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S. W. LUCAS

2,622,722

DEVICE FOR HANDLING GRAIN

Filed Oct. 12, 1949

2 SHEETS—SHEET 1

FIG. 1

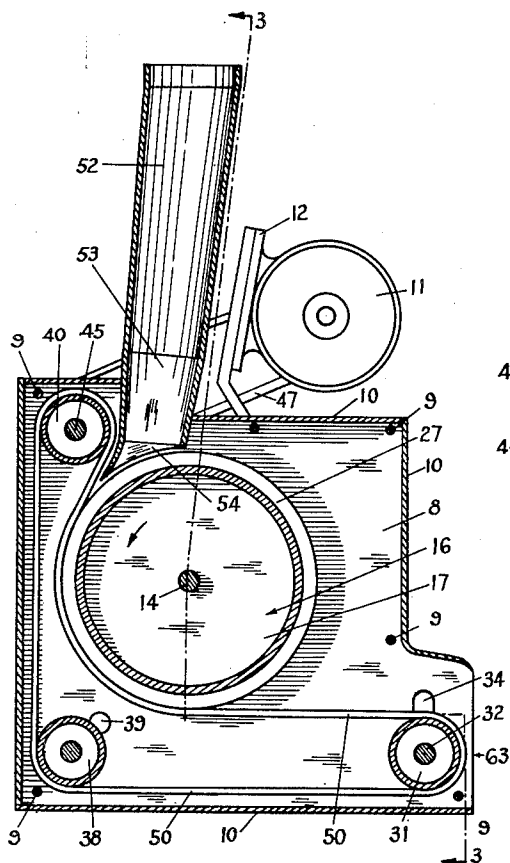


FIG. 3

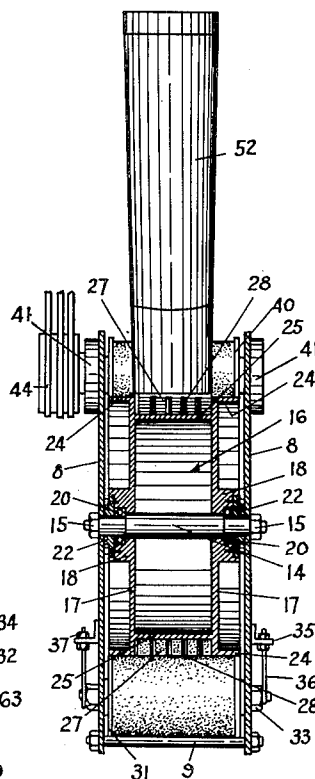
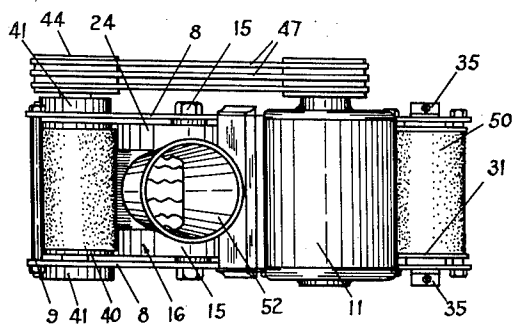


