

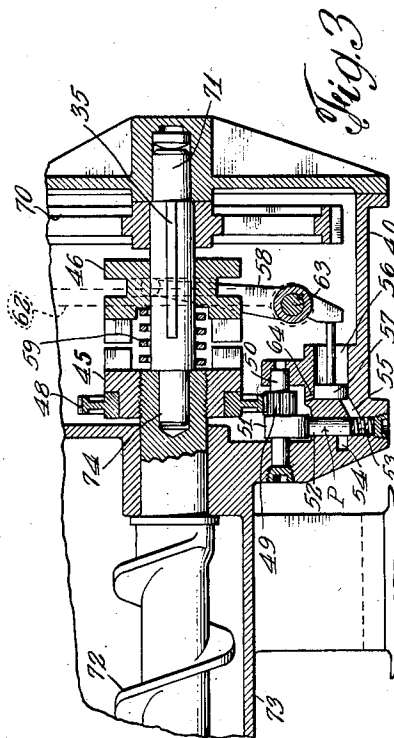
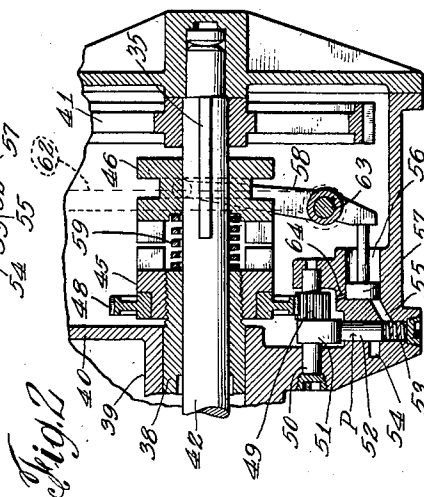
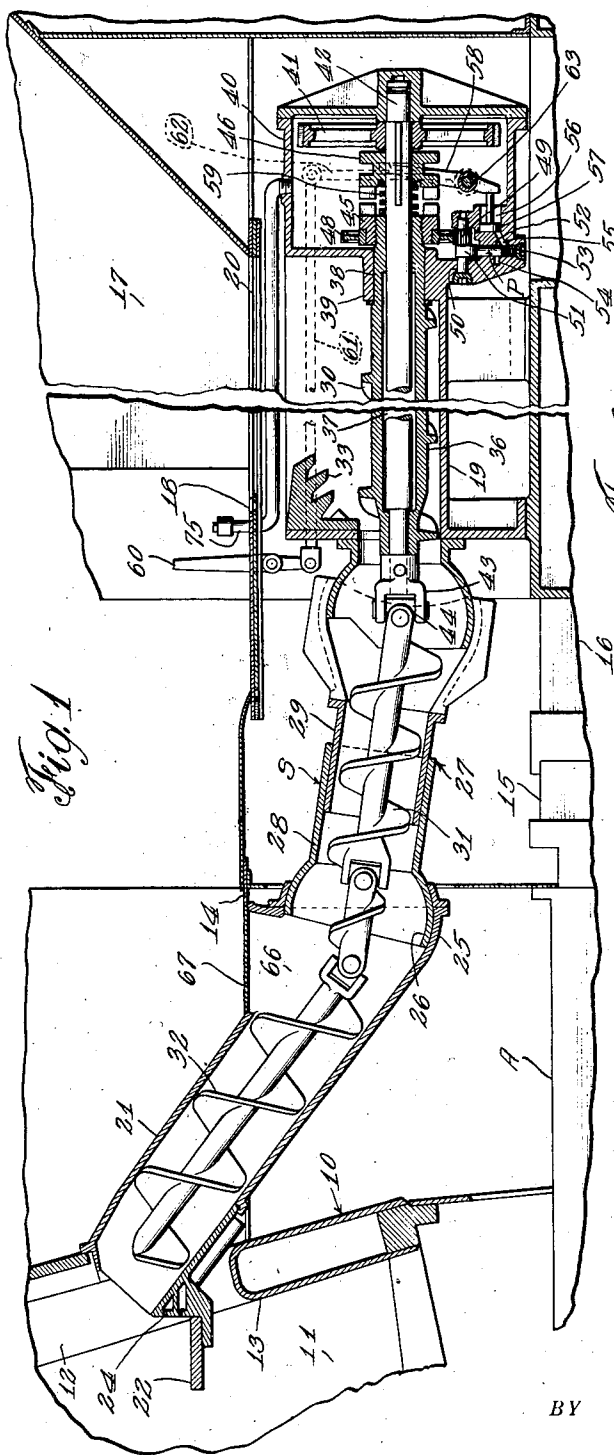
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STOKER MECHANISM

