Dec. 23, 1924. 1,520,000

R. E. BAKER ET AL

SAFETY DEVICE FOR CONVEYER MECHANISMS

Original Filed March 21, 1917 2 Sheets-Sheet 1

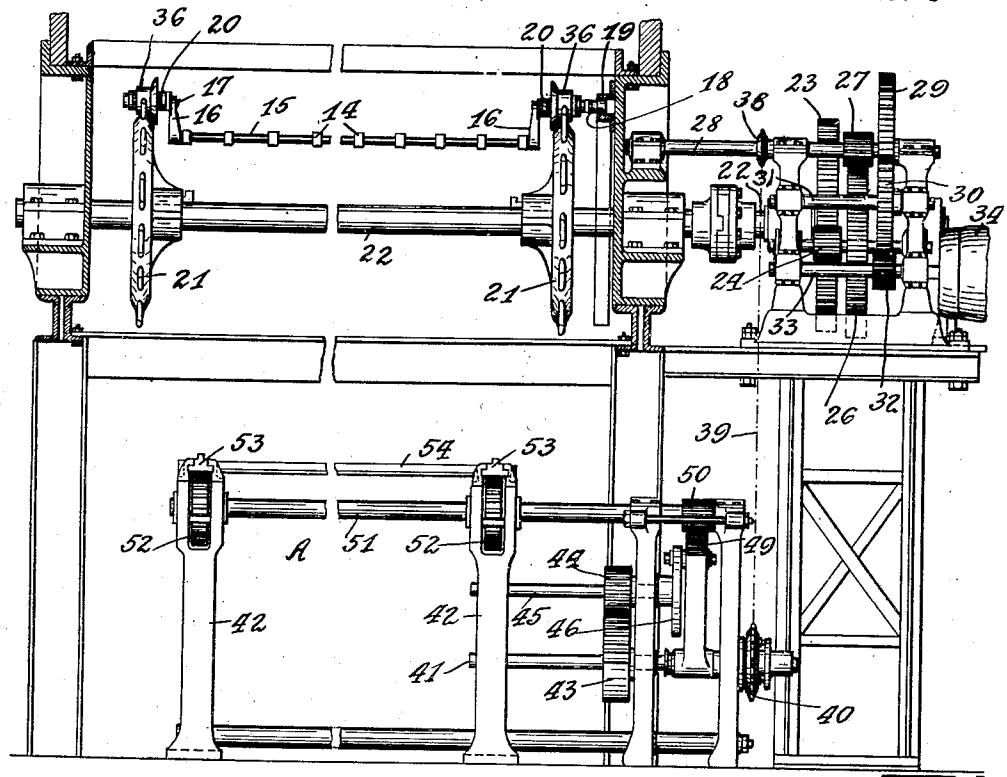


Fig. 1.

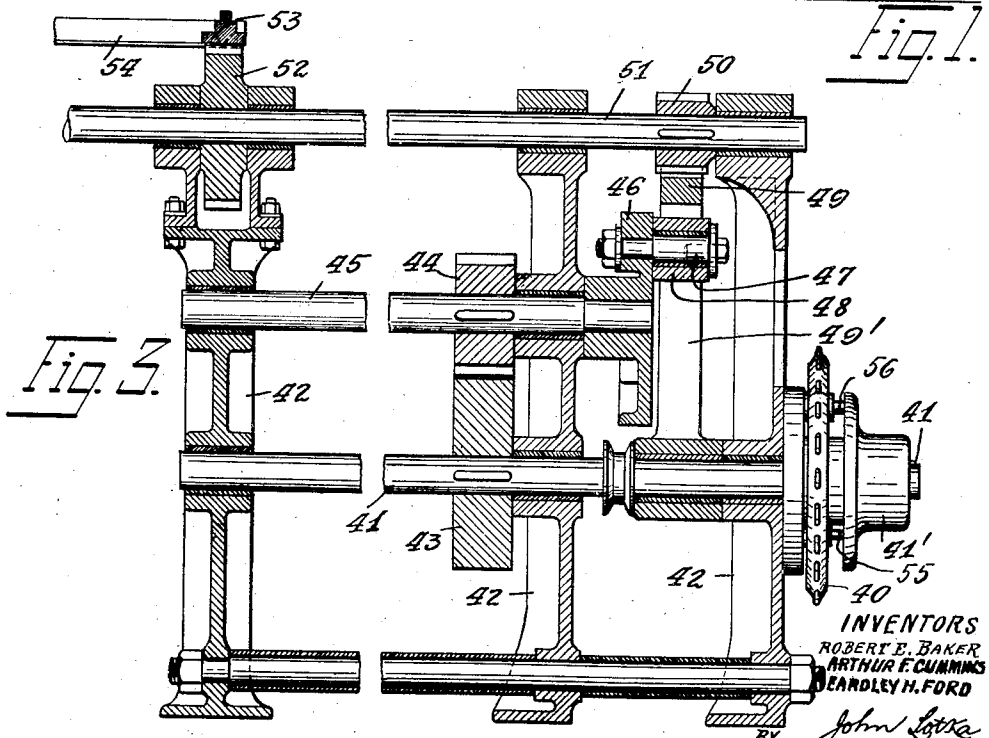


Fig. 3.

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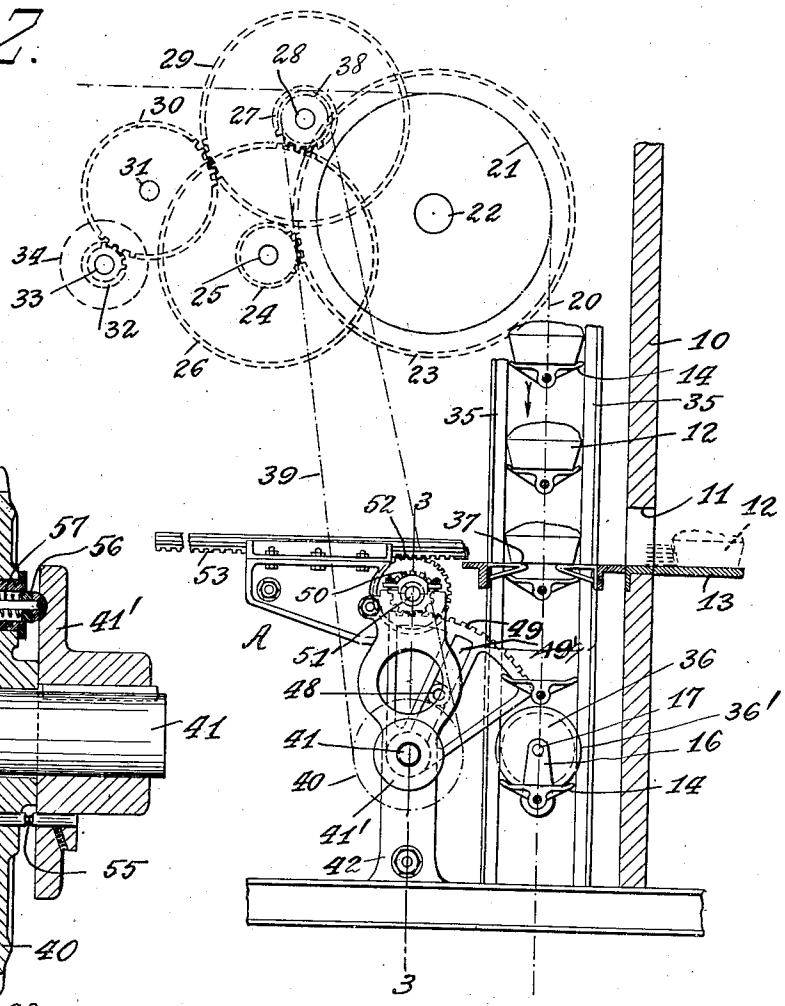
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Fig. 2.



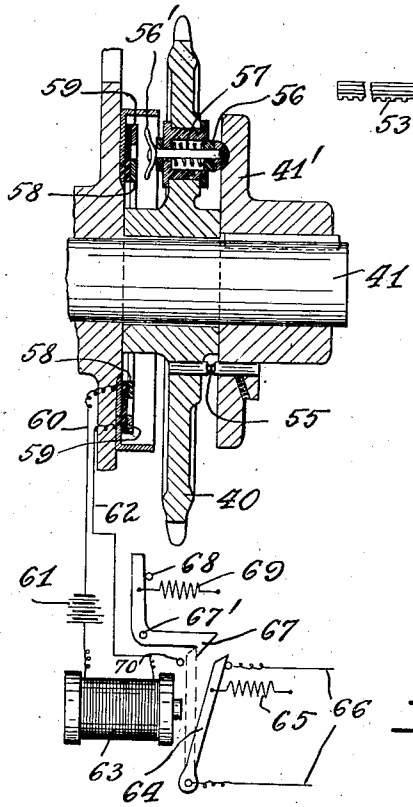


Fig. 4.

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UNITED STATES PATENT OFFICE.

ROBERT ELMER BAKER, OF BRONXVILLE, AND ARTHUR FRANCIS CUMMINS, OF WHITE PLAINS, NEW YORK, AND EARDLEY HARRY FORD, OF LOS ANGELES, CALIFORNIA, ASSIGNORS, BY MESNE ASSIGNMENTS, TO JOSEPH BAKER SONS & PERKINS COMPANY, INC., OF WHITE PLAINS, NEW YORK, A CORPORATION OF NEW YORK.

SAFETY DEVICE FOR CONVEYER MECHANISMS.

Original application filed March 21, 1917, Serial No. 156,275. Divided and this application filed November 12, 1920. Serial No. 423,723.

To all whom it may concern:

Be it known that we, ROBERT ELMER BAKER, a resident of Bronxville, in the county of Westchester and State of New York, ARTHUR FRANCIS CUMMINS, formerly of Nutley, in the county of Essex and State of New Jersey, but now a resident of White Plains, in the county of Westchester and State of New York, and EARDLEY HARRY FORD, formerly of Brooklyn, in the county of Kings, city and State of New York, but now a resident of Los Angeles, in the county of Los Angeles and State of California, all three subjects of the King of Great Britain, have jointly invented certain new and useful Improvements in Safety Devices for Conveyer Mechanisms, of which the following is a specification.

Our invention relates to safety devices for use in conjunction with conveyer mechanism co-operating with a discharge device, and is designed particularly for use in machines for "proving" dough before baking it. In the type of proving machine to which our invention is intended to be applied primarily, conveyers are employed for carrying through the proving chamber, the trays, tins, or other containers in which the dough has been placed, and at the outlet of said chamber, such containers are removed from the conveyer by a discharge device operating transversely of the conveyer path. The safety device which forms the subject-matter of our present application is employed in connection with the discharge mechanism to insure a stoppage of the entire machine (and particularly of the conveyer) in the event of an obstruction's interfering with the proper operation of the discharge device. This safety device preferably consists of a pin or other member adapted to give readily in case of an abnormal strain, and forming part of the driving means of said discharge mechanism. We also prefer to provide a supplementary device, generally operated electrically, for insuring, under the circumstances referred to above, not only a stoppage of the discharge mechanism, but a stoppage of its drive as well, and of the drive of the conveyer.

This application is a division of an application for Letters Patent of the United States, filed by us March 21, 1917, Serial No. 156,275, which has matured into Letters Patent No. 1,412,444 dated April 11, 1922.

For the better explanation of our invention, we will now proceed to describe in detail a typical embodiment thereof, as represented in the accompanying drawings, in which Fig. 1 is an end elevation of a portion of the proving chamber with part of the conveyer, of the discharge device, and of the driving arrangement; Fig. 2 is a side elevation, with parts in section, showing chiefly the arrangement of the discharge device and of its drive; Fig. 3 is a partial vertical section, taken substantially on the plane indicated by the line 3—3 of Fig. 2, but with certain parts in a different position; and Fig. 4 is a detail sectional view showing, upon an enlarged scale, certain parts indicated at the right-hand portion of Fig. 3, together with the electrical connections and appliances for controlling the drive of the discharge device and of the conveyer.

In Fig. 2 we have indicated at 10 one of the walls of the proving chamber, with an opening 11 through which the trays, tins, or other containers 12 are adapted to be pushed out of said chamber, to reach a table or support 13, by the action of the discharge device designated, in its entirety, by the letter A. These containers 12 travel through the proving chamber, being carried therethrough by a conveyer which may be of any suitable construction and therefore need not be described in detail herein. The containers 12 rest on carriers 14, connected with the conveyer in such a manner as to keep the carriers and containers horizontal during their travel. Thus, the carriers may be secured rigidly to rods 15 connected by cranks 16 on short shafts 17 which are also provided with other cranks 18 engaging stationary guides 19. The shafts 17 form the pivot connections of the conveyer chains 20, guided and supported at suitable points by suitable parts, among which are the driving sprockets 21 mounted rigidly on the shaft 22. This shaft also carries a gear wheel 23, in

mesh with a pinion 24 on a shaft 25, which also carries a gear wheel 26 in mesh with a pinion 27 on a shaft 28. This shaft also carries a gear wheel 29, meshing with a gear 30 on a shaft 31, said gear 30 being also in mesh with a pinion 32 on a shaft 33, which is driven in any suitable manner, but preferably by means of an electric motor, indicated at 34.

At 35 we have indicated guides, adapted to be engaged by portions of the conveyers, say by rollers 36 mounted loosely on the conveyer pivots 17, to steady the conveyer laterally adjacent to the outlet 11, against the pushing action of the discharge device A which operates transversely of the path of the longitudinally-moving conveyer. The tins or other containers 12, when brought into registry with the opening 11 by the movement of the conveyer, are arrested by stationary fingers or supports 37, and as it were lifted off said carriers (see Fig. 2), whereupon the discharge device will push such containers from the supports 37 through the opening 11 and transfer them to the table or other support 13; this support might be a conveying belt from which the containers 12 would pass to the baking oven (not shown). The detail construction of the discharge device is set forth more fully in another application filed by us simultaneously herewith, Serial No. 423,722, and a brief description will suffice at this point: On the shaft 28 is secured rigidly a sprocket wheel 38, connected by a chain 39 with a larger sprocket 40 on the main shaft 41 of the discharge device, the connection of said shaft 41 with its sprocket 40 being rigid under normal conditions. The shaft 41 is journaled in standards 42, and carries rigidly a mutilated gear 43, meshing at times with a mutilated pinion 44 rigidly secured to a counter-shaft 45, so that an intermittent motion is imparted to said counter-shaft during a continuous motion of the main shaft 41, corresponding to the continuous travel of the conveyer. On the counter-shaft 45 is further secured rigidly a disk 46 from which projects a crank pin 47 extending loosely through a slide 48 movable in and out along a radial guide way 49′ of a toothed sector 49 which is mounted loosely on the main shaft 41, so that it may rock thereon. This sector is in mesh with a pinion 50, mounted rigidly on a shaft 51 which extends across the machine and also carries rigidly two pinions 52 in mesh with racks 53 suitably guided in the standards 42, to slide towards and from the discharge opening 11. These two racks are connected at their forward or outer ends by a cross bar or pusher 54 of such length and position that it may pass between the two chains of the proving conveyer. Fig. 2 shows the pusher in its inner or retracted position. It will be understood that the mutilated gears 43, 44 will produce an intermittent operation of the pusher, and this should be so proportioned in time to the continuous motion of the traveling conveyer, that between two successive outward or working strokes of the pusher the conveyer will advance a distance equal to the length of the chain links, or in other words, a distance equal to the space between adjoining carriers 14.

It will be evident that if by accident one or more of the containers 12 should fall off the conveyer, or if any other obstruction should get into the path of the pusher in such a way as to interfere with its intended operation, the resulting jamming of the pusher (and possibly of the conveyer) might result in serious injury to the mechanism. As a safety device to prevent such injury, we have provided a yielding connection and certain other instrumentalities which, in the specific embodiment illustrated, are constructed as follows:—The sprocket 40, while normally held to turn with the main shaft 41, may become loose or free under certain conditions, since its connection with a collar 41′, rigid with the shaft 41, is effected through the medium of a pin 55 having a weakened portion, so that while the pin is strong enough to transmit the power normally required for the operation of the pusher, such pin will break if for any reason the resistance to the movement of the pusher becomes abnormal. Thus, should a container fall off the conveyer and become wedged or otherwise lodged in the path of the pusher so as to interfere with its operation, or should any other obstruction become lodged either in the path of the pusher or of any member of its driving mechanism shown in Fig. 3, the pin 55 will break, and the drive of the pusher will be arrested, so that the pusher (or the jammed member of its driving mechanism) will no longer be pressed against the obstruction, and thus an injury which might result to the pusher and possibly to the conveyer, will be avoided.

We also consider it advisable that in the event of the breaking of the pin 55, the motive power should be disconnected not only from the pusher but from the proving conveyer as well, thus stopping the latter, and guarding against the possibility of injury to the conveyer should it continue to travel while an obstruction is lodged not only in the path of the pusher, but in that of the conveyer as well, this being the place where obstructions are most likely to lodge. For the purpose of thus stopping the conveyer, we have illustrated the following arrangement: A pin 56, mounted to slide in

the sprocket 40 in a direction parallel to the shaft 41, is pressed by a coiled spring 57 toward the collar 41′, and as long as the pin 55 is unbroken, that is to say, under normal driving conditions, one end of said pin 56 is pressed by said spring into a small socket in the collar 41′, so that an elastic contact member 56′ carried by the other end of said pin 56 will be out of engagement with two insulated rings 58, 59 which are stationary. When the pin 55 breaks, the sprocket 40, becoming loose on the shaft 41, will continue to be turned for a while by the chain 39, and this rotation of the sprocket 40 relatively to the collar 41′ (which has stopped owing to the jamming of the pusher or of its driving mechanism) will force the one end of the pin 56 out of its socket in the collar 41′ and bring the contact member 56′ against the stationary contact rings 58, 59, thus closing a circuit which may be utilized to shut off the power in any suitable manner. For instance as indicated diagrammatically in Fig. 4, the one contact 58 may be connected by a wire 60 with one terminal of a source of electricity 61, while the contact 59 is connected by a wire 62 with an electromagnet coil 63, also connected with the other terminal of said source of electricity. The armature 64 of this magnet would normally, under the influence of a spring 65, close the circuit 66 of the electric motor 34, but when attracted by the magnet upon the energizing of the latter by the member 56′ coming against the contact rings 58, 59, the armature 64 would open said circuit 66 and cause the motor 34 to stop. As the momentum of the conveyer might keep it in motion for a short time, causing the sprocket 40 to revolve for a few revolutions after the pin 55 had become broken, the pin 56 would at each of these revolutions for a moment reach the position shown in Fig. 4 and cause the circuit of the coil 63 to become interrupted. This would tend to allow the armature 64 to swing back to the circuit-closing position indicated by full lines in Fig. 4, so that the motor 34 would receive a short current impulse, tending to throw the apparatus in motion, in a jerky fashion. To avoid this, we have shown a hook catch 67, fulcrumed at 67′, and normally pulled against a stop 68 by a spring 69. When the armature 64 is attracted against the stop 70, the catch 67 yields to let the armature pass, and then snaps back to lock the armature in the position indicated by dotted lines, so that said armature cannot swing back to the circuit-closing position when the coil 63 is temporarily currentless, as described above. Of course, the hook catch 67 would also hold the armature 64 in the circuit-breaking position in the unlikely but not impossible event of the sprocket 40 stopping (after the breaking of the pin 55) in a position in which the pin 56 would register exactly with, and enter, the socket in the collar 41′, so that the circuit energizing the coil 63 would remain interrupted. The motor-controlling circuit 66 will therefore remain open after the breaking of the pin 55. When proper repairs have been completed, and a new pin 55 has been substituted for the broken one, the operator would lift the hook end of the catch 67, allowing the armature 64 to be returned to its normal, circuit-closing position, by the action of the spring 65. The armature 64 may control a motor other than an electric motor.

Various modifications may be made without departing from the nature of our invention as set forth in the appended claims.

We claim as our invention:

1. In a conveyer mechanism, a conveyer, a discharge device movable relatively to said conveyer to remove articles therefrom, driving mechanism for said conveyer and for said discharge device, the driving mechanism of the discharge device including a member adapted to give way readily in case of an abnormal strain, to stop the operation of the discharge device if the latter meets an obstruction, and means, operated by the stoppage of the discharge device resulting from the breakage of said member, for arresting the drive of the conveyer.

2. In a conveyer mechanism, a conveyer, a discharge device movable relatively to said conveyer to remove articles therefrom, driving mechanism for said conveyer, a yielding drive for said discharge device, to allow said device to stop in the event of its meeting an obstruction, and means, operated by the movement of said yielding drive caused by the stoppage of the discharge device, for arresting the driving mechanism of the conveyer.

3. The combination of driving means, an operated device, a connection for transmitting power from said driving means to said operated device, said connection including a weakened member adapted to break if said device is stopped by an obstruction, a circuit-closer adapted to be brought from the open position to the closing position when said weakened member breaks, and a stop device, controlled electrically by the operation of said circuit-closer, for shutting off said driving means.

4. The combination of driving means, an operated device, a connection for transmitting power from said driving means to said operated device, said connection including a weakened member adapted to break if said device is stopped by an obstruction, and electrically-controlled means for shutting off said driving means when said weakened member breaks.

5. The combination of an electric motor,

an operated device, a connection for transmitting power from said motor to said device, said connection including a weakened member adapted to break if said device is stopped by an obstruction, a switch controlling the supply of current to said motor, and means, adapted to be brought into operation by the breaking of said weakened member, for bringing said switch to the open position.

6. The combination of an electric motor, an operated device, a connection for transmitting power from said motor to said device, said connection including a weakened member adapted to break if said device is stopped by an obstruction, a switch controlling the supply of current to said motor, and constructed of magnetizable material, an electro-magnet for which said switch forms an armature, and a circuit-closure in circuit with a source of electricity and with said electro-magnet, and adapted to be moved automatically to the circuit-closing position when the said weakened member breaks, to throw the switch to the open position.

7. The combination of driving means, an operated device, a connection for transmitting power from said driving means to said operated device, said connection including two adjacent rotary members and a pin connecting them and having a weakened portion adapted to break when the mechanism encounters unusual resistance, and a device, brought into operation by the turning of one of said rotary members relatively to the other, upon the breaking of the pin, for shutting off said driving means.

8. The combination of driving means, an operated device, a connection for transmitting power from said driving means to said operated device, said connection including two co-axial rotary members and a connecting member normally compelling them to move in unison, said connecting member having a weakened portion adapted to break when the mechanism encounters unusual resistance, and a device, brought into operation by the relative turning movement of said rotary members which ensues upon the breaking of said connecting member, for shutting off said driving means.

9. The combination of driving means, an operated device, a connection for transmitting power from said driving means to said operated device, said connection including two co-axial rotary members and a connecting member normally compelling them to move in unison, said connecting member having a weakened portion adapted to break when the mechanism encounters unusual resistance, a circuit-closing member movably carried by one of said rotary members, means brought into operation by the relative turning movement of said rotary members which ensues upon the breaking of said connecting member, for causing said circuit-closing member to move relatively to the rotary member on which it is carried, and means, operated by such movement of the circuit-closing member, for shutting off said driving means.

10. The combination of driving means, an operated device, a connection for transmitting power from said driving means to said operated device, said connection including two co-axial rotary members and a connecting member normally compelling them to move in unison, said connecting member having a weakened portion adapted to break when the mechanism encounters unusual resistance, a circuit-closing member carried by one of said rotary members and mounted to slide thereon lengthwise of the axis of rotation, a spring for pressing said circuit-closing member toward the other rotary member and normally into a recess thereof, whereby, upon the breaking of the weakened connecting member, the turning of one rotary member relatively to the other will force the said circuit-closing member out of its socket and move it lengthwise of the axis of rotation and means, operated by such longitudinal movement of said circuit-closing member, for shutting off said driving means.

11. The combination of driving means, an operated device, a connection for transmitting power from said driving means to said operated device, said connection including two co-axial rotary members and a connecting member normally compelling them to move in unison, said connecting member having a weakened portion adapted to break when the mechanism encounters unusual resistance, a circuit-closing member mounted to slide on one of said rotary members lengthwise of the axis of rotation, said member having two contact-making portions, stationary insulated contact rings adapted to be engaged by said contact-making portions, a spring tending to press the circuit-closing member toward the other rotary member and to normally hold said contact-making portions away from their contact rings, said other rotary member having an actuating surface engaging a portion of the circuit-closing member and adapted to force said member lengthwise of the axis of rotation and into engagement with said contact rings, by the relative turning movement of such rotary members which ensues upon the breaking of said weakened connecting member, and means, operated when said circuit-closing member engages said contact-rings, for shutting off said driving means.

12. In a conveyer mechanism, a conveyer, a discharge device movable relatively to

said conveyer, driving mechanism for said conveyer a drive for said discharge device comprising a pair of relatively movable members, a member, adapted to give way readily in case of an abnormal strain, connecting said pair of members to cause them to move normally in unison, and means operated by relative movement of said members for arresting the drive of said conveyer.

In testimony whereof we have signed this specification.

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ARTHUR FRANCIS CUMMINS.
EARDLEY HARRY FORD.