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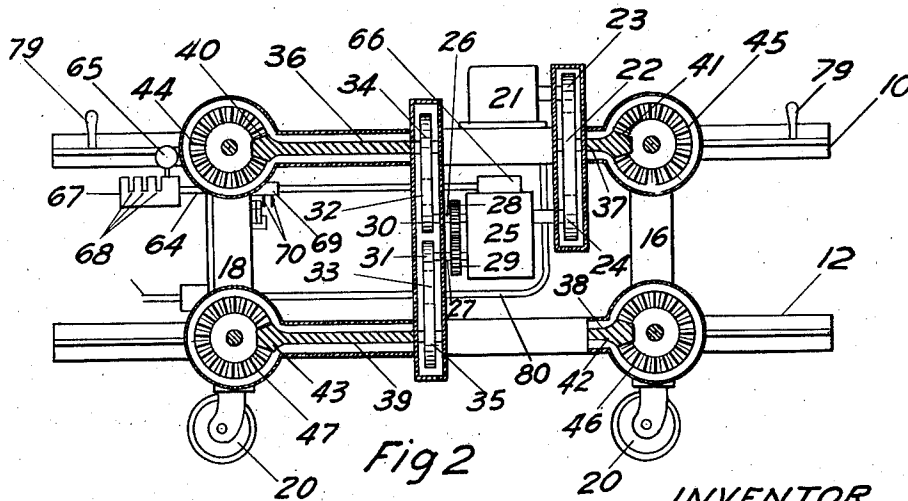
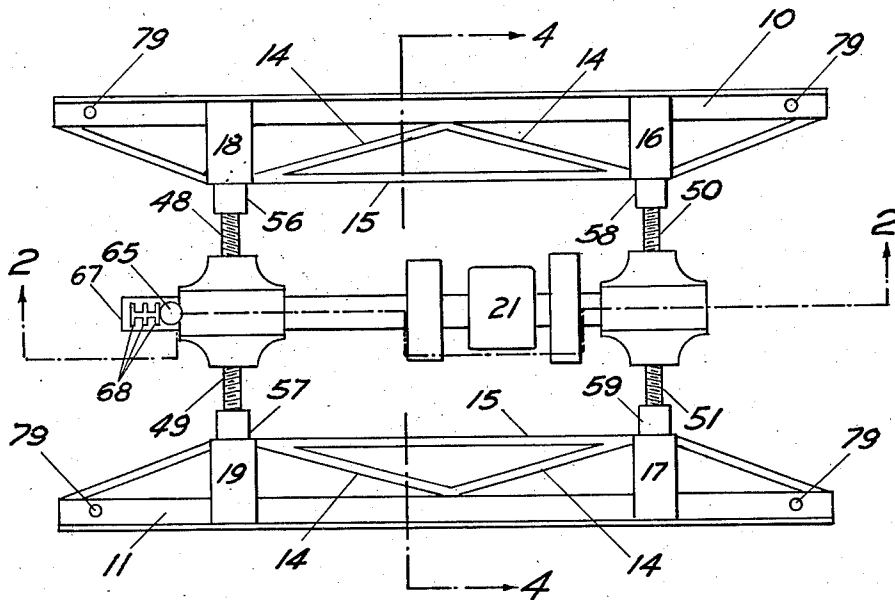
A. H. BRASE