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BY

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## UNITED STATES PATENT OFFICE

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## STOKER MECHANISM

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mesne assignments, to The Standard Stoker  
Company, Inc., New York, N. Y., a corpora-  
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8 Claims. (Cl. 198—15)

My present invention appertains generally to drive mechanism and more particularly to drive mechanism for stokers of the type which employ a series of screw conveyors connected in end to end relation. A stoker of this type is illustrated in my copending application Serial No. 638,451, filed October 19, 1932 for Stoker mechanism, to which copending application the present one is related. This application has matured into Patent No. 1,957,680 dated May 8, 1934.

An important object of this invention is to provide in a mechanism comprising driving and driven members which are normally in driving relation with each other, power means which is actuated by the driven member when the latter is in operation, the power means being capable of maintaining these members in their driving relation, which members are arranged to be disengaged from their operative relation upon a substantial reduction in the speed of the driven member.

Another object of this invention is to provide in conveying mechanism having a plurality of conveying screws, a drive mechanism which automatically interrupts the operation of one of the screw sections during the continued operation of the remainder of the screw sections.

It is also an object of this invention to provide in stokers having several of their screw sections in end to end relation, a drive mechanism which automatically interrupts the operation of one of the screw sections during the continued operation of the remainder of the screw sections.

A further object of this invention is the provision in stokers of the type specified and during such times when a clog occurs, of means for automatically disconnecting the clogged portion of the screw from driving relation with the remainder of the connected screw sections whereby the last named screw sections may be operated, and the provision of means for supplying fuel manually to the screw sections so operated.

It is also an object of this invention to provide in stokers having a drive mechanism as specified above, of hydraulic means for effecting the automatic disconnection of the clogged portion of the screw conveyor from its driving relation with the remainder of the connected screw sections.

A more specific object of this invention is the provision in a driving unit which is encased in a suitable oil containing housing and having a driving member and a driven member normally in driving engagement with each other, of means operable by one of said members which dis-

connects said members from driving engagement when the oil in the housing reaches a predetermined low level.

Other objects reside in the novel arrangement of parts and in their combination one with another in a manner which will now be described in the following specification accompanying the drawing, in which

Figure 1 is a central vertical longitudinal section through the adjacent portions of a locomotive and tender showing the invention in similar section applied to a locomotive stoker;

Figure 2 is an enlarged fragmentary view of a portion of Figure 1; and

Figure 3 is a view similar to Figure 2 showing a modified form of the invention shown in Figures 1 and 2.

On the drawing, A designates the locomotive having a boiler 10 which is provided with a fire-box 11, a firing opening 12 in the backwall 13 and the cab deck 14. Coupled to the locomotive as at 15 is a tender 16 having a fuel bunker 17 disposed above the floor 18 thereof. The stoker utilized for the purpose of describing my invention in one embodiment is generally indicated by S and includes a trough 19 mounted below the fuel bunker 17 to receive fuel through an aperture 20 in the floor 18. Mounted on the locomotive A is a riser conduit 21 which is in communication with the lower portion of the firing opening 12 and delivers fuel upon the distributor plate 22, which, in conjunction with a pressure fluid head 24, projects fuel over the firebed. At its lower end, the riser conduit is provided with a spherical seat 25 for receiving a ball member 26 of the intermediate conduit 27. The intermediate conduit comprises the telescopically related sections 28 and 29, the section 28 being flexibly connected with the riser conduit 21, while the section 29 is flexibly connected to the trough 19. Housed within the trough, intermediate conduit and riser conduit are the screw sections 30, 31 and 32 respectively, forming a continuous conveying system. Fuel which drops into the trough 19 is carried forwardly by the screw section 30 therein, oversize lumps being reduced by a crusher 33, and then the fuel is conveyed forwardly and upwardly by the remainder of the conveying screw system to the distributor plate 22 for distribution over the fire.