FIG. 2



INVENTOR
SAMUEL WALTER LUCAS

BY: *Wassettine, Laker & Co.*
AGENTS

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2 SHEETS—SHEET 2

FIG. 4

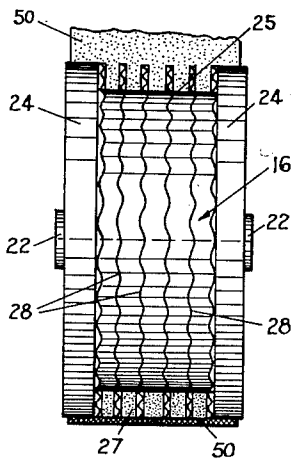


FIG. 5

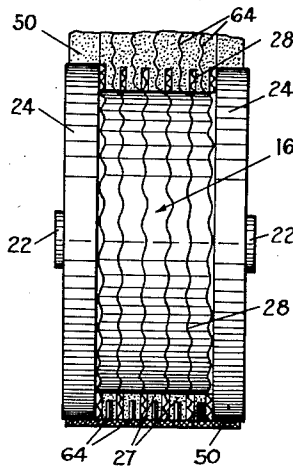


FIG. 6

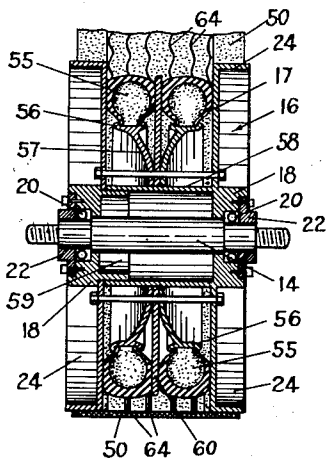
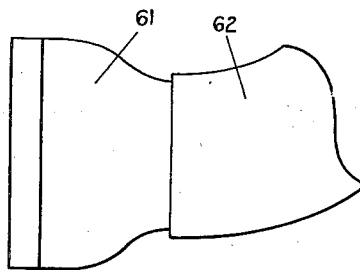


FIG. 7



INVENTOR
SAMUEL WALTER LUCAS
By: *Hammett, Lake & Co.*
AGENTS

UNITED STATES PATENT OFFICE

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DEVICE FOR HANDLING GRAIN

Samuel Walter Lucas, Underdale, South
Australia, AustraliaApplication October 12, 1949, Serial No. 120,871
In Australia October 28, 1948

5 Claims. (Cl. 198—128)

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This invention relates to an improved device for handling grain and in particular it relates to a device for trimming the holds of ships or the like where grain must be moved to various localities to completely fill a hold or a silo or the like.

It has been found heretofore that in filling the holds of ships the grain tends to "heap" at a position adjacent the feed grain outlet and in order to completely fill the hold of the ship it is necessary to manually move the grain outwardly from the feed chute outlet. In order to overcome the necessity of manually shifting the grain to the edges of the hold, grain trimming devices have been utilized of the type in which a moving endless belt contacts rollers and a grooved wheel in such a manner that the grain is deflected from the vertical to approximately the horizontal direction to allow the grain to be distributed to the outer edges of the hold. Considerable difficulties are encountered in handling grain in that it is essential to prevent damage to the grain during the trimming operation and due to its fine nature it has been found heretofore that difficulty existed in accelerating the grain outwardly due to its somewhat fluid nature when handled in bulk. It will be appreciated with trimming machines that the grain is normally fed downwardly due to gravity or other means and that during its movement through the trimming machine, its direction must be changed through approximately a right angle and it must be accelerated so that the grain will be given sufficient momentum to carry it outwardly to the furthest portions of the ship's hold. It will be seen, therefore, that it is necessary to feed the grain into the trimming machine in a relatively solid mass so that it will be deflected around and outwardly to give a maximum outward "throw" in the required direction.

Trimming devices heretofore of the rotary type had the inherent disadvantage of allowing "slip" between the rotary member and the grain to be deflected so that considerable loss occurred and the "throw" from the rotary member was therefore limited.

It is therefore the object of this invention to provide a trimming machine incorporating a rotary member which would overcome the before mentioned difficulties and would give a high degree of efficiency in rotating, deflecting, and transmitting the grain outwardly.

It is a further object of this invention to provide a novel type of rotary member which will collect the grain from the feed chute and deflect it outwardly at high speed during its movement around part of the periphery of the drum.

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According to this invention, the improved device for trimming grain consists of a rotary drum having a circumferential channel and endless belt passing around rollers which are so positioned that the belt extends partially around the periphery of the drum. Driving means are provided to move the belt around the rollers and around a portion of the drum. Circumferential sinuous walls are provided in the channel shaped to cause the grain to be well packed in the channel so that during its movement around a portion of the periphery of the channel, and when it is held between the channel and the belt, it will be deflected outwardly at high speed from the drum. The belt is moved at a relatively high speed and the grain is fed to the rotary drum in a continuous well packed mass to ensure that adequate means are provided to transmit the high speed of the rotary drum to the grain without any substantial "slip" during its deflecting period.

The particular feature of this invention is the shaped sinuous or corrugated circumferential walls in the grain channel and if desired also the shape of the conveyor belt so that, when the belt and the ribs co-operate with each other around a portion of the periphery of the grain channel, the grain will be well packed so that maximum acceleration may be conveyed to it.

The conveyor belting may comprise a flexible strip having upon its surface a row of longitudinal walls or ridges spaced apart and parallel with the length of strip, each wall having along the length thereof and on one or both sides a succession of recesses formed by corrugating or sinuously shaping the ribs. It will be seen that when this type of conveyor belt co-acts within the grain channel the grain may be packed tightly therein and accelerated at high speed through the trimming machine. The said walls co-operate with the circumferential walls on the drum to give the required effect.

