Feb. 1, 1944. J. L. CLARKSON 2,340,509

CONVEYER DRIVE FOR LOADING MACHINES

Filed Dec. 22, 1942 2 Sheets-Sheet 1

FIG. 1.

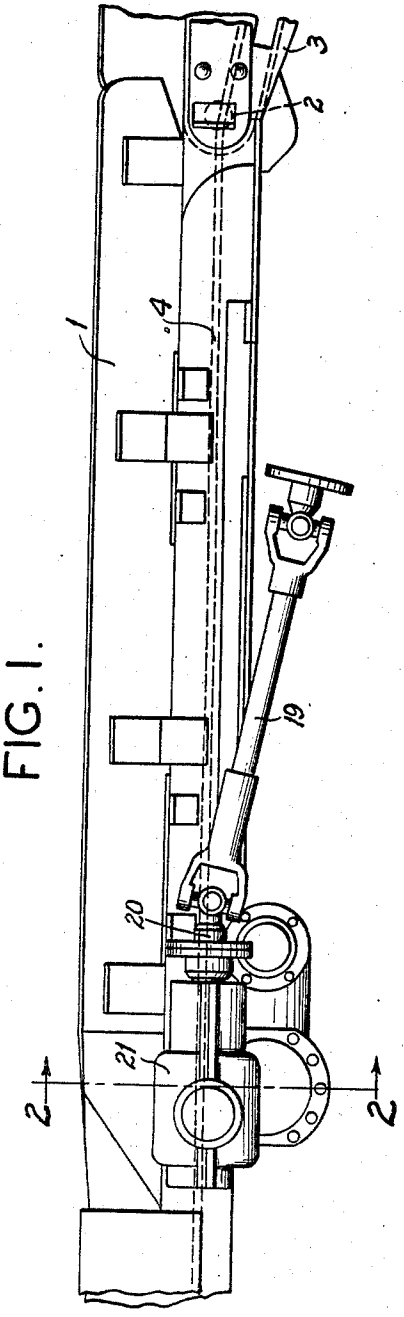
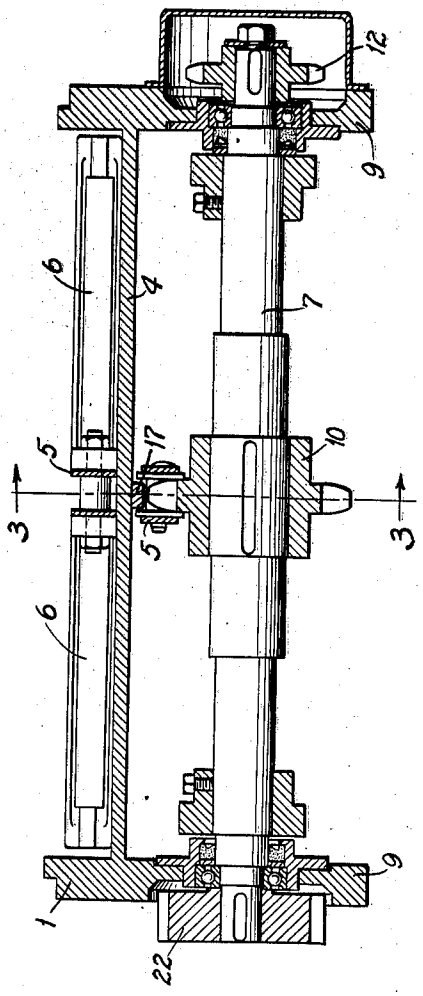


FIG. 2.



INVENTOR;
JOHN L. CLARKSON
BY
Brumbaugh & Sutherland
ATTORNEYS

Feb. 1, 1944. J. L. CLARKSON 2,340,509

CONVEYER DRIVE FOR LOADING MACHINES

Filed Dec. 22, 1942 2 Sheets-Sheet 2

FIG. 3.

