

No. 823,627.

PATENTED JUNE 19, 1906.

J. NORTHROP.

HOPPER ACTUATING MECHANISM FOR AUTOMATIC LOOMS.

APPLICATION FILED JULY 12, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

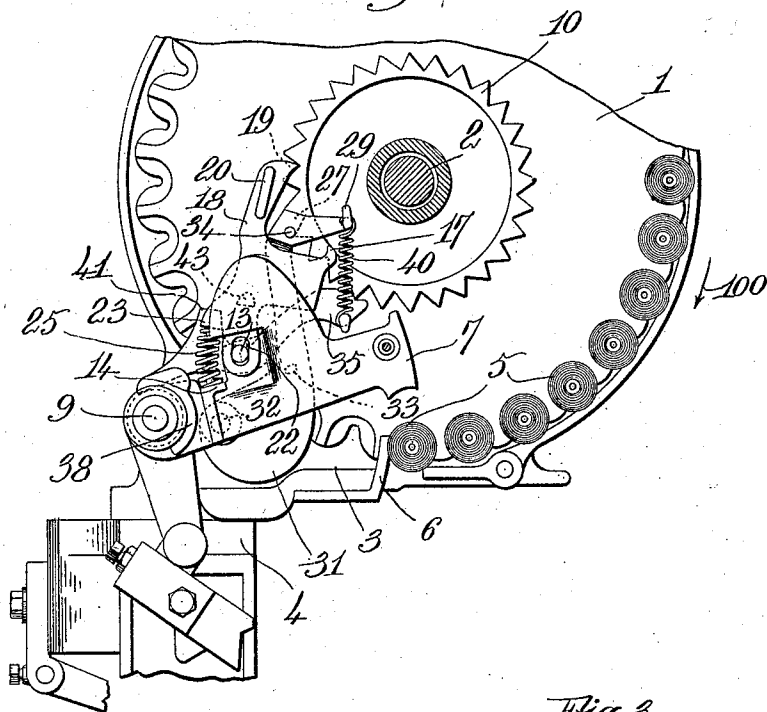


Fig. 2.

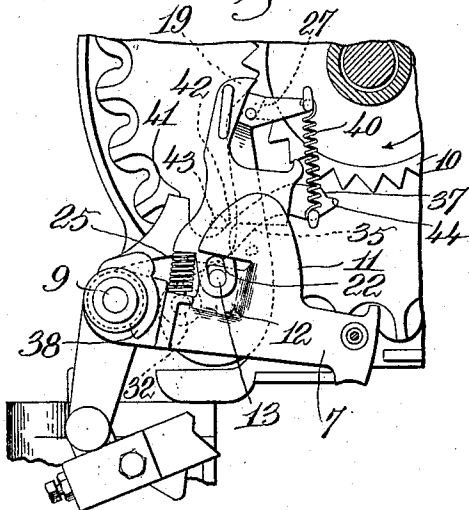
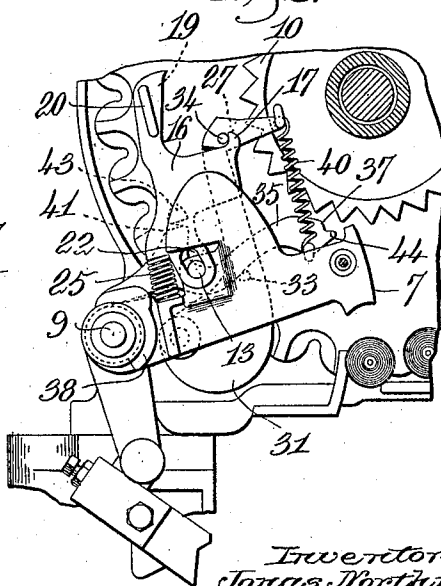


Fig. 3.



Witnesses.
Thomas J. Drummond.
S. William Lutton.

Inventor.
Jonas Northrop,
by Crosby Gregory,
att'y.

