section;

Fig. 3 is a transverse section taken substantially on the line 3—3 of Fig. 2; and

Fig. 4 is a fragmentary bottom plan of a portion of my mechanism.

I have shown a baling chamber of substantially standard construction, indicated generally by the reference numeral 10, and associated with that chamber in accordance with standard practice, I have shown a baling plunger 11 adapted to be reciprocated in the baling chamber through the medium of a pitman 12 connected to a bull wheel (not shown).

Arranged outside the baling chamber and, in the illustrated embodiment, adjacent the two lateral sides of the chamber, I propose to mount two rock shafts 13 and 14, each of which projects both above and below the baling chamber 10.

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The upper ends of the shafts 13 and 14 are journaled in the opposite ends of a transverse bar 15; while the lower ends of said shaft are journaled in a second transverse bar 16. The shaft 13 carries a cam 17, whose length is substantially equal to the depth of the baling chamber, said cam being so constructed and arranged that, as the shaft 13 is rocked in a counter-clockwise direction, as viewed in Fig. 1, the degree of projection of the cam 17 into the baling chamber 10 will be increased, while the degree of that projection will be reduced if the shaft 13 is rocked in a clockwise direction as viewed in Fig. 1. The shaft 14 carries a similar, but oppositely arranged, cam 18.

A coiled spring 19 has one end anchored at 20 on the baling chamber, and has its opposite end anchored at 21 on the bar 15 to resist resiliently movement of said bar toward the left hand, or discharge, end of the baling chamber 10.

Fixed to the upper end of the shaft 13 is an arm 22 which projects generally toward the shaft 14 and which is provided, near its outer free end, with an elongated slot 23. A similar arm 24, having an elongated slot 25 in its free end, is fixed to the upper end of the shaft 14 and projects generally toward the shaft 13. A yoke 26 embraces the overlapping ends of the arms 22 and 24, and a pin 27, carried by said yoke 26, projects through the slots 23 and 25. Said yoke 26 is carried at one end of a link 28 whose opposite end carries a yoke 29, straddling, and pivotally secured by means of a pin 30 to, a lever 31. Said lever 31 has one end pivotally mounted upon a pin 32 fixed to the baling chamber 10; and its opposite end swings within a guard 33 which may be provided with spaced teeth for holding the lever 31 in any desired position of adjustment.

It will be clear that, as the lever 31 is swung in a clockwise direction, or toward the inlet end of the baling chamber 10, the arm 22 and shaft 13 will be moved in a clockwise direction while the arm 24 and shaft 14 will be moved to a substantially equal degree in a counter-clockwise direction, whereby the degree of projection of the cams 17 and 18 into the baling chamber 10 will be reduced. It will likewise be clear that bodily movement of the bar 15 to the left, or toward the discharge end of the baling chamber 10, will result in a similar swinging movement of the arms 22 and 24, shafts 13 and 14, and cams 17 and 18.

Fixed to the lower end of the shaft 13 is an arm 34 which, in the illustrated embodiment

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of the invention, projects generally toward the discharge end of the baling chamber 10. The lower end of the shaft 14 similarly carries a similar arm 35 which projects in the same general direction. The free end of the arm 35 carries a swivel nut 36 in which is threadedly engaged a threaded shaft 37. As is clearly to be seen in Figs. 1, 3 and 4, the opposite end of the shaft 37 is loosely engaged in an enlargement 38 of the arm 34. Intermediate its ends, and between the arms 34 and 35, a nut 40 is threadedly adjustably mounted on the shaft 37, and a coiled spring 41 is sleeved on the said shaft and is confined between said nut 40 and the arm 34, whereby said spring resiliently tends to separate the arms 34 and 35. Otherwise expressed, it may be said that the spring 41 tends to hold the arm 34 in engagement with the stop collar 49 on that end of the shaft 37 which carries a crank 39.

A coiled spring 42 has one end anchored on a bracket 43 carried on the bottom wall of the baling chamber 10, and has its opposite end anchored at 44 on the bar 16, said spring 42 resiliently resisting bodily movement of the bar 16 toward the discharge end of the baling chamber.

It will thus be seen that, because of the springs 19 and 42, bodily movement of the shafts 13 and 14 toward the discharge end of the baling chamber is resiliently resisted. Stops 45 and 46 mounted on the baling chamber positively limit bodily movement of the shaft 13 toward the inlet end of the baling chamber; and similar stops 47 and 48 positively limit bodily movement of the shaft 14 toward the inlet end of the baling chamber.

