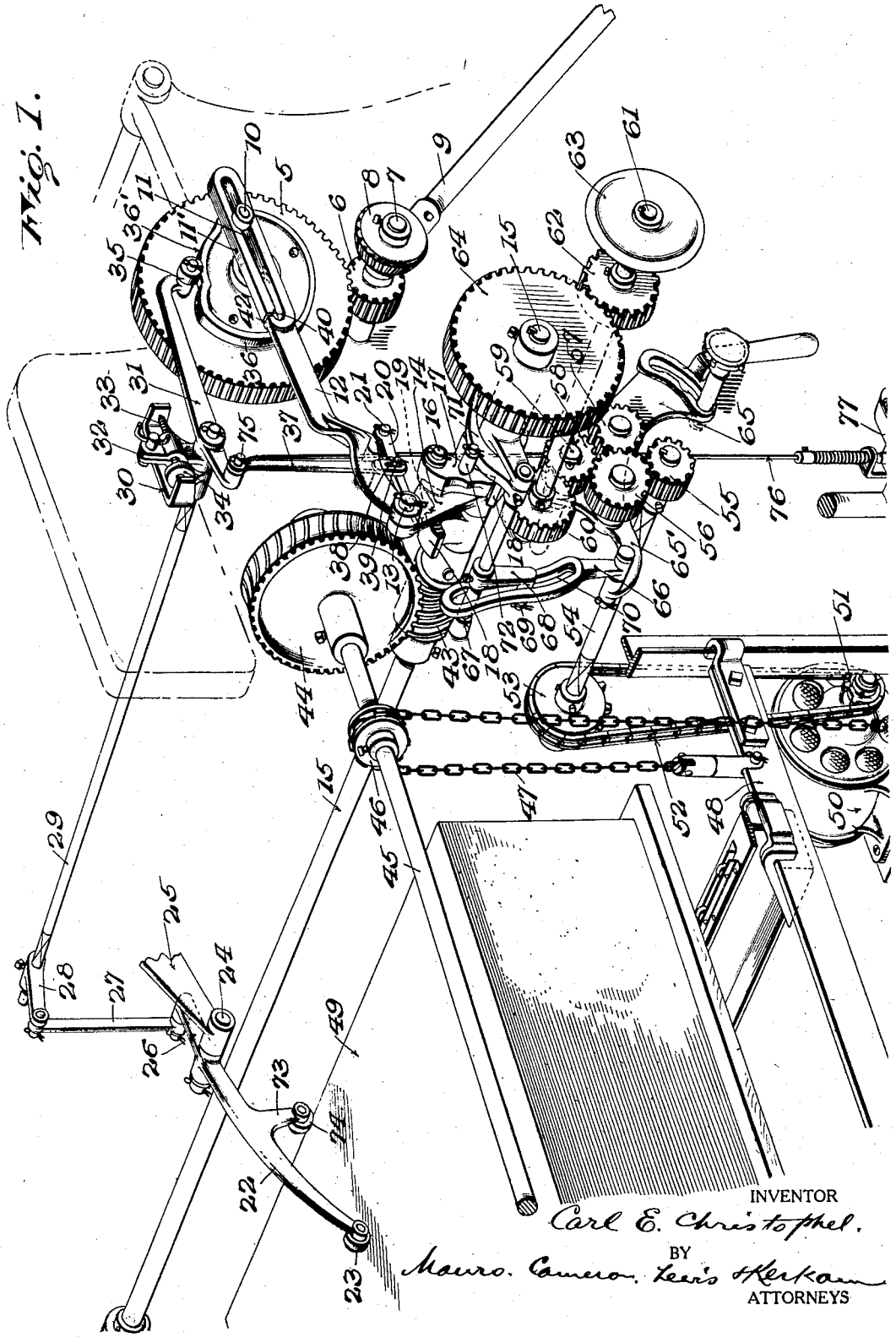
Dec. 6, 1927. 1,651,444

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SHEET FEEDING MACHINE

Filed Feb. 25, 1925 2 Sheets-Sheet 1

Fig. 1.