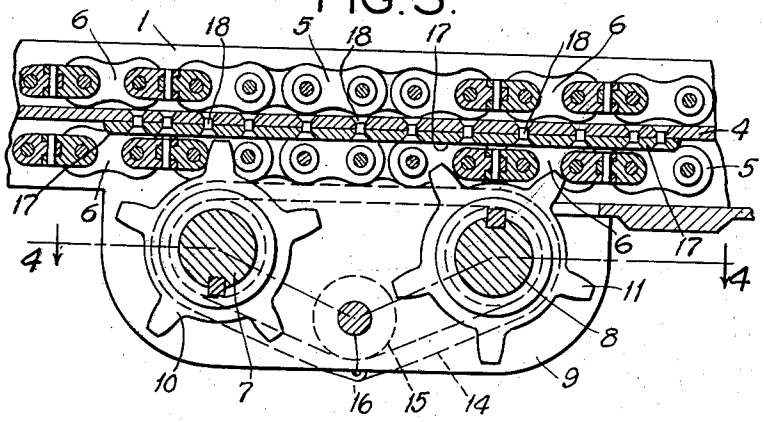
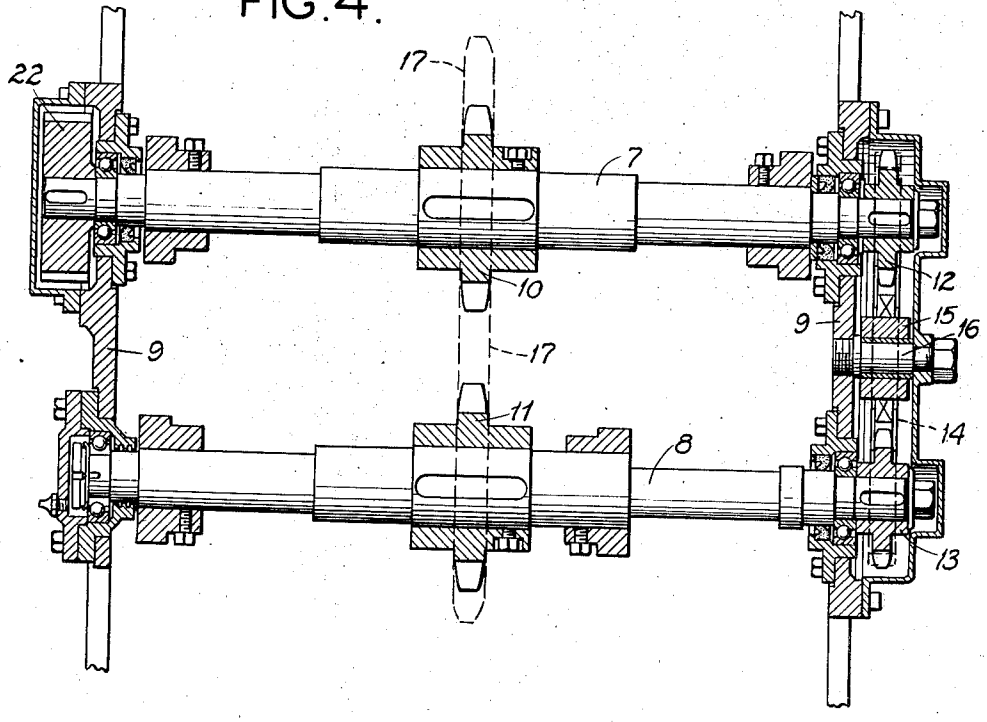


FIG. 4.



INVENTOR;
JOHN L. CLARKSON
BY Brumbaugh & Sutherland
ATTORNEYS

Patented Feb. 1, 1944

2,340,509

UNITED STATES PATENT OFFICE

2,340,509

CONVEYER DRIVE FOR LOADING MACHINES

John L. Clarkson, Nashville, Ill.