Obviously, if the shaft 37 is turned in a direction to draw the free ends of the arms 34 and 35 toward each other, the degree of projection of the cams 17 and 18 into the baling chamber will be reduced. At the same time, the arm 22 will be swung in a clockwise direction and the arm 24 will be swung in a counter-clockwise direction so that, if the lever 31 is held stationary, the bar 15 and the upper ends of the shafts 13 and 14 will be shifted toward the left as viewed in Fig. 1.

Alternatively, the parts being in the illustrated positions, if the shaft 37 is turned in the opposite direction, the shaft will be bodily shifted to the right as viewed in Fig. 3, against the tendency of the spring 41, since counter-clockwise rotation of the shaft 13 and clockwise rotation of the shaft 14 would tend, through the action of the link 28, to shift the bar 15 toward the right; and said bar is positively held against such movement by the stops 45 and 47.

The parts are shown in a position of substantially maximum projection of the cams 17 and 18 into the baling chamber. As material is fed forward by means of the plunger 11, its movement is resisted by the projection of said cams into the baling chamber, and it will be obvious that the degree of that projection determines the degree of resistance and therefore the degree of compression of the material as it moves past the cams. If the force exerted by the plunger 11 exceeds that degree for which the parts are set, the cams will be bodily moved, by the material, against the resistance of the springs 19 and 42, toward the left. The lever 31 being held against movement, such bodily movement of the cams will result in clockwise movement of the shaft 13 and counter-clockwise movement of the shaft 14, because the free ends of the levers 22 and 24 are held by the link 28 against participation in such

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bodily movement. Thereby, the degree of projection of the cams 17 and 18 into the baling chamber is reduced, and the degree of compression which would otherwise arise in the bale is reduced substantially to the desired value. The degree of movement of the bars 15 and 16 will depend upon the degree by which the force exerted by the plunger exceeds the value for which the parts are set, and will determine the degree of reduction of cam projection into the baling chamber.

The point at which bodily movement of the bars 15 and 16 toward the discharge end of the chamber will become effective to reduce the degree of cam projection into the chamber will depend upon the setting of the shaft 37 and the lever 31. If, when the shafts 13 and 14 are at rest against the stops 45, 46, 47 and 48, the arm 34 is in engagement with the stop collar 49, then the first increment of movement of the shafts away from said stops will begin withdrawal of the cams from the baling chamber. On the other hand, if the lever 31 is moved in a counter-clockwise direction from its illustrated position, while the setting of the shaft 37 remains as shown, the bar 15 and the upper ends of the shafts 13 and 14 will thereby be shifted to the left, and the spring 49 will be extended to increase its resistance to further extension. Now, in order that an increase in the force exerted upon the material moving through the baling chamber shall result in retraction of the cams, the cams must be shifted by the material beyond the new positions of the upper ends of the shafts 13 and 14, and in order so to move said shafts, the bar 15 must be moved beyond its new position against the increased resistance of the spring 49.

Alternatively, without readjusting the shaft 37, the lever 31 may be moved in a clockwise direction from its illustrated position. This will preliminarily reduce the degree of projection of the cams 17 and 18 into the baling chamber, and increase the angle at which the material in the baling chamber engages the cams. Thereby, the resistance to movement of material through the baling chamber offered by the cams is reduced, and the bale will come through less tightly packed, as a result of this adjustment.

The action of the mechanism is, of course, automatic once the parts have been set to a predetermined relation; and so long as the parts maintain that relationship, the illustrated mechanism will act to maintain a substantially constant degree of compression within all bales of material produced in the machine.

I claim as my invention:

1. In a baler, an elongated baling chamber, rotary cam material-obstructing means at each of two opposite sides of said chamber, said obstructing means being movable in the direction of material movement through said chamber, means resiliently resisting such movement of said obstructing means, and means operatively associated with said obstructing means to oscillate the same to reduce the obstructive effect thereof as said obstructing means is moved in the direction of material movement.

2. In a baler, an elongated baling chamber, material-obstructing means projecting into said chamber at each of two opposite sides of said chamber, said obstructing means being movable in the direction of material movement through said chamber, means resiliently resisting such movement of said obstructing means, means for preliminarily adjusting the degree of projection of said obstructing means into said chamber, and

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means operatively associated with said obstructing means to reduce the degree of projection thereof into said chamber as said obstructing means is moved in the direction of material movement.

3. In a baler, an elongated baling chamber, material-obstructing means projecting into said chamber at each of two opposite sides of said chamber, said obstructing means being movable in the direction of material movement through said chamber, means resiliently resisting such movement of said obstructing means, means for preliminarily adjusting the degree of projection of said obstructing means into said chamber, means operatively associated with said obstructing means to reduce the degree of projection thereof into said chamber as said obstructing means is moved in the direction of material movement, and other means operatively associated with said obstructing means to vary the position of said obstructing means, longitudinally of said chamber, at which said last-named means becomes effective.