The screw section 30 comprises a hub 36 which is hollowed throughout its length as at 37 and has a rearward portion 38 journaled in a bearing 39 of the gear case 40. Housed within the gear case 40 is a gear 41 driven by a suitable inter-

meshing pinion (not shown). The gear 41 is operatively mounted upon a shaft 42 which passes through the hollowed screw hub 36 and extends beyond the forward end of the screw 30 to receive a jaw 43 forming one element of a universal joint 44 which connects the screw sections 30 and 31. Threaded on the rearward portion 38 of the screw 30 and rigidly fixed thereto is a clutch member 45 which is normally engaged by a clutch member 46 slidably mounted on the key 35 of the shaft 42.

The stoker and the drive mechanism described thus far are of the same construction as in my United States Letters Patent 1,957,680; the present invention contemplates the shifting of the clutch member 46 out of engagement with the clutch member 45 by automatic means which functions when the operation of the screw conveying system is interrupted due to a piece of tramp iron or other foreign matter lodging between the flights of the screw 30 and the crusher 33.

Secured to the clutch member 45 is a gear 48 which meshes with a small pinion 49 for rotating the shaft 50. The shaft 50 has formed therewith a cam 51, the rotary movement of which causes reciprocating movement of the plunger 52 against the tension of a spring 53. A lubricant such as oil is contained within the gear case 40 and its level should always be maintained somewhat above the lowermost limit of the gear 41. In approximate alignment with the low oil level of the gear case 40 is a port 54 which admits oil into the pump P, the oil thus admitted is forced therefrom by the plunger 52 through the passage 55 into a cylinder 56. Mounted within the cylinder 56 is a piston 57 which will be moved to the right when oil is forced into the cylinder; such movement of the piston 57 will cause movement of the shifting yoke 58, thereby causing the clutch member 46 to engage the clutch member 45 against the tension of the spring 59. Thus it will be seen that as long as a head of oil exists in the cylinder 56, the clutch members 45 and 46 will be in engagement and the entire conveying screw system will be in operation.

In order to operate the entire screw conveying system, the fireman starts the stoker driving engine in order that the gear 41 may be rotated; he then grasps the lever 60 at the forward end of the tender and pushes it toward the rear of the tender. This will cause the link 61 to move the arm 62 which is keyed to the shaft 63, to which shaft the shifting yoke 58 is also keyed, and thus this yoke will shift the clutch member 46 into driving engagement with the clutch member 45. Motion will then be transmitted to the screw 30 through this clutch member and also the gear 48 will rotate the small pinion 49 at a high rate of speed so that the pump P will quickly develop sufficient oil pressure within the cylinder 56 for retaining the clutch members 45 and 46 in driving relation. It will of course, be understood that the fireman need only push against the lever 60 for a moment, as the pressure within the cylinder 56 will be developed almost instantaneously, and the piston 57 will retain the clutch members in driving engagement.

When a piece of tramp iron or other foreign material becomes lodged between the flights of the screw 30 and the crusher 33, the entire screw conveying system will stall. It will be evident that the oil pump P will also stop and no longer force oil into the cylinder 56. The spring 59 will then gradually move the clutch member 46 to the

right, which in turn will cause the piston 57 to move toward the pump P, the oil in the cylinder 56 being forced out through the bleed port or vent 64. During the normal operation of the stoker, the excess oil which is forced into the cylinder 56 discharges through the vent 64 and sprays the gear 48 and the other driving mechanism which is above the oil level of the gear case 40. By making this vent 64 smaller or larger, the time required for the spring 59 to disengage the clutch 46 from the clutch member 45 will be proportionately increased or decreased.