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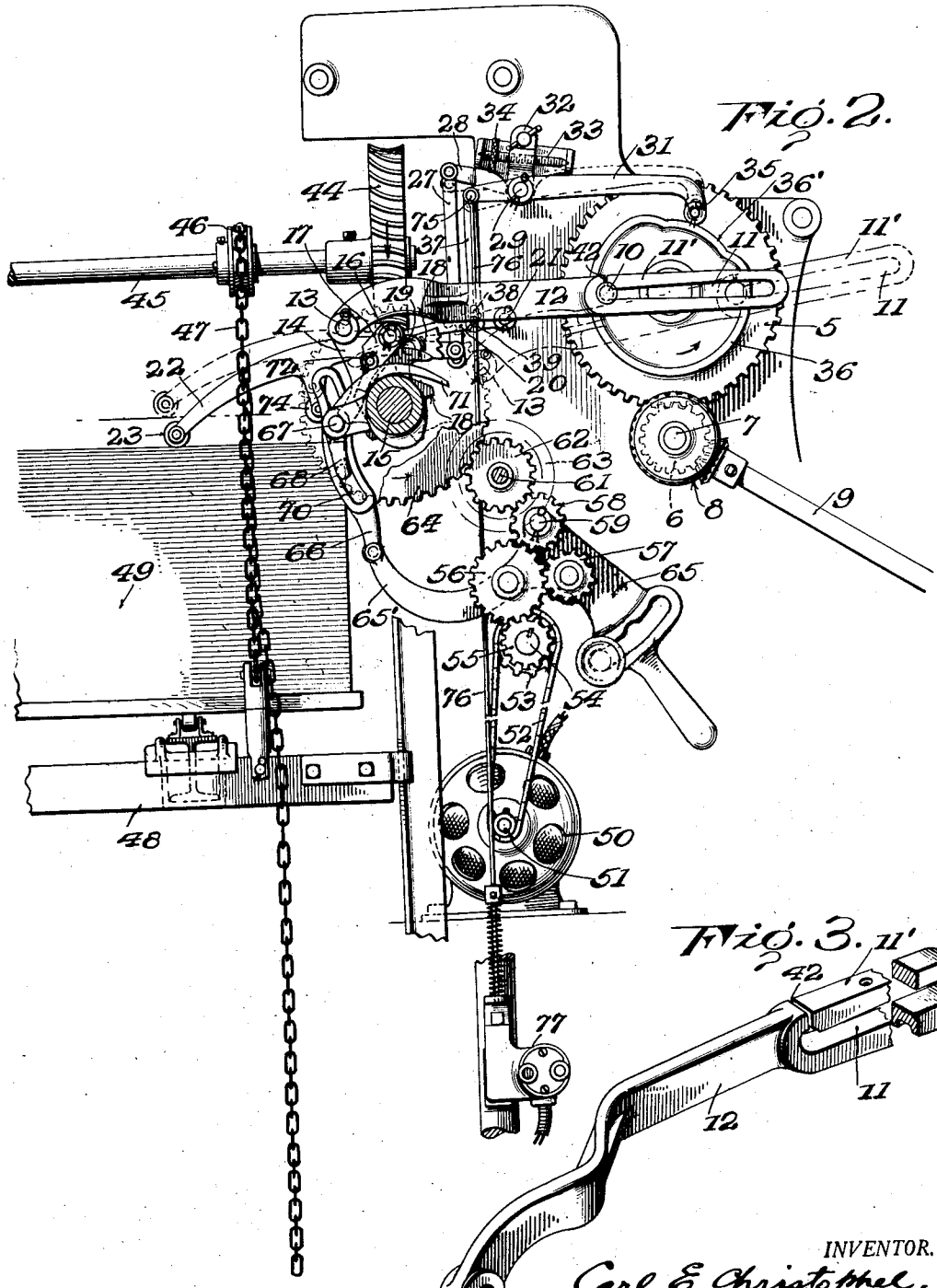


Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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SHEET-FEEDING MACHINE.

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The present invention is an improvement in sheet-feeding machines, and particularly in the mechanism for controlling the elevation of the pile of sheets carried by the sheet support.

Normally the pile is automatically elevated step by step under the control of the governor, and one of the objects of the invention is to provide improved means for preliminarily adjusting the governor member with respect to the top of the pile. Another object of the invention is to provide improved means for actuating the feed pawl from a rotating part of the mechanism.