2,252,283

BOX SQUEEZE

Filed June 29, 1940

2 Sheets-Sheet 1



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BOX SQUEEZE

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2 Sheets-Sheet 2

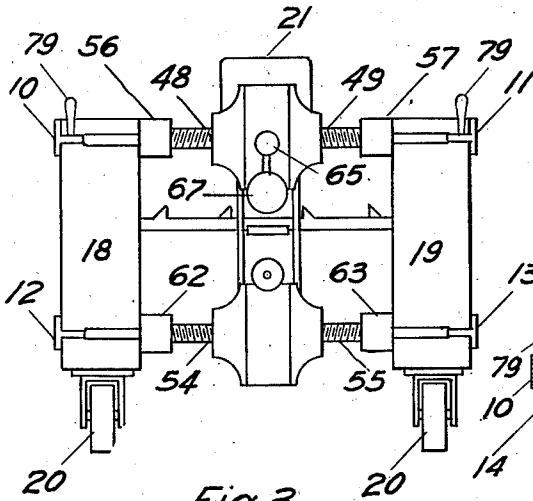


Fig. 3

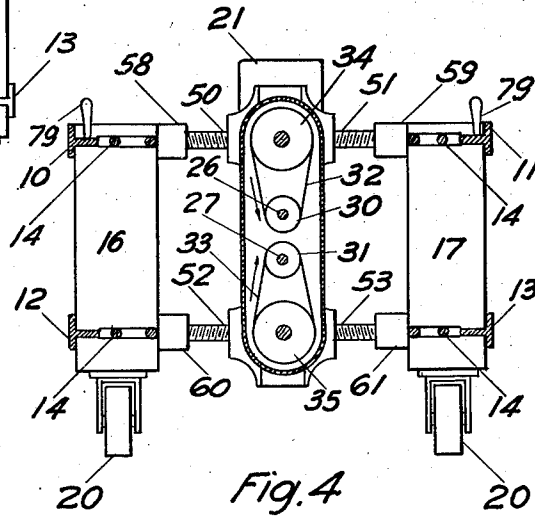


Fig. 4

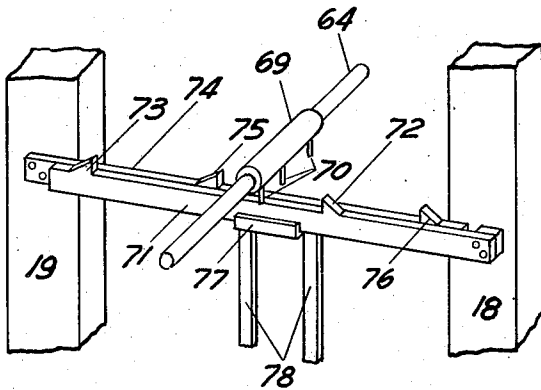


Fig. 5

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## UNITED STATES PATENT OFFICE

2,252,283

## BOX SQUEEZE

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2 Claims. (Cl. 105-369)

This invention relates in general to a device known as a box squeeze, adapted to squeeze boxes, cases, or the like, in railroad cars. In particular, this invention relates to a device of this type used for the purpose of tightening or compressing the stacks of boxes back into the freight car both ways from the center in order to obtain more loading space and to tighten the load.

As those familiar with the loading of railroad cars know, it is practically impossible to place stacks of boxes manually in a freight car as tightly as is necessary in order to give satisfactory rigidity and stability to the load for shipping purposes. In particular, in loading refrigerator cars with boxes or crates of fruits, as, for example, oranges or lemons, it is customary to tier the boxes two high and to fill the car from both ends toward a point in the middle of the car adjacent the door. As mentioned before, it is practically impossible to manually place or pack the boxes sufficiently close together to give a satisfactory rigidity and to prevent shifting of the load during transportation. In order to overcome this difficulty, it has been the practice to employ some type of mechanical device to force the boxes tightly together and against the ends of the cars.

Devices which are now used for this purpose usually consist of an expansible frame mounted on rollers. Such devices are usually manually operated, often requiring the use and force of two men for their operation. Furthermore, the devices have been so constructed that the pressure applied against the boxes for the purpose of tightening the load has not been evenly applied, resulting in tightening only a portion of the load. Also, buckling of the box squeeze itself sometimes occurs, since in these devices no effort has been made to equalize the application of force within the squeeze itself.

In accordance with the present invention, however, I have developed a device for tightening the loads in cars, which is equipped with power means and, therefore, requires little or no manual operation after the squeeze has been positioned within the car. Furthermore, my squeeze is so constructed that the pressure bars which press against the load are positively moved through an equal distance with an equal force. As a consequence, the entire load is tightened to the same extent. Accordingly, it is an object of this invention to provide a box squeeze which is equipped with power means and is so constructed that the pressure bars are positively moved an equal distance by an equal force.

Another object of this invention is to provide a device of the class described which is so constructed that the frame members may be expanded against a load without buckling.

A still further object of this invention is to provide and disclose a device of the class described which is adapted to be operated at different speeds.

Another object of this invention is to provide and disclose a device of the class described which is adapted to exert varying degrees of pressure as needed.

A further object of this invention is to provide and disclose a device of the class described which obviates the necessity for manual operation.

Other objects and advantages and modifications will become apparent to those skilled in the art. It is understood that changes in the arrangement and relationship of the parts may be made without departing from the scope of my invention. The operation of my device will be apparent as the description proceeds in connection with the accompanying drawings in which:

Fig. 1 is a plan view of the device.