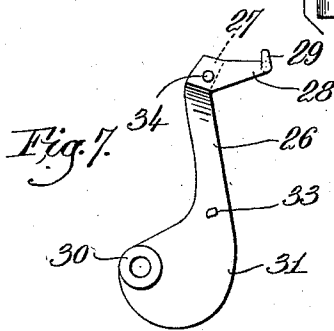
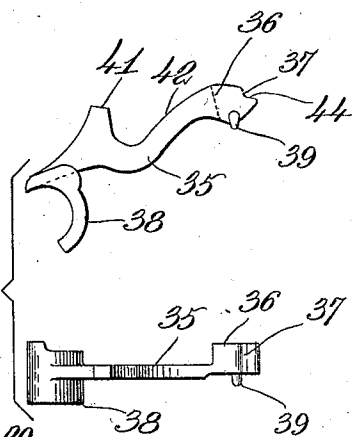
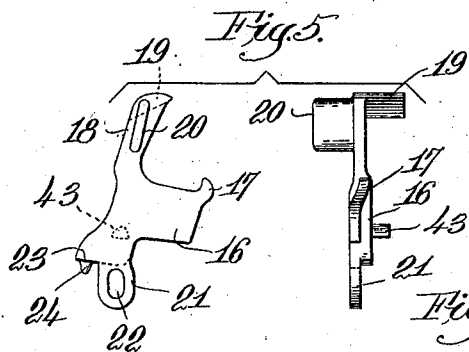
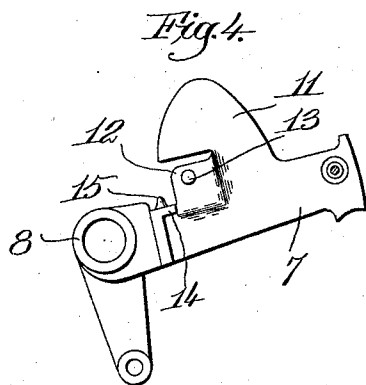
No. 823,627.

PATENTED JUNE 19, 1906.

J. NORTHROP.
HOPPER ACTUATING MECHANISM FOR AUTOMATIC LOOMS.

APPLICATION FILED JULY 12, 1905.

2 SHEETS—SHEET 2.



Witnesses.

Thomas Drummond,
S. William Lutton.

Inventor.
Jonas Northrop,
by Elias Gregory
Attys.

UNITED STATES PATENT OFFICE.

JONAS NORTHROP, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO
DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

HOPPER-ACTUATING MECHANISM FOR AUTOMATIC LOOMS.

No. 823,627.

Specification of Letters Patent.

Patented June 19, 1906:

Application filed July 12, 1905. Serial No. 269,329.

To all whom it may concern:

Be it known that I, JONAS NORTHROP, a citizen of the United States, and a resident of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Hopper-Actuating Mechanism for Automatic Looms, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

This invention has for its object the production of novel mechanism for controlling and effecting intermittent movement of the filling feeder or hopper in a loom of the automatic type, wherein the running filling is replenished from time to time by insertion of a fresh supply of filling into the shuttle.

United States patent to Northrop, No. 529,940, shows a loom of this general type, and later patents show various devices for advancing the hopper step by step to bring into position to be transferred one after another of a plurality of filling-carriers or bobbins held as a reserve supply in the hopper.

In my present invention I have provided means for effecting the advance of the hopper after each operation of the transferrer, the latter acting to transfer the filling-carriers from the hopper to the shuttle in such a manner that the motion imparted to the hopper will be without sudden shock or jar, and I have also provided novel means for limiting the advance of the hopper to a predetermined distance.

In order that the hopper may not turn backward when the advancing mechanism is being set preparatory to the next advance, a detent is provided.

When the attendant wishes to fill the hopper, it is sometimes necessary or convenient to move the hopper freely in either direction, and herein I have provided means whereby by manual movement of a single member of the controlling mechanism the hopper is entirely freed from such mechanisms and can be moved in either direction by the attendant and the filling-carriers placed therein as required.

I have illustrated my invention in connection with a rotatable hopper of the Northrop type, such as shown in the patent hereinbefore referred to, and in order to control the said hopper I have provided feed, detent,

and stop pawls to cooperate with a ratchet rotatable with the hopper, the stop-pawl being automatically retracted by or through the setting movement of the feed-pawl, and by manual retraction of one of said pawls, preferably the feed-pawl, all of the pawls are disengaged from the ratchet to free the hopper.