Further, it is frequently desirable to rapidly elevate or lower the pile support either manually or by a motor, in which event the elevating means controlled by the governor are disengaged and the pile is elevated by independent manual or motor means. It sometimes happens that when thus elevated manually or by independent motor means, the pile support is raised so rapidly and to such an extent as to damage the mechanism, and, accordingly, another object of the invention is to provide means for automatically and promptly stopping the further elevation of the pile support after it has reached a predetermined height.

The invention will be better understood by reference to the accompanying drawings, illustrating one expression of the inventive idea, and in which—

Fig. 1 is a perspective view of a sheet-feeding mechanism illustrating the invention;

Fig. 2 is a side elevation corresponding to Fig. 1; and

Fig. 3 is a detail showing the improved strap for actuating the feed pawl.

Referring to the drawings, wherein like reference numerals indicate like parts, 5 is a continuously rotating member here shown as a gear, and which is driven from any suitable source of power as through a pinion 6 mounted on a shaft 7, which latter also carries a bevel gear 8 meshing with a similar bevel gear that is rotated by a connection 9. The gear 5 carries on its face a pin 10 that engages in an elongated slot 11 of a connecting rod 12, one end of which is connected at 13 to the free end of a support 14 which is adapted to be freely oscillated on shaft 15. This support 14 has pivoted thereto at 16 a feed pawl 17 that is adapted to effect the rotation of the shaft 15 by engagement with the teeth of a ratchet wheel 18 keyed to said shaft. The support 14 is also provided with a curved surface 18′ and with a recess 19, in which recess there normally engages the free end of a dog 20 pivoted at 21 to the frame of the machine. This dog normally prevents clockwise movement of the support 14 when the pile is at the predetermined height and accordingly prevents the operation of the feed pawl 17.

When the dog 20 is elevated out of engagement with the recess 19, the support 14 and the feed pawl 17 may be moved to the right as shown in Fig. 1, in order to engage the succeeding tooth on the ratchet wheel 18 to effect rotation of the shaft 15 to elevate the pile.

In order to effect the elevation of the dog 20 for this purpose, connections are provided with a governor lever 22 carrying in its free end a governor roller 23, which latter rests on the top of the pile. This governor lever is pivoted at 24 in the frame 25, and the other arm 26 of said lever is connected to the lower end of a link 27, the upper end of which is connected to the free end of an arm 28 secured to a shaft 29 suitably mounted in bearings in the frame. This shaft 29 is provided with a yoke 30 which is fixedly secured thereto, and loosely mounted on said shaft is a lever 31 which is provided with a lug 32 through which passes a screw 33 that bears at either end against the flanges of the yoke 30. A set-screw 34 is provided to effect a relative rotation between the shaft 29 and the lever 31 in order to adjust the position of the governor roller 23 with respect to the top of the pile. This adjustment is provided at a point where it is readily accessible to the workmen, and any desired change in the relation of the governor roller with the top of the pile may be readily effected.

The lever 31 has mounted on one arm thereof a roller 35 that engages a cam 36 formed on the face of the gear 5. The other arm of said lever is connected to the upper end of a link 37, the lower end of which is provided with an elongated slot 38 in which engages a pin 39 carried by the dog 20. The rotation of the gear 5 effects a periodical

raising and lowering of the governor roller 23, the roller 23 being elevated when the roller 35 engages the high part of the cam 36, which takes place at the time when the sheets are being fed from the pile, and being lowered onto the pile when the roller 35 engages the cut away portion 36′ of the cam, which is the position shown in Fig. 1.

When the top of the pile is below the predetermined level, the governor roller 23 will be lowered and through the connections described the dog 20 will be elevated out of engagement with the recess 19. Accordingly, the support 14 and the feed pawl 17 may be moved in a clockwise direction, as seen in Fig. 1, to engage the latter with the next succeeding tooth on the ratchet wheel. This movement of the support 14 toward the right is effected by the engagement of the pin 10 in the recess 40 at the left-hand end of the elongated slot 11. One of the members that bounds the elongated slot is severed at 42, in effect constituting said member 11′ a spring arm. When the dog is elevated so that the parts are free to be moved to the right, the pressure of the free end of the member 11′ on the pin 10 is sufficient to carry the support 14 and the pawl 17 a distance to the right to effect the engagement of the latter with the next succeeding tooth on the ratchet. On the other hand, when the dog 20 is in engagement with the recess 19, so that the support 14 and the pawl 17 is restrained from movement toward the right, the pin 10 will readily disengage itself from the recess 40 on each rotation of the gear 5. Heretofore, a compression spring has been associated with the support 14 for effecting the movement of the latter and of the feed pawl to the right, but injury to and breakage of said spring was frequent in the operation of the machine. The provision of the particular means described obviates the defects and difficulties heretofore encountered with respect to the movements of the support 14 and feed pawl 17.

After the pawl has been engaged with the succeeding tooth on the ratchet wheel 18, the rotation of the shaft 15 is effected by the movement of the connecting rod 12 to the left under the influence of the pin 10, which at that time engages the left-hand extremity of the slot 11, or in other words engages in the recess 40. The shaft 15, if necessary, has successive feeding movements imparted thereto through the pawl 17 and the connections described until the pile has been automatically elevated to its predetermined height by said shaft and the following instrumentalities.

It will be observed that the shaft 15 carries a worm 43 which is keyed thereto, said worm 43 engaging with a worm-wheel 44 keyed to shaft 45. This shaft 45 carries a sprocket wheel 46 around which passes a chain 47, one end of which is connected to the support 48 on which is mounted the pile of sheets 49.

It is frequently desirable to elevate or lower the pile rapidly by manual or motor means independent of the automatic pile elevating means. For this purpose there is provided a motor 50 on the armature shaft of which is provided a sprocket wheel 51 around which passes a sprocket chain 52 that also passes around a sprocket wheel 53 carried by a shaft 54 mounted in suitable bearings in the frame. The shaft 54 carries a gear 55 that is adapted to be meshed with gear 56 or 57 depending on whether the pile is to be elevated or lowered. If the pile is to be lowered, the gear 56 is meshed with the gear 55 and if the pile is to be elevated the gear 57 is meshed with the gear 55. In any event the gear 56 is always in mesh with a gear 58 mounted on a stud 59 carried by the frame, and gear 58 is always in mesh with a gear 60 secured to the shaft 61 which carries a second gear 62 and a hand-wheel 63. The gear 62 meshes with a large gear 64 secured to the shaft 15.

When the pile support is to be lowered, the driving connection between shaft 54 and shaft 61 is through gears 55, 56, 58 and 60. When the pile is to be elevated, the driving connection between shaft 54 and shaft 61 is through gears 55, 57, 56, 58 and 60. In other words, in the independent elevation of the pile one more gear, 57, is introduced into the train, and this gear is always in mesh with gear 56. Both gears 56 and 57 are mounted on a swing-arm 65 that swings about the stud 59, and this arm 65 has three positions, a neutral position in which neither gear 56 nor 57 is in mesh with 55, a position in which gear 56 is in mesh with 55, and a position in which gear 57 is in mesh with gear 55. The neutral position is that which the parts occupy when the elevation of the pile is being automatically effected through the gear 5 and the connecting rod 12 and feed pawl 17.

When the pile is to be raised or lowered by motor 50, the feed pawl 17 is automatically disengaged from the ratchet 18, this being effected by means of a slotted arm 66 connected at its lower end to the part 65′ of the swing-arm, and at its upper end passing around a shaft 67, which latter carries an arm 68 provided with a finger 69 that engages in the cam slot 70 of said arm 66. The shaft 67 has also secured thereto a cam member 71 that is engaged by a roller 72 carried by the feed pawl 17. The cam slot 70 is so shaped as to elevate the cam member 71 when the swing-arm 65 is moved either to the right or to the left, and accordingly the feed pawl 17, under either of these conditions, is raised out of engagement with the ratchet 18.

In order to prevent injury to the parts should the sheet support be elevated too rapidly after the motor 50 starts operating, and in order to insure a prompt disconnection of the motor when the pile has reached a predetermined height, means are provided for automatically stopping the motor under these conditions. This interruption of the electric circuit is preferably effected by a member 73 carried by the governor lever 22, said member being preferably provided with a roller 74 adapted to engage the pile of sheets when the same has been elevated to said determined height by the motor. This member or arm 73 is located as close to the pivot 24 as practical, in order to effect as prompt movement of the connections 27, 28, 29 and 31 as possible to disconnect the motor 50, the lever 31 having connected thereto at 75 the upper end of a connecting rod 76 which, on movement of said connections by engagement of the pile with the roller 74, is adapted to break the electric circuit to the motor at 77.

It will thus be seen that in the normal operation of the feeder the elevation of the pile is controlled through the feed pawl 17; and further that, when it is desired to rapidly raise or lower the pile, the feed pawl 17 is disconnected and the pile is raised or lowered from the motor 50 through the connections described, means being provided for promptly disconnecting the motor 50 by breaking the electric circuit to the motor at 77, when the pile has been elevated to the predetermined height, these means being here shown as an arm 73 carrying a roller 74 that is engaged by the pile and which, through the connections described, will operate to promptly break the electric circuit at 77.

While for the purpose of illustration, one expression of the inventive idea has been herein shown and described in detail, it will be understood that the invention may be embodied in various mechanical expressions within the limits of the appended claims.

What is claimed is:—

1. In a device of the character described, the combination of a pile support, a motor for elevating the same, connections between said pile support and said motor, a governor lever engaging the top of the pile, feeding means connected to said governor lever for automatically maintaining the top of the pile at a predetermined height, a safety device carried by said lever, and connections between said safety device and said motor for disconnecting the motor when it has elevated the pile to a predetermined height.

2. In a device of the character described, the combination of a pile support, a governor lever engaging the top of the pile, means controlled thereby for automatically maintaining the top of the pile at a predetermined height, a safety device carried by said governor and lever and positioned between the end of said lever and its pivot, independent means for elevating the pile, and connections between said safety device and said independent means for disconnecting the latter when it has elevated the pile to a predetermined height.

3. In a device of the character described, the combination of a pile support, a governor lever engaging the top of the pile, means controlled thereby for automatically maintaining the top of the pile at a predetermined height, a pile engaging member carried by the governor lever intermediate its end and pivot, independent means for elevating the pile, and connections between said member and said independent means for disconnecting the latter when it has elevated the pile to a predetermined height.

4. In a device of the character described, a pile support, a governor lever engaging the top of the pile, means controlled thereby for automatically maintaining the top of the pile at a predetermined height including a shaft, means for periodically raising the governor lever as successive sheets are being fed off, said means including a cam-actuated lever pivotally connected with said shaft, and means for adjusting the angular relation between said shaft and said cam-actuated lever.

5. In a device of the character described, a sheet support, means for automatically maintaining the top of the pile at a predetermined height, including a shaft, a ratchet wheel mounted thereon, a feed pawl, a rod connected at one end to said pawl, means engaging the other end of said rod to move said pawl and including a pin, said rod being provided with an elongated slot and having a spring arm engaging said pin.

6. In a device of the character described, the combination of a rotating member provided with a pin, a rod provided with an elongated slot in which said pin engages, said rod having a spring member engaging said pin, a shaft, a ratchet mounted thereon, a sheet support, means connected with the shaft and said sheet support for elevating the latter on rotation of the shaft, a pawl support loosely mounted on said shaft, and a pawl carried thereby and adapted to rotate said shaft through said ratchet, said pawl support being connected to said rod.

7. In a device of the character described, the combination of a sheet support, a shaft, means connected with the shaft and said sheet support for automatically elevating the latter on rotation of the shaft, a pawl support loosely mounted on the shaft, a pawl on the pawl support, a fixed ratchet on said shaft and adapted to be rotated by said pawl, a rod connected at one end to said pawl support, rotary means for reciprocating said rod, a pin and slot connection between

said rod and rotary means, and a spring arm bearing on said pin.

8. In a device of the character described, the combination of a sheet support, a shaft, means connected with the shaft and said sheet support for elevating the latter on rotation of the shaft, means for rotating the shaft including a rod, a pawl and pawl support mounted on said shaft, and rotary means for reciprocating the rod through a pin and slot connection, said rod having a spring arm integrally formed therewith and bearing on said pin.

9. In a device of the character described, the combination of a rotary member, a pin carried thereby, a rod provided at one end with an elongated slot in which said pin engages, said rod having a spring arm carried thereby and engaging said pin, shaft rotating elements connected to the other end of said rod, a sheet support, and connections between said sheet support and said shaft for elevating the sheet support on rotation of the shaft.

In testimony whereof I have signed this specification.

CARL E. CHRISTOPHEL.