When the clutch member 46 is no longer in driving engagement with the clutch member 45, the shaft 42 will then be free to turn and thus transmit motion to the screws 31 and 32 through the medium of the universal joint jaw member 43 which is secured to the forward end of the shaft 42. Fuel which is within the conduits 27 and 21 will then be conveyed to the distributor by the screws 31 and 32 and the amount of fuel contained in these conduits will usually be sufficient to maintain a good fire in the firebox while the fireman is occupied with the removal of the clog. In the event that the clog is of a nature which requires a great deal of the fireman's time, a hopper 66 is provided in the riser conduit 21 and by removing the cover 67, the fireman can shovel a quantity of coal into this hopper and thereabove so that he can resume his efforts in relieving the clog. Upon removing the clog, he places the lever 60 in a position to cause engagement of the clutch members 45 and 46 and the stoker will then operate normally. It will be apparent to those skilled in the art that by the described construction the stoker will deliver coal to the distributor with but a slight interruption in its operation when a clog stalls the stoker, such delivery of coal being accomplished by the automatic clutch disengaging means in the gear case 40.

The relation of the port 54 of the oil pump P with the "low oil level" in the gear case is also of advantage in that the oil pump P functions as a governing device which will disengage the clutch members 45 and 46 at such times when the oil in the gear case 40 goes below the port 54. It is obvious that when no more oil is supplied to the oil pump P, the head of oil in the cylinder 56 will be reduced causing the spring 59 to disengage the clutch member 46 from driving engagement with the clutch member 45. In this manner, the stoker is made inoperative when oil is lacking in the gear case, thereby eliminating the danger of wearing away of valuable drive mechanism when the proper oil level is not maintained. By replenishing the gear case 40 with oil through the pipe 75 and engaging the clutch members 45 and 46, the stoker will operate normally.

In Figure 3 I have shown a modification of this phase of my invention. A gear such as 70 may drive the shaft 71 which may also be termed a power or driving member while the screw conveyor or driven member 72 is disposed in the trough 73. The drive shaft 71 is journaled within this screw as at 74, but does not need to pass through this screw as does the shaft 42 of the preferred construction. Clutch members 45 and 46 are each in the same relation with the screw 72 and the drive shaft 71 respectively as in the preferred form, as are also the other elements of the oil pump P and hence, further reference thereto is not necessary. As in the preferred form, when the oil level goes below the port 54, the pump P can no longer force oil into the cyl-

inder 56 for maintaining the clutches 45 and 46 in engagement and hence the stoker will not operate. While I have described this phase of my invention in connection with the shaft which directly drives the conveyor screw 12, it is capable of use in connection with the other shafts of the stoker drive mechanism or with similar elements of various types of machines.

From the foregoing it will be apparent to those skilled in the art that I have devised a structure which is useful not only in conjunction with stokers and drive mechanism therefor but also with other mechanism. The following claims define my invention.

I claim:

1. A conveying system, comprising a pair of rotatable conveyors, drive mechanism for operating said conveyors including a rotatable driving member in operative driving relation with one of said conveyors, said driving member and the other of said conveyors being normally in operative driving relation, power means responsive to operation of said last named conveyor for maintaining the driving relation between said driving member and such last named conveyor, said power means including a rotatable element arranged to be operated at a higher rate of speed than the last named conveyor, and means responsive to a reduction in the speed of said last named conveyor for causing such conveyor to become disengaged from its driving relation with said member.

2. A conveying system having a receiving portion and a delivery portion, means for urging the material through said system from the receiving portion to the delivery portion including a rotatable conveyor in the receiving portion and a rotatable conveyor for urging material to the delivery portion, drive mechanism for said conveyors including a rotatable driving member in operative driving relation with the conveyor of said delivery portion, said driving member and the conveyor of said receiving portion being normally in operative driving relation, power means responsive to operation of the last named conveyor for maintaining the driving relation between said driving member and such last named conveyor, said power means including a rotatable element arranged to be operated at a higher rate of speed than the last named conveyor, and means responsive to a reduction in the speed of said last named conveyor for causing such conveyor to become disengaged from its driving relation with said member, said conveying system at a point in advance of said last named conveyor being provided with a supplemental receiving portion whereby material may be conveyed to the delivery portion of the conveying system by the first named conveyor.

3. A conveying system, comprising a pair of rotatable conveyors, drive mechanism for operating said conveyors including a rotatable driving member in operative driving relation with one of said conveyors, a clutch device normally engaging said driving member and the other of said conveyors for conjoint operation with the first named conveyor, power means responsive to operation of said second named conveyor for maintaining said clutch device in driving relation between the second named conveyor and said driving member, said power means including a rotatable element arranged to be operated at a higher rate of speed than the second named conveyor, and means responsive to a reduction in the speed of the second named conveyor for

causing said clutch device to become disengaged from its driving relation between the second named conveyor and said driving member.

4. A conveying system comprising a pair of conveyors, drive mechanism for operating said conveyors including a driving member in operative driving relation with one of said conveyors, a clutch device normally engaging said driving member and the other of said conveyors for conjoint operation with the first named conveyor, power means for maintaining said clutch device in driving relation between the second named conveyor and said driving member, said power means including a pump operated by said second named conveyor for developing fluid pressure, a cylinder, and a piston in said cylinder, said pump delivering fluid under pressure to said cylinder for moving said piston, such movement of said piston reacting on said clutch device whereby the latter maintains the driving relation between the second named conveyor and said driving member, and means responsive to a reduction in the fluid pressure for causing said clutch device to become disengaged from its driving relation between the second named conveyor and said driving member.

5. A conveying system comprising a pair of conveyor screws, one of said conveyor screws having a hollow hub, drive mechanism for operating said conveyor screws including a driving member passing through the hollow hub of the named conveyor screw and being operatively connected to the other of said conveyor screws, a clutch device normally engaging said driving member and the first named conveyor screw for conjoint operation with the second named conveyor screw, power means for maintaining said clutch device in driving relation between the first named conveyor and said driving member, said power means including a pump operated by said conveyor screw for developing fluid pressure, a cylinder and a piston in said cylinder, said pump delivering fluid under pressure to said cylinder for moving said piston, such movement of said piston reacting on said clutch device whereby the latter maintains the driving relation between the first named conveyor and said driving member, and means responsive to a reduction in the fluid pressure for causing said clutch device to become disengaged from its driving relation between the first named conveyor screw and said driving member.

6. A transferring conduit comprising a lubricant containing gear case mounted at one end thereof, a bearing formed with said gear case, a conveyor screw journaled in said bearing, a drive shaft, a drive gear in said gear case fixed upon said shaft and rotatable therewith, a clutch member slidably mounted on said shaft and rotatable therewith, a clutch member secured to said conveyor screw, a pump responsive to rotation of said conveyor screw, said pump having an intake port at the low level of the lubricant in said gear case, means responsive to pressure of lubricant developed by said pump for retaining said clutch members in engagement, and means for effecting disengagement of said clutch members when the pressure of said lubricant is reduced.

7. The combination including a rotatable driving member and a rotatable driven member normally in driving relation with each other, means actuated by said driven member during operation thereof for maintaining said members in driving relation with each other, said power means including a rotatable element arranged to be operated at a higher rate of speed than said driven

member, and means responsive to a reduction in the speed of said driven member for causing said members to become disengaged from their driving relation with each other.

- 5 8. The combination including a rotatable driving member and a rotatable driven member, a clutch device normally engaging said members for conjoint operation, means actuated by said driven member during operation thereof for maintaining

said clutch device in driving relation between said members, said power means including a rotatable element arranged to be operated at a higher rate of speed than said driven member, and means responsive to a reduction in the speed of said driven member for causing said clutch device to become disengaged from its driving relation between said members.

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