4. In a baler, an elongated baling chamber, material-obstructing means variably projectible into said chamber and movable in the direction of material movement through said chamber, means resiliently resisting such movement of said obstructing means, and means operatively associated with said obstructing means to reduce the degree of projection thereof into said chamber as said obstructing means is moved in the direction of material movement.

5. In a baler, an elongated baling chamber, a rock shaft traversing one side of said chamber outside said chamber and bodily movable in the line of movement of material through said chamber, a cam carried by said shaft and projectible into said chamber to a greater or less extent by rocking movement of said shaft in one direction or the other, the length of said cam being substantially equal to the length of said side of said chamber, spring means resiliently resisting bodily movement of said shaft toward the discharge end of said chamber, means positively limiting bodily movement of said shaft toward the inlet end of said chamber, and means operatively connected with said shaft to produce rocking movement thereof, in a direction to reduce the degree of cam projection into said chamber, upon bodily movement of said shaft toward the outlet end of said chamber.

6. In a baler, an elongated baling chamber, a rock shaft traversing one side of said chamber outside said chamber and bodily movable longitudinally of said chamber, a cam carried by said shaft and projectible into said chamber to a greater or less extent by rocking movement of said shaft in one direction or the other, the length of said cam being substantially equal to the length of said side of said chamber, spring means resiliently resisting bodily movement of said shaft toward the discharge end of said chamber, means positively limiting bodily movement of said shaft toward the inlet end of said chamber, and means operatively connected with said shaft to produce rocking movement thereof, in a direction to reduce the degree of cam projection into said chamber, upon bodily movement of said shaft toward the outlet end of said chamber, said last-named means being movable to vary its operative effect upon said shaft.

7. In a baler, an elongated baling chamber, a rock shaft traversing one side of said chamber outside said chamber and movable lengthwise of

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said chamber, a cam carried by said shaft and projectible into said chamber to a greater or less extent by rocking movement of said shaft in one direction or the other, the length of said cam being substantially equal to the length of said side of said chamber, spring means resiliently resisting bodily movement of said shaft toward the discharge end of said chamber, means positively limiting bodily movement of said shaft toward the inlet end of said chamber, and screw means operatively associated with said shaft to vary its rotational position.

8. In a baler, an elongated baling chamber, a rock shaft traversing one side of said chamber outside said chamber and movable in the line of material movement through said chamber, a cam carried by said shaft and projectible into said chamber to a greater or less extent by rocking movement of said shaft in one direction or the other, the length of said cam being substantially equal to the length of said side of said chamber, spring means resiliently resisting bodily movement of said shaft toward the discharge end of said chamber, means positively limiting bodily movement of said shaft toward the inlet end of said chamber, a lever pivotally mounted on said chamber and swingable toward and away from the inlet end of said chamber, and means operatively connecting said lever with said shaft to produce rocking movement of said shaft, in a direction to reduce the degree of cam projection into said chamber, upon bodily movement of said shaft toward the outlet end of said chamber.

9. In a baler, an elongated baling chamber, a rock shaft traversing one side of said chamber outside said chamber for bodily movement in the line of material movement through said chamber, a cam carried by said shaft and projectible into said chamber to a greater or less extent by rocking movement of said shaft in one direction or the other, the length of said cam being substantially equal to the length of said side of said chamber, spring means resiliently resisting bodily movement of said shaft toward the discharge end of said chamber, means positively limiting bodily movement of said shaft toward the inlet end of said chamber, a lever pivotally mounted on said chamber and swingable toward and away from the inlet end of said chamber, an arm fixed to said shaft, and a link pivotally connected to said lever and to said arm.

10. In a baler, an elongated baling chamber, a rock shaft traversing one side of said chamber outside said chamber for transaxial movement longitudinally of said chamber, a cam carried by said shaft and projectible into said chamber to a greater or less extent by rocking movement of said shaft in one direction or the other, the length of said cam being substantially equal to the length of said side of said chamber, spring means resiliently resisting bodily movement of said shaft toward the discharge end of said chamber, means positively limiting bodily movement of said shaft toward the inlet end of said chamber, a lever pivotally mounted on said chamber and swingable toward and away from the inlet end of said chamber, an arm fixed to said shaft, a link pivotally connected to said lever and to said arm, a second arm fixed to said shaft, and screw means operatively associated with said second arm for affecting the rotational position of said shaft.