According to a further modification of this invention the conveyor belt is provided with tread or ribs and the rotary drum may consist of the before mentioned driving flanges having between them a resilient surface co-operating with the shaped surface of the conveyor belt. This object may be achieved by utilizing pneumatic motor tires carried by suitable rims between the said driving walls of the rotary drum, the treads of the tires forming with the belt the boundary of the channel within which the grain is accelerated.

I am aware that transverse ribs have been used in grain throwers but these tend to impact and

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damage the grain whereas the sinuous longitudinal ribs while assisting acceleration do not give rise to this difficulty nor do they break up the stream as is the case with transverse ribs.

In order however, that the invention may be more clearly understood, it will now be described with reference to the accompanying drawings in which—

Fig. 1 is a central sectional elevation of a grain trimming device in accordance with this invention,

Fig. 2 is a plan view of a grain trimming device in accordance with this invention,

Fig. 3 is an end elevational section as on line 3—3 of Fig. 1,

Fig. 4 is an end elevation of one type of rotary drum illustrating a portion of the conveyor belt upon the drum,

Fig. 5 illustrates a modified form of a rotary drum and conveyor belt,

Fig. 6 illustrates a further modified form of a rotary drum and conveyor belt, and

Fig. 7 illustrates a deflector nozzle which may be carried upon the frame adjacent the grain outlet from the conveyor belt.

Referring first to Figures 1, 2, 3 and 4, a trimming device in accordance with this invention is illustrated in which the frame of the device consists of a pair of side plates 8 positioned apart by means of a series of dividing bolts 9 and completely housed by an outer housing 10 which is only illustrated in Fig. 1. Carried upon the upper portion of the frame is a driving motor 11 which is not shown sectioned in Fig. 1 and which is mounted on a frame 12 pivotally carried upon the main frame so that its overhung weight will apply tension to the driving belt.

Carried by the side plates 8 is the shaft 14 extending transversely between the plates and held on the same by means of nuts 15 which may be locked in position thereon. Carried upon the shaft 14 is the rotary drum 16 which consists of annular plates 17 having central bosses 18 within each of which is housed the ball-race bearings 20 for the shaft 14. The ball-race bearings 20 are completely sealed in the bosses 18 by means of a plate 22 on each boss 18, the plate 22 extending outwardly a short distance from the bosses 18 to provide a dividing or positioning means to ensure that the rotary drum 16 will be correctly aligned between side plates 8. The annular plates 17 each has a driving flange 24 extending outwardly from them and they are joined together by means of the annular surface 25 to form the rotary drum 16 with a pair of driving flanges 24, between which is a circumferential grain channel 27.

Positioned within the grain channel 27 are a series of sinuously shaped or corrugated walls 28 extending outwardly from the surface 25 approximately to the level of the driving flanges 24.

Carried upon the forward end of the frame formed by the side plates 8 is a roller 31 carried upon a shaft 32 which is held between the side plates 8 in the same manner as the rotary drum 16. The shaft 32, however, is carried in a vertical slot 34 so that by untightening the nuts 33 carrying the roller, the shaft 32 may be moved upwardly or downwardly with respect to the side plates 8. Carried by the side plates 8 are a pair of brackets 35 extending outwardly and supporting screwed shafts 36 having lock nuts 37 arranged to provide a means of adjusting the shaft 32 in the slot 34 when the nuts 33 are unloosened. When adjustment has been made the nuts 33

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are tightened to hold the roller 31 in the required position.

Carried upon the rear lower corner between the side plates 8 is a further roller 38 mounted in a similar manner to the roller 31 but arranged to be adjustable in an inclined direction in a slot 39.

A driving roller 40 is carried in sealed bearings 41 to allow the pulley 44 to drive the shaft 45 carrying the roller 40. The pulley 44 is preferably of the multiple V type and is coupled by V belts 47 to the driving motor 11.

Extending around the driving pulley 40, the loose pulleys 38 and 31, and partially around the driving flanges 24 of the rotary drum 16, is an endless conveyor belt 50 which is of such a length that by suitably adjusting the rollers and the drum 16 it will be held taut around its circuit so that the rotation of the driving pulley 40 will be conveyed to the rotary drum 16. Positioned upon the upper surface of the main frame is a feed chute 52 preferably circular in shape at its upper end and being shaped down to a substantial square shape at its lower portion 53. The square section is arranged to have the same area as the corresponding circular portion of the feed chute. Carried upon the lower end of the feed chute is a shaped shoe 54 having a curved portion conforming substantially to the contour of the driving flanges 24 adjacent the channel 27 so that grain passing downwardly through the feed chute will be packed into the channel 27 between the corrugated ribs 28.