Fig. 2 is a vertical, longitudinal, cross-sectional view of the device taken along the line 2-2 of Fig. 1, and shows partial details of the driving mechanism.

Fig. 3 is a front view.

Fig. 4 is a vertical, transverse, cross-sectional view taken along the line 4-4 of Fig. 1.

Fig. 5 is an enlarged, perspective view of the limit switch mechanism.

Corresponding and like parts are referred to in the following description and are indicated in all views of the drawings by the same reference numbers.

Referring now to the drawings in detail, it will be apparent that the device is provided with four parallel pressure bars 10, 11, 12, and 13, a pair on each side of the device, each pair of pressure bars being reinforced, for example, by suitable bracings 14 and 15 and maintained in position by upright pressure bar supports 16, 17, 18, and 19. The device is mounted on wheels 20.

Referring in particular to Fig. 2, in which the parts 21 to 35 are shown in elevation, a reversible motor 21 is positioned between the pairs of parallel pressure bars. The reversible motor is connected by means of a drive belt 22 operating in conjunction with the pulleys 23 and 24, to a transmission 25. Mounted on axles 26 and 27 are intermeshing pinion gears 28 and 29. Power is transmitted from the transmission 25 by means of these pinion gears, one pinion gear being di-

rectly driven from within the transmission 25 and the other pinion gear being driven by the first-mentioned pinion gear so that they revolve in opposite directions. Also attached to the axles 26 and 27 are the sprocket wheels 30 and 31, which operate in conjunction with the related chain drives 32 and 33 and drive-shaft sprocket wheels 34 and 35. To the drive-shaft sprocket wheel 34 there are attached two opposed drive shafts 36 and 37. Also, to the drive-shaft sprocket wheel 35 are attached two opposed drive shafts 38 and 39. The drive shafts 36, 37, 38 and 39 respectively terminate in pinion gears 40, 41, 42, and 43, operating in connection with the respective ring gears 44, 45, 46, and 47. In the embodiment of my invention shown in the drawings, these ring gears are all on the same side—the left side, as viewed in Fig. 3—of their respective pinion gears. A modification of that arrangement is suggested hereinbelow.

To each of the ring gears, 44, 45, 46, and 47, is centrally attached a single axle having oppositely threaded jack-screw end portions. As a consequence of the arrangement of the ring gears, as just mentioned, the axle attached to the ring gear 44 has, on its left portion, left-hand threads 48. The right portion has right-hand threads 49. On the axle attached to the ring gear 45, the left portion has right-hand threads 50 and the right portion has left-hand threads 51. On the axle attached to the ring gear 46, the left portion has left-hand threads 52, and the right portion has right-hand threads 53. On the axle attached to the ring gear 47, the left portion has right-hand threads 54, and the right portion has left-hand threads 55. In other words, each one of the four axles has its opposite end portions oppositely threaded. The result of the foregoing arrangement is that each pair of threaded axle portions has oppositely disposed threads, and this is true whether a pair of end portions be taken at opposite ends of the same axle or vertically or horizontally on the same side of the machine. This arrangement has an important effect in the operation of the device, as will appear more fully hereinbelow. The threaded portions 48, 49, 50, 51, 52, 53, 54, and 55 of the four above-mentioned axles are adapted to respectively engage stationary threaded channels 56, 57, 58, 59, 60, 61, 62, and 63. Each pair of threaded channels—58 and 60, 59 and 61, 56 and 62, and 57 and 63—are attached to and preferably made a part of the pressure bar supports 16, 17, 18, and 19 respectively.

A gear shift bar 64, terminating at its forward end in a gear shift handle 65, is adapted to change the gear relationships in the transmission 25. Operating in connection with the gear shift bar 64 is a double-throw electric switch 66 suitably wired to the reversible motor 21. The gear shift handle 65 is positioned within a housing 67 having transverse slots as indicated at 68 for positioning the gear shift handle 65.