11. In a baler, an elongated baling chamber, two rock shafts arranged adjacent opposite sides of said chamber and projecting beyond said

chamber in both directions, said shafts being bodily movable toward and away from the outlet end of said chamber, a bar outside said chamber providing a journal mounting for one end of both said shafts, a second bar outside said chamber providing a journal mounting for the other end of both said shafts, a cam carried by each of said shafts, said cams being projectible into said chamber to a greater or less extent by rocking movements of their shafts in one direction or the other, spring means resisting bodily movement of said shafts toward the outlet end of said chamber, means positively limiting bodily movement of said shafts toward the inlet end of said chamber, and means operatively connected with said shafts to produce rocking movement of both of said shafts, to substantially equal extents, in a direction to reduce the degree of cam projection into said chamber, upon bodily movement of said shafts toward the outlet end of said chamber.

12. In a baler, an elongated baling chamber, two rock shafts arranged adjacent opposite sides of said chamber and projecting beyond said chamber in both directions, said shafts being bodily movable longitudinally of said chamber, a bar outside said chamber providing a journal mounting for one end of both said shafts, a second bar outside said chamber providing a journal mounting for the other end of both said shafts, a cam carried by each of said shafts, said cams being projectible into said chamber to a greater or less extent by rocking movements of other shafts in one direction or the other, spring means resisting bodily movement of said shafts toward the outlet end of said chamber, means positively limiting bodily movement of said shafts toward the inlet end of said chamber, and screw means operatively associated with said shafts to vary their rotational positions.

13. In a baler, an elongated baling chamber, two rock shafts arranged adjacent opposite sides of said chamber and projecting beyond said chamber in both directions, said shafts being bodily movable longitudinally of said chamber, a bar outside said chamber providing a journal mounting for one end of both said shafts, a second bar outside said chamber providing a journal mounting for the other end of both said shafts, a cam carried by each of said shafts, said cams being projectible into said chamber to a greater or less extent by rocking movements of their shafts in one direction or the other, spring means resisting bodily movement of said shafts toward the outlet end of said chamber, means positively limiting bodily movement of said shafts toward the inlet end of said chamber, a lever pivotally mounted on said chamber to swing toward and away from the inlet end thereof, and means operatively connecting said lever with both of said shafts to produce opposite and substantially equal rocking movements of said respective shafts, in a direction to reduce cam projection into said chamber, upon bodily movement of one of said bars toward the outlet end of said chamber.

14. In a baler, an elongated baling chamber, two rock shafts arranged adjacent opposite sides

of said chamber and projecting beyond said chamber in both directions, said shafts being bodily movable longitudinally of said chamber, a bar outside said chamber providing a journal mounting for one end of both said shafts, a second bar outside said chamber providing a journal mounting for the other end of both said shafts, a cam carried by each of said shafts, said cams being projectible into said chamber to a greater or less extent by rocking movements of their shafts in one direction or the other, spring means resisting bodily movement of said shafts toward the outlet end of said chamber, means positively limiting bodily movement of said shafts toward the inlet end of said chamber, an arm for each of said shafts, each arm being fixed to its own shaft and projecting generally toward the other shaft, means adapted to assume any one of a plurality of fixed positions with respect to said chamber, and means connecting said last-named means to both of said arms to produce rocking movement of both of said shafts, to substantially equal extents, in a direction to reduce the degree of cam projection into said chamber, upon bodily movement of said shafts toward the outlet end of said chamber.

15. In a baler, an elongated baling chamber, two rock shafts arranged adjacent opposite sides of said chamber and projecting beyond said chamber in both directions, said shafts being bodily movable longitudinally of said chamber, a bar outside said chamber providing a journal mounting for one end of both said shafts, a second bar outside said chamber providing a journal mounting for the other end of both said shafts, a cam carried by each of said shafts, said cams being projectible into said chamber to a greater or less extent by rocking movements of their shafts in one direction or the other, spring means resisting bodily movement of said shafts toward the outlet end of said chamber, means positively limiting bodily movement of said shafts toward the inlet end of said chamber, means operatively associated with said shafts to produce rocking movement of both of said shafts to substantially equal extents, in a direction to reduce the degree of cam projection into said chamber, upon bodily movement of said shafts toward the outlet end of said chamber, an arm fixed to one of said shafts, an arm fixed to the other of said shafts, said arms projecting from their shafts in the same general direction, a threaded shaft threadedly engaged with one of said arms and loosely engaging the other of said arms, a nut threadedly mounted on said threaded shaft between said arms, and a coiled spring sleeved on said shaft, abutting said nut, and abutting said other arm to urge said arms resiliently apart.

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The following references are of record in the file of this patent:

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