Application December 22, 1942, Serial No. 469,853

8 Claims. (Cl. 198—203)

This invention pertains to loading machines, such as are used in coal mines for loading coal on to mine cars, and particularly to machines designed for use in low entries. More specifically, the invention pertains to a conveyer drive for such a loading machine.

Where coal loading machines have been used to mine coal which occurs in low veins, many difficulties of construction have been encountered on account of the restriction in vertical space available for the machine. The organization of such a loading machine is usually such that the material is gathered from in front of the machine and elevated by a conveyer to pass over the machine to the rear thereof. A delivery conveyer extends beyond the rear of the machine and over the front wall of a mine car, so as to carry the material to the rear of the machine and deposit it in the car. It is usually desirable to have the delivery conveyer adjustable vertically to accommodate different heights of mine cars, and to take advantage of all the vertical space available in entries of different heights. However, when the lowest coal veins are encountered, the conveyer must be lowered accordingly. As the movable conveyer structure must carry certain mechanisms among which is a drive mechanism for driving the conveyer chain, the vertical space occupied by any such mechanism must be reduced to a minimum in order to meet the space restrictions imposed by low coal.

In accordance with this invention, an improved drive for the conveyer chain is provided which is organized to occupy a minimum vertical space.

An important object of the invention, therefore, is to provide a conveyer drive which will not only occupy a minimum vertical space, but which will have ample power and a positive driving engagement with the conveyer chain.

A further object of the invention is to provide such a drive, which will be simple in construction and rugged in service.

Further objects will appear from the following description taken in connection with the accompanying drawings in which Figure 1 is a side view of a part of a loading machine embodying this invention showing a portion of the delivery conveyer including driving means embodying this invention. Figure 2 is a section one line 2—2 of Figure 1, and Figure 3 is an enlarged section taken on line 3—3 of Figure 2. Figure 4 is a section on line 4—4 of Figure 3.

Referring to the drawings, 1 indicates generally the delivery conveyer of a loading machine. In the machine illustrated in Figure 1, the conveyer 1 is pivoted about at 2 on the chassis of the machine indicated at 3, the chassis itself not being shown. The conveyer 1 may be of any suitable structure and means are usually provided for raising and lowering the conveyer on its hinge at 2. These devices are not shown in the drawings as they form no part of the present invention.

The conveyer 1 usually includes a bed or bottom plate 4 over which a conveyer chain 5 is arranged to move. The chain 5 is usually provided with transverse flights 6 extending across the bed 4, and adapted to carry the material along that bed as the chain moves therealong. The movement of the chain is in a direction to the rear of the machine, so as to carry the material to cars placed behind it. In Figure 1 the movement is toward the left for the upper run of the chain upon the bed 4. At the rear end of the conveyer 1, the chain passes around a pulley or roller and then returns underneath the bed to the front end where it passes around a similar pulley or roller. Thus, the chain is endless and when driven moves continually along the bed 4.

In accordance with this invention, driving means are arranged to engage the return run of the conveyer chain below the bed 4. In the embodiment illustrated two drive shafts 7 and 8 are arranged below the bed 4 and extending transversely thereof. These shafts are journaled in suitable bearings in side plates 9 on the conveyer 1 and extending below the bed 4. These shafts are positioned at a point of the conveyer where the return run of the chain 5 may be straight along the underface of the bed 4. In the embodiment illustrated the conveyer has a single chain in the middle thereof and the flights 6 extend laterally in both directions therefrom. The invention may, however, be applied to other types of conveyers, including those having two chains, one at each side of the bed 4 with the flights extending therebetween. Each of the shafts 7 and 8 carries a small sprocket designated 10 and 11, respectively. These sprockets are of the same size and number of teeth, and are both arranged for driving engagement with the lower run of the chain 5 as it passes along the underside of the bed 4.