Also operating in conjunction with the gear shift bar 64 is a limit switch mechanism adapted, by stopping the motor, to prevent the device from being expanded or retracted beyond certain determined limits. An enlarged view of the limit switch mechanism is shown in Fig. 5. It comprises a collar 69 positioned on the gear shift bar 64, said collar having dogs 70 depending therefrom. A switch bar 71 attached to the pressure bar support 18 is equipped with lugs 72 and 73, and a switch bar 74 attached to the pressure

bar support 19 is equipped with lugs 75 and 76. These lugs are so positioned with respect to the depending dogs 70 that in any one of the three engaged positions of the gear shift handle 65 opposite some one of the transverse slots 68, one of the pair of lugs 72, 73 or one of the pair of lugs 75, 76 will impinge upon some one of the dogs 70, thereby turning the gear shift bar 64 and returning the handle 65 to an upright position and automatically stopping the motor 21 by opening the switch 66. The switch bars 71 and 74 are held in position by means of a switch bar support 77 which is maintained in position by means of bracing 78. By means of the switch mechanism above mentioned, it is impossible to expand or retract the pressure bars beyond certain determined limits since if the gear shift handle 65 is turned to the right then the depending dogs 70 will be turned to the left, and when the parallel bars are being expanded the lug 73 will impinge against one of the depending dogs and turn the gear shift bar 64, thereby returning the handle 65 to an upright position and automatically stopping the motor by opening the switch. If, on the other hand, the device is being retracted, lug 75 will impinge upon one of the depending dogs, thereby stopping the movement of the device. Similarly, if the handle 65 is turned to the left, thereby positioning the depending dogs 70 to the right, then when the device is expanded the lug 76 will operate against the depending dog to stop the motion, whereas during retraction the lug 72 will operate to stop the motion.

On the upper pressure bars 10 and 11, both at the forward and rear ends, are placed handles 79 to assist in positioning the device. Electricity is supplied to the reversible motor 21 by means of the cable 80.

When loading for example, a refrigerator car with boxes of oranges, the boxes are trucked into the car and stacked along both ends. Successive stacks are placed in front of these until the space in the car is filled except for a space in the center opposite the car doors. My box squeeze in contracted position is then rolled into the car in the space between the boxes, and expanded.

The operation of the device is as follows: The double-throw electric switch 66 is operated by turning the gear shift bar 64 to the right or left by the handle 65. Consequently, when the gear shift handle is in an upright or perpendicular position, the switch is open and the reversible motor will not be in operation. Also, by means of the gear shift bar 64 the gear relationships within the transmission 25 are determined, that is to say, the gears are changed by shifting the gear shift handle 65 forward or backward to positions in line with the transverse slots 68 within the housing 67. It is obvious, therefore, that the motor cannot be started until the gears within the transmission 25 are in some particular engagement, that is to say, until the gear shift handle 65 is in line with one of the transverse slots 68. When the gear shift handle is so positioned, it may be turned to the right or left, thereby closing the switch 66 and starting the motor 21, which, being reversible, is adapted to rotate in opposite directions, depending upon whether the switch 66 is thrown to the right or to the left.

As soon as the gears within the transmission 25 have been engaged and the motor 21 is in operation, power is transmitted by means of the drive belt 22 and pulleys 23 and 24 to the transmission

25. Since the pinion gears 28 and 29 mounted on the axles 26 and 27 are intermeshing, they revolve in opposite directions. This results in having the sprocket wheels 30 and 31, also attached to the axles 26 and 27, revolve in opposite directions. The sprocket wheels 30 and 31 motivate the drive-shaft sprocket wheels 34 and 35 by means of the chain drives 32 and 33, thereby causing the drive-shaft sprocket wheels to rotate in opposite directions.

I wish particularly to point out at this time that my driving mechanism has been carefully arranged so as to equalize or balance the application of force to the respective parts when the device is in operation. That is to say, I have arranged the driving mechanism so that for each unit of force applied at one point in one direction, a corresponding and compensating force is applied in the opposite direction at a correspondingly opposite and compensating point, so that any tendency for the device to be under undue lifting or twisting stress is reduced to a minimum.

For example, it will be noted that when the axle centrally attached to the ring gear 44 is turning clockwise, the axle directly below and attached to the ring gear 47 revolves counterclockwise, at the same time the axle attached centrally to the ring gear 45 is rotating counterclockwise, the axle directly below and passing centrally through the ring gear 46 is rotating clockwise. In view of my unique arrangement of the driving mechanism, an even distribution of force against all points of the load, and smooth operation of the box squeeze in general, are assured. Also, my particular arrangement of the driving mechanism causes the pairs of parallel pressure bars to be expanded or retracted through an equal and opposite distance.

It will be obvious from what has been said hereinabove that the drive shafts 36 and 37 will have the same direction of rotation as the drive-shaft sprocket wheel 34 but will impart opposite directions of rotation to the ring gears 44 and 45, which cooperate with the pinion gears 40 and 41 at the extremities of the axles. Similarly, the drive shafts 38 and 39 attached to the drive-shaft sprocket wheel 35 will have the same direction of rotation but will impart opposite directions of rotation to the ring gears 46 and 47 cooperating with the pinion gears 42 and 43. Therefore, if, for example, the ring gear 44 rotates clockwise, the ring gear 45 will rotate counterclockwise; and the ring gear 46 will rotate clockwise, while the ring gear 47 will rotate counterclockwise. In a modification of this arrangement, the ring gears at one end of the device may be on one side of the pinion gears, and at the opposite end on the other side of them. This arrangement eliminates the main fault arising from the unbalanced application of force in prior devices of this class, namely, the tendency of the device to "lift" itself.

When the device has been expanded so that the pressure bars are firmly pressed against the stacks of boxes, the gear ratio within the transmission may suitably be changed merely by returning the gear shift handle 65 to a perpendicular position, thereby stopping the motor, and pushing the gear shift rod 64 forward or backward so as to engage gears within the transmission adapted to give more power. The gear shift handle is then turned sidewise so as to start the motor and the additional pressure is applied to the stacks of boxes.

Obviously the amount of pressure available

is dependent upon the gear ratio set up within the transmission. I prefer a high gear for quick expansion and retraction where no appreciable amount of pressure is required. I also find it desirable to have an intermediate gear for the application of the preliminary pressure, and, finally, a low gear for the ultimate tightening of the load.

When sufficient pressure has been applied against the boxes so as to wedge them tightly against the ends of the car, the squeeze is retracted. This operation is accomplished as follows:

The gear shift handle 65 is first thrown to the opposite side and the motor reversed to retract the squeeze somewhat in the same gear until the pressure from the boxes is relieved, and then the handle 65 is shifted to a perpendicular position and the gear shift bar 64 moved forward or backward, as the case may be, to engage the gears within the transmission which give the maximum speed. The gear shift handle is then again turned in the opposite direction from that used to expand the squeeze, and the retraction is quickly completed.

It is clear, as pointed out hereinabove, that by means of a reversible motor and suitable gearing arrangements within the transmission, any desired speed may be obtained either for the expansion or retraction of the pressure bars. It is obvious that it is advantageous to have different speeds for the expansion of the device in order that the mechanism may be quickly extended to the point where it pushes lightly against the load and then be able to produce a strong positive pressure to force the load tightly against the ends of the car. Similarly, quick retraction of the device is desirable in order to save time.

It is to be presumed that variations and modifications will occur to those skilled in the art with respect to the particular arrangements of the apparatus or kind of apparatus used. My device is not limited, therefore, to the specific parts and arrangements of parts referred to herein for illustrative purposes. Any and all changes, modifications, and alterations in the device coming within the scope of the appended claims are embraced thereby.

Having thus fully described my invention in such clear, concise, and exact terms as to enable others skilled in the art to use the same, I claim as my invention and desire to secure by Letters Patent the following:

1. A device for tightening loads in box cars comprising pairs of parallel pressure bars positioned in opposed relationship, the bars of said pairs of parallel pressure bars being maintained in parallel relationship by supporting members, a reversible motor positioned between the pairs of parallel pressure bars, said reversible motor operating in conjunction with means for positively maintaining the parallelism of said pairs of pressure bars and for providing compensated application of force within said device in the operation thereof, said means comprising a transmission from which power is transmitted by oppositely operating driving mechanism to oppositely rotating drive shafts, said drive shafts terminating in pinion gears each operating in connection with a ring gear, each ring gear being attached to an axle centrally of said axle, each axle having oppositely threaded jack screw end portions, said axles operating in threaded channels attached to supporting members for the pressure bars, whereby the pairs of parallel pressure

bars may be moved away from or toward each other.

2. A device for tightening loads in box cars comprising sets of parallel pressure bars positioned in opposed relationship, the bars of said sets of parallel pressure bars being maintained in parallel relationship to each other by supporting members, a motor positioned between the sets of parallel pressure bars, said motor operating in conjunction with means for positively maintaining the parallelism of said sets of pressure bars and for providing compensated application of

5 force within said device in the operation thereof, said means comprising a transmission from which power is transmitted to oppositely rotating drive shafts, said drive shafts being operatively connected with axles whereby rotation of the drive shafts causes the said axles to rotate, each axle having oppositely threaded end portions, said axles operating in threaded channels connected to supporting members for the pressure bars, 10 whereby the sets of parallel pressure bars may be moved away from or toward each other.

ARTHUR H. BRASE.