In operation, grain is fed continuously from the chute 52 to the channel 27 where it is packed tightly between the walls 28, and the high speed of rotation of the conveyor belt 50 and the drum 16 will carry the grain around in the direction indicated in Fig. 1 to deflect it outwardly through the opening 63.

Referring now to Fig. 5, a modification of the invention is illustrated in which the rotary drum 16 is constructed in a similar manner to that described heretofore. The conveyor belt 50 has a series of outwardly projecting, corrugated walls 64 adapted to co-act with the corrugated walls 28 of the drum 16 to form pockets within which the grain may be packed to ensure that it is deflected by the drum 16 without any substantial "slip" between the grain and the moving conveyor and drum.

Referring now to Fig. 6 a further modification of the invention is illustrated in which the conveyor belt 50 has the outwardly extending walls as illustrated in Fig. 5 which co-act with tread upon the pneumatic tires 55 which has supporting rims 56, the unit thus formed being constructed from normal type of vehicle wheels. The dished surface 57 carrying the rims 56 is bolted to the annular plates 17 carrying the driving flanges 24. The dished surfaces 57 are carried upon a sleeve 58 secured to the one annular surface 17 and the other annular surface 17 has an inwardly projecting annular surface 59 fitting within the sleeve 58. Carried between the pair of wheels is an annular plate 60 which forms a dividing piece between the pneumatic tires 55. The bosses 18 carried by the annular plate 17 are similar to the rotary drums shown in the other modification and the shaft 14 is carried between the side plates in a similar manner. It will be seen that the conveyor belt 50 having the outwardly extending ribs 64 may co-act with the tread on the pneumatic tires 55 to provide the required pockets in the channel

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27 to convey the grain around the surface of the drum and deflect it outwardly. The advantage of utilizing the pneumatic tires is that a resilient surface is obtained which may be adjusted by inflating or deflating the tires to the required degree. It will be appreciated that with a particular shaped tread upon the pneumatic tires 55 co-acting with the walls 64, good gripping surface may be obtained between the conveyor belt 50 and the drum 16 so that the grain may attain the velocity of rotation to the drum 16 without material "slip."

Referring now to Fig. 7 a deflector nozzle is illustrated which consists of an outer tapered housing 61 which may be constructed of stainless steel or other suitable material which will provide a minimum resistance to the passage of the grain. Positioned upon the leading end of the housing 61 is a short flexible hose 62 which may be bent manually to the required angle so that if the trimming device is fixed the grain may be deflected for a short distance at an angle to the movement of the conveyor belt 50. Referring to Fig. 1, it will be seen that the outer housing 61 may be secured upon the outlet 63 and provides a means of directing the grain passing outwardly through same.

What I claim is:

1. An improved device for handling grain comprising a rotary drum, a circumferential channel in the said drum, an endless belt passing around rollers and extending partially around the periphery of the said drum, means to feed grain to the said channel, and circumferentially positioned sinuously shaped walls in the channel.

2. An improved device for handling grain comprising a rotary drum, a circumferential channel in the said drum, an endless belt passing around rollers and extending partially around the periphery of the said drum, means to feed grain to the said channel, and circumferentially positioned sinuously shaped walls secured to the drum in the channel thereof dividing the channel into a series of annular sections.

3. An improved device for handling grain comprising a rotary drum, a circumferential channel in the said drum, an endless belt passing around rollers and extending partially around

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the periphery of the said drum, means to feed grain to the said channel, and circumferentially positioned sinuously shaped walls extending from the said belt and projecting into the said channel and dividing the channel into a series of annular sections at the location where the grain is carried.

4. An improved device for handling grain comprising a rotary drum, a circumferential channel in the said drum, an endless belt passing around rollers and extending partially around the periphery of the said drum, means to feed grain to the said channel, circumferentially positioned sinuously shaped walls secured to the drum in the channel thereof dividing the channel into a series of annular sections, and longitudinal sinuously shaped walls on the said belt positioned to fit between the said walls on the said drum.

5. An improved device for handling grain comprising a rotary drum, a circumferential channel in the said drum, an endless belt passing around rollers and extending partially around the periphery of the said drum, means to feed grain to the said channel, circumferentially positioned shaped walls dividing the channel into a series of annular sections, and motor tyres forming the bottom of the said circumferential channel.

SAMUEL WALTER LUCAS.

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