The shafts 7 and 8 are connected together by a driving connection, such as to insure that they will rotate in the same direction and at the same speed. In the embodiment shown this is accomplished by providing each of these shafts with a second sprocket indicated at 12 and 13 for the shafts 7 and 8, respectively. These are

also small sprockets preferably smaller than the sprockets 10 and 11. They are connected together by a chain 14, which provides the driving connection between them. As the chain 14 may be long enough to slip over the teeth of one sprocket while engaged with the other, in order to put the chain on the sprockets, means for maintaining this chain taut are provided by a roller 15 on a stub shaft 16 suitably mounted on the plate 9. This roller may be of such a size as to keep the chain 14 sufficiently taut to maintain a fixed timing between the teeth of the sprockets 10 and 11. These sprockets are mounted on the shafts 7 and 8 in such relative positions that their teeth engage the chain 5 in staggered relation with each other. By this is meant that a tooth of one of these sprockets will be in full driving engagement with the chain 5 when a tooth of the other sprocket is entering or leaving engagement with the chain. These relative positions are illustrated in Figure 3. This timing relation is such as to insure that there will always be full driving engagement of the chain with either one or the other of the sprockets 10 and 11.

As the sprockets 10 and 11 engage the chain 5 at a position on the conveyer 1, where said chain has a substantially straight run, it is desirable to provide means to insure against any possibility of the chain jumping over the teeth of the sprockets. For this purpose a backing shoe or rail 17 is secured to the underside of the bed 4 in any suitable manner as by means of rivets 18. In the embodiment shown the shoe 17 has the form of a straight strip or narrow plate secured to the bed 4 and positioned directly over the path of the chain 5. The width of the shoe 17 is preferably such that it will pass between the side flanges of the links of the chain 5, as shown in Figure 2. By this arrangement the shoe serves as a guide to maintain the chain laterally in a straight run properly aligned with the sprockets 10 and 11. The shoe, therefore, is placed not only in a laterally-guiding relation to the chain, but in a backing or retaining relation, such as to prevent any tendency for the chain to ride over the teeth of the driving sprockets.

The shafts 7 and 8, with their sprockets 10 and 11, thus operate to drive the conveyer chain 5. This drive is itself driven from suitable power means, not shown, located on the loader chassis, through the agency of driving connections, including a telescoping shaft 19 universally jointed at both ends, a short shaft 20 and gearing 21 of any suitable type which includes a gear 22 on one of the shafts 7 or 8, in the embodiment illustrated on the shaft 7. The driving effort is thus delivered to the shaft 7 and by it, through the chain 14 to the shaft 8. Accordingly, both shafts 7 and 8 are active in driving the chain 5.

It will be seen that this invention provides a drive which is simple and effective for driving the conveyer chain. By placing both the shafts 7 and 8 closely adjacent the bed 4 and providing small sprockets 10 and 11, the drive is reduced to minimum vertical dimensions consistent with strength. While ordinarily a small sprocket, such as 10, would not be practical for driving a chain by engaging a straight run thereof, for the reason that at certain points in its revolution the engagement of the teeth with the chain may be uncertain, by the provision of a plurality of such sprockets with their teeth arranged in staggered relation and driven in unison, a positive drive is assured. This arrangement of a plurality of small sprockets, engaging the chain at a straight run thereof, eliminates the usual bend in the chain to pass it around the driving sprocket with an idler to keep it in engagement with the sprocket, which has been the usual driving arrangement heretofore. Accordingly, not only the uncertain driving engagement of this looped arrangement is avoided, but the vertical space occupied thereby is greatly reduced. The provision of the backing shoe 17 eliminates the only uncertainty encountered in a drive in which a sprocket engages a straight run of the chain, namely, the danger of the chain jumping over the teeth of the sprocket. This shoe not only guides the chain surely into correct engagement with the sprockets, but maintains it in proper driving engagement throughout that part of its run during which it is engaged with the driving sprockets.

While a preferred embodiment of the invention has been illustrated in the drawings, it will be understood that various changes may be made in the details of construction within the scope of the appended claims without departing from the spirit of this invention, and it is understood, therefore, that the invention is not limited to the specific details shown and described.

Having thus described the invention, what is claimed is:

1. In a loading machine of the character described designed to operate in low entries having a conveyer including a conveyer bed and a flexible chain movable therealong, a conveyer drive comprising, means providing a substantially straight run for said chain along and below said bed, a plurality of drive shafts closely adjacent said chain at said straight run, small sprockets on said shafts having teeth meshing with said chain in staggered relation to each other, other small sprockets on said shafts, a driving chain connecting said other sprockets to drive one at the same speed and in the same direction of rotation as the other, means for maintaining said last chain taut, and means associated with said bed adapted to retain said first chain in driving engagement with said first sprockets.

2. In a loading machine of the character described designed to operate in low entries having a conveyer including a conveyer bed and a flexible chain movable therealong, a conveyer drive comprising, means providing a substantially straight run for said chain along and below said bed, a plurality of drive shafts closely adjacent said chain at said straight run, driving means arranged to drive said shafts in the same direction of rotation, small sprockets on said shafts having teeth meshing with said chain, and a backing shoe on said bed extending along said straight run in laterally-guiding relation to said chain and positioned to retain said chain in driving engagement with said sprockets.

3. In a loading machine of the character described designed to operate in low entries having a conveyer including a conveyer bed and a flexible chain movable therealong, a conveyer drive comprising, means providing a substantially straight run for said chain along and below said bed, a plurality of drive shafts closely adjacent said chain at said straight run, driving means arranged to drive said shafts in the same direction of rotation, small sprockets on said shafts having teeth meshing with said chain, and a backing shoe on said bed extending along said straight

run adapted to retain said chain in driving engagement with said sprockets.

4. In a loading machine of the character described designed to operate in low entries having a conveyer including a conveyer bed and a flexible chain movable therealong, a conveyer drive comprising, means providing a substantially straight run for said chain along and below said bed, a plurality of drive shafts closely adjacent said chain at said straight run, driving means arranged to drive said shafts in the same direction of rotation, small sprockets on said shafts having teeth meshing with said chain, and means associated with said bed providing a backing for said chain to retain the same in driving engagement with said sprockets.

5. In a loading machine of the character described designed to operate in low entries having a conveyer including a conveyer bed and a flexible chain movable therealong, a conveyer drive comprising, means providing a substantially straight run for said chain along and below said bed, a plurality of drive shafts closely adjacent said chain at said straight run, driving means arranged to drive said shafts in the same direction of rotation, small sprockets on said shafts having teeth meshing with said chain, and means associated with said bed adapted to retain said chain in driving engagement with said sprockets.

6. In a loading machine of the character described designed to operate in low entries having a conveyer including a flexible chain, a conveyer drive comprising, means providing a substantially straight run from said chain, a plurality of drive shafts closely adjacent said chain at said straight run, driving means arranged to drive said shafts in the same direction of rotation and at the same speed, small sprockets on said shafts having teeth meshing with said chain but in staggered relation to each other, and backing means to retain said chain in driving engagement with said sprockets.

7. In a loading machine of the character described designed to operate in low entries having a conveyer including a flexible chain, a conveyer drive comprising, means providing a substantially straight run for said chain, a plurality of drive shafts closely adjacent said chain at said straight run, driving means arranged to drive said shafts in the same direction of rotation and at the same speed, and small sprockets on said shafts having teeth meshing with said chain but in staggered relation to each other.

8. In a loading machine of the character described designed to operate in low entries having a conveyer including a flexible chain, a conveyer drive comprising, means providing a substantially straight run for said chain, a plurality of drive shafts closely adjacent said chain at said straight run, driving means arranged to drive said shafts in the same direction of rotation, and small sprockets on said shafts having teeth meshing with said chain.

JOHN L. CLARKSON.