These and other novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a transverse sectional view of the hopper of an automatic filling replenishing loom of the Northrop type, taken across the axis of rotation of the connected disks comprising the hopper and with one embodiment of my novel hopper mechanism applied thereto, the parts being shown in normal position in readiness for the next filling-carrier to be transferred when called for. Fig. 2 is a similar view, a portion of the hopper-disk being omitted as unnecessary, but showing the parts in the position desired at the instant that the transferrer has completed its operative movement to insert a filling-carrier in the shuttle, the feed-pawl having been set in readiness for the next advance of the hopper and the stop-pawl being shown as retracted to permit the initiation of such advance movement. Fig. 3 is a view similar to Fig. 2, but showing the hopper as freed from the control of its operating mechanism. Fig. 4 is a side elevation of the transferrer detached. Fig. 5 shows side and rear edge views of the feed-pawl. Fig. 6 shows side and top plan views of the stop-pawl; and Fig. 7 is a detached view, in side elevation, of the detent-pawl.

Inasmuch as the filling replenishing mechanism, broadly speaking, and the means for actuating the transferrer are not of my invention, the same being well known to those skilled in the art, it will be sufficient to state that the hopper in practice comprises two connected disks or plates, the inner one, as 1, being herein shown rotatably mounted on a disk or stud 2, fixed to the hopper-stand 3, mounted on the breast-beam 4 of the loom.

The filling carriers or bobbins 5 are suitably held by their butts and tips by and between the two disks of the hopper in a circularly-arranged series, as shown in Fig. 1, and

by intermittent advance or step-by-step movement of the hopper said filling-carriers are brought one by one into transferring position adjacent a stop 6 to be engaged by the rocking transferrer 7, and thereby transferred from the hopper to the running shuttle all in well-known manner.

The transferrer 7 has its hub 8 mounted to rock on a horizontal stud 9, and it is retracted or lifted to normal position by a spring (not shown) and positively depressed or rocked on its operative stroke or movement by well-known mechanism on the beat up of the lay.

I have herein shown a circular ratchet 10, secured to and to rotate with the hopper, and in actual practice the ratchet is secured to or formed on the outer face of the disk 1, its teeth corresponding to the number of holding devices for the filling-carriers.

The transferrer in my present invention is slightly different in certain details of construction, and, as best shown in Fig. 4, the said transferrer is provided with an upturned and enlarged extension 11 cut away at its lower portion and offset laterally, as at 12, the parts 11 and 12 being in different vertical planes, the offset portion 12 having a lateral pin or stud 13 thereon, and adjacent the front end of the extension a shelf 14 is provided having an upturned projection 15, the shelf forming a spring-seat and the projection serving to position the spring upon the seat.

The feed-pawl by which the advance movement of the filling-carrier is effected is shown separately in Fig. 5, and consists of a casting having a main body portion 16, provided at its rearward corner with a slightly-hooked finger 17, and at the outer corner the body is upturned, as at 18, and provided with a broad lateral tooth 19 to cooperate with the ratchet 10. Oppositely projecting from the extension 18 is a finger-piece 20 for a purpose to be described, and viewing Fig. 5 it will be seen that the finger 17 is slightly offset from the body portion of the pawl.

A depending foot 21 is provided with an elongated slot 22, and in front of the slot is located an overhanging shoulder 23, having a depending tip 24, which enters the upper end of and retains in position a coiled actuating-spring 25, (see Figs. 1, 2, and 3,) this spring being interposed between the shoulder 23 and the seat 14 on the transferrer hereinbefore referred to.

The pin or stud 13 on the transferrer loosely enters the slot 22 at the lower portion of the feed-pawl, and, observing Figs. 1, 2, and 3, it will be seen that while the cooperation of the slot and pin constitutes a positive connection at times between the transferrer and the feed-pawl it is a lost-motion connection, permitting not only a rocking movement of the feed-pawl with relation to the transferrer, but also a bodily longitudinal movement of the pawl for a purpose to be explained.

The slot extension 21 bears against the face of the offset 12 of the transferrer, and the main or body portion of the pawl bears against the opposed face of the enlargement 11, the two parts 11 and 13 being offset from each other sufficiently to permit the easy insertion and movement of the feed-pawl between them.

The transferrer is firmly mounted on its fulcrum-stud (as is well known to those familiar with this type of loom) and has practically no lateral movement and the width of the pawl-tooth 19 is such that its inner end is close to the outer face of the hopper-disk 1. Thus the feed-pawl cannot become displaced laterally on the transferrer, and its up-and-down movement is limited by the slot-and-pin connection. The actuating-spring 25 is of sufficient strength to advance the hopper a predetermined distance after the feed-pawl has been set, as will be described, such setting compressing the spring, as shown in Fig. 2.

Supposing a transfer is about to be effected, the downward movement of the transferrer from the position shown in Fig. 1 to that shown in Fig. 2 operates to bring the stud 13 against the lower end of the slot 22, and the toothed feed-pawl clicks over one tooth of the ratchet as the pawl is positively set or moved into operative position. This setting movement of the pawl, effected positively by or through the operative movement or stroke of the transferrer, serves to compress the actuating-spring, as shown in Fig. 2, wherein the pawl is shown in position ready to effect the advance of the hopper. The rise of the transferrer as it returns to normal position permits the spring to act upon the feed-pawl to lift the latter, and thereby through its cooperation with the ratchet to advance the hopper, and just before the transferrer has completed its upward stroke the hopper will have been advanced the full predetermined distance, so that the stud 13 is moved upward a short distance away from the bottom of the slot 22, as shown in Fig. 1, the spring effecting the advance of the hopper in a yielding manner, as will be manifest, and preventing shock or jar.

In order to prevent retrograde movement of the hopper under normal conditions, and also to prevent any reverse movement during the setting of the feed-pawl, a detaining device or detent-pawl is provided to cooperate with the ratchet, said pawl 26 (separately shown in Fig. 7) having a ratchet-engaging tooth 27 and an adjacent rearwardly-extended arm 28, provided with a hook 29 at its extremity, and the lower portion of the pawl eccentric to its hook 30 is enlarged or widened, as at 31, the hook being mounted to rock on a fixed fulcrum-pin 32 on the hopper-stand 3. The detent-pawl is thus located between the transferrer and the innermost

disk 1 of the hopper, its tooth 27 engaging the ratchet below the feed-pawl tooth 19. When the hopper is advanced, the detent-pawl clicks over the ratchet, and its weight causes it to drop rearwardly into the next tooth and to prevent rotation of the hopper in a direction opposite to the arrow 100, Fig. 1. A lateral lug or projection 33 is formed on the outer face of the detent-pawl for a purpose to be described.

Referring to Fig. 2, it will be seen that the detent-pawl remains in operative engagement with the ratchet during the setting movement of the feed-pawl, so that at such time the hopper cannot be jarred or accidentally moved in a retrograde direction. A second laterally-extended lug or projection 34 is formed on or secured to the detent-pawl at its upper end substantially opposite to the tooth 27 and in such position relatively to the finger 17 that when the feed-pawl is manually retracted the finger will engage the lug 34 and will retract the detent-pawl from engagement with the ratchet, such manual retraction being effected by the operative grasping the finger-piece 20 and swinging the feed-pawl forward into the position shown in Fig. 3, thus clearing or freeing the hopper from the control of its feed mechanism and the detent device. This will be referred to hereinafter. I have provided a novel and efficient stop to prevent overrunning of the hopper when it is advanced and to limit the advance movement to a predetermined amount. To this end I have provided a stop-pawl 35, (see Fig. 6,) having a tooth 36 at its rear or free end provided with an upright face 37, adapted to cooperate with the leading face of one of the ratchet-teeth, and at its outer end the stop-pawl is provided with a semihub 38, which loosely embraces the transferer-hub 8. The stop-pawl is thus mounted to rock concentrically with the axis of the transferer, and it extends rearwardly to the ratchet, passing between the detent-pawl 26 and the feed-pawl. The hook 39 on the free end of the stop-pawl has attached to it one end of a spring 40, the other end of the spring being attached to the hook 29 on the extension 28 of the detent-pawl, the spring by its contraction tending to swing upward the stop-pawl toward the detent-pawl and retaining the tooth 36 of the stop-pawl in operative engagement with a ratchet-tooth under normal conditions. The stop-pawl is provided with cams 41 and 42, and a lug 43, extended laterally from the inner face of the body 16 of the feed-pawl, is arranged to cooperate with one or the other of the cams.

When the feed-pawl is set, the downward movement thereof causes the lug 43 to engage the cam 42 and depress or swing downward the stop-pawl 35, disengaging the tooth-face 37 thereof from the ratchet, as shown in Fig. 2, so that the ratchet can advance on the

feed movement of the feed-pawl far enough to carry the last-engaged tooth beyond the face 37 of the tooth of the stop-pawl. The advance of the hopper is initiated before the spring 40 is free to lift the stop-pawl into the path of the next tooth of the ratchet, the lug 43 cooperating with the cam 42 long enough to permit such initial movement of the hopper. As the advance of the latter is continued, however, the stop-pawl rises until it engages the fresh tooth of the ratchet, and when the stop-pawl and ratchet are in the relative position shown in Fig. 1 it will be seen that further advance of the ratchet cannot be effected, for the push of the hopper is transmitted through the stop-pawl in a line which substantially passes through its axis. Hence the hopper is stopped after a predetermined advance. The rise of the stop-pawl is of course limited by the engagement of the point of the ratchet-tooth with the corner formed by intersection of the faces 37 and 44 of the stop-pawl. There is no direct connection or engagement at any time between the transferer and the ratchet, the hopper advance being effected by or through the actuating-spring 25, and its stoppage when advanced by or through the cooperation of the stop-pawl and ratchet, as explained, so that there is no hard bump on the endmost filling-carrier of the series when the latter is moved into transferring position against the fixed stop 6.

If the operative desires to free the hopper from its controlling means, hereinbefore described, so that it can be turned freely in either direction, for the purpose of inserting filling-carriers or for any other purpose needful, he grasps the finger-piece 20, pulls the feed-pawl forward, the latter swinging at such time on the pin 13 as a fulcrum, and the finger 17 by cooperation with the lug 34 of the detent-pawl withdraws tooth 27 of the latter from the ratchet as the manual retraction of the feed-pawl withdraws its tooth 19 from engagement with the ratchet. As the feed-pawl is thus retracted the lug 43 thereon is brought into engagement with the cam 41 on the stop-pawl 35, and the latter is depressed or swung downwardly about its fulcrum into the position shown in Fig. 3, withdrawing its tooth from engagement with the ratchet, so that the hopper is freed entirely from engagement with all three pawls and the operative can turn the hopper on its axis, as desired. By grasping the hook 29 on the free end of the detent-pawl and pulling the latter forward the tooth 27 is withdrawn from the ratchet, and the lug 34 on the detent-pawl engages the adjacent edge of the part 18 of the feed-pawl and swings the latter forward, withdrawing its tooth 19 from the ratchet, the feed-pawl then acting, as has been described, to retract the stop-pawl 35. It will be manifest, therefore, that

either one of the feed or detent members can be disengaged from the ratchet by or through manual disengagement of the other member from said ratchet.

5 The lug 33 on the lower portion of the detent-pawl projects beneath the stop-pawl and limits its downward movement and at the same time acts in an indirect way to limit the manual retractive movement of the feed
10 and detent pawl. When the finger-piece is released, the feed-pawl returns to operative position by expansion of the spring 25, and the detent and stop pawl are restored to position in which they can cooperate with
15 the ratchet, and if the hopper has not been left by the operative in such position that the teeth of the several pawls can immediately and properly engage the ratchet a slight movement of the hopper will carry the points
20 of the ratchet-teeth forward far enough to permit the immediate positioning of the several pawl-teeth, restoring the parts to the condition shown in Fig. 1. The detent-pawl
25 cooperates with the ratchet at a point intermediate the feed and stop pawls in the construction herein shown and described.

Changes or modifications in the details of construction may be made by those skilled in the art without departing from the spirit
30 and scope of my invention, one practical embodiment of which is herein shown and described.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—
35

1. A movable hopper to hold a series of filling-carriers, a ratchet movable therewith, a transfer-
40 rer, a spring-actuated feed-pawl to cooperate with the ratchet, means to positively set the pawl by or through operative movement of the transfer-
45 rer, the pawl acting to advance the hopper on the return movement of the transfer-
rer, a detent for the ratchet, the ratchet being engaged normally
by the pawl and detent, and means to disengage either one of said members from the
ratchet by or through manual disengagement of the other member from said ratchet.

2. A movable hopper to hold a series of filling-carriers, a ratchet movable therewith, a
50 transfer-
rer, feed and detent pawls cooperating with the ratchet, means to set the feed-pawl by or through operative movement of the transfer-
55 rer, to advance the hopper on the return of the transfer-
rer to normal position, and means to disengage both pawls from the ratchet by or through manual retraction of either pawl.

3. A movable hopper to hold a series of filling-carriers, a ratchet movable therewith, a
60 transfer-
rer, feed and detent pawls cooperating with the ratchet, a spring to actuate the feed-pawl, means to set the latter positively by or through operative movement of
65 the transfer-
rer, the spring acting through

said feed-pawl to advance the hopper on the return of the transfer-
rer, and a normally-inoperative connection between the pawls whereby manual retraction of the feed-pawl
70 disengages the detent-pawl and the ratchet.

4. A movable hopper to hold a series of filling-carriers, a ratchet movable therewith,
75 feed and detent pawls cooperating with the ratchet, means to control the operation of the feed-pawl to effect the advance of the hopper
upon each operation of the transfer-
80 rer, a connection between the pawls whereby both may be disengaged from the ratchet by manual retraction and disengagement of the feed-
pawl, and a transfer-
85 rer to remove the filling-carriers one by one.

5. A movable hopper to hold a plurality of filling-carriers, a transfer-
85 rer to remove the latter one by one, means to advance the hopper step by step, a device to prevent retrograde movement of the hopper, and means to free the hopper from the control of said device
and the advancing means by or through manual movement of a member of such advancing
90 means to inoperative position.

6. A rotatable hopper to hold a circularly-
95 arranged series of filling-carriers, a transfer-
rer to remove the latter one by one, means to advance automatically the hopper step by
step, a device to prevent retrograde rotation
of said hopper, and means to free the hopper
100 from the control of said device and said advancing means by or through manual movement of a member of such advancing means
into inoperative position.

7. A movable hopper to hold a series of filling-carriers, a ratchet movable therewith, a
105 transfer-
rer, a spring-actuated feed-pawl to cooperate with the ratchet, a lost-motion connection between said pawl and transfer-
110 rer to set the former by operative movement of the latter, a device to prevent retrograde movement of the ratchet, and means to disengage
said device and the ratchet by or through
manual retraction of the feed-pawl from co-
operation with said ratchet.

8. A movable hopper to hold a series of filling-carriers, a ratchet movable therewith, a
115 transfer-
rer, a spring-actuated feed-pawl to cooperate with the ratchet, a slot-and-pin
connection between the pawl and transfer-
120 rer, to set the former as the latter completes its operative movement, the pawl advancing the hopper on the return movement of the transfer-
rer, a detent for the hopper, and a connection
125 between said detent and pawl whereby the former is disengaged from the ratchet by manual movement of the pawl into inoperative position.

9. A rotatable hopper to contain a plurality of filling-carriers, a transfer-
130 rer to remove the latter one by one, spring-acting means to advance the hopper step by step, a connection between said means and the transfer-
rer to set the former by operative movement of

the latter, a hopper-detent, and means to free the hopper from control of both said advancing means and the detent when said means is rendered inoperative manually.

5 10. A rotatable hopper to contain a plurality of filling-carriers, a transferrer to remove the latter one by one, hopper-advancing means, comprehending a ratchet movable with the hopper, a cooperating feed-pawl, an
10 operating-spring therefor, and a connection between the pawl and transferrer to set the former by movement of the latter to remove a filling-carrier, a detent normally cooperating with the ratchet, and a connection between
15 said detent and pawl whereby both are disengaged from the ratchet by manual retraction of the pawl.

11. A movable hopper to hold a plurality of filling-carriers, a transferrer to remove the
20 latter one by one, a ratchet movable with the hopper, a spring-actuated feed-pawl to cooperate with the ratchet, and a lost-motion connection between the pawl and transferrer to set the former by or through operative
25 movement of the latter, the spring-actuated pawl advancing the hopper as the transferrer returns to normal position.

12. A movable hopper to hold a plurality of filling-carriers, a ratchet movable with the
30 hopper, a cooperating feed-pawl, a transferrer, one having a slot and the other provided with a pin entering the slot, constituting a positive, lost-motion connection between the pawl and transferrer, operative movement of
35 the latter acting through such connection to set the pawl as a filling-carrier is transferred from the hopper, and a spring to actuate the feed-pawl and advance the hopper while the transferrer returns to normal position.

13. A movable hopper to hold a plurality of filling-carriers, a ratchet movable with the
40 hopper, a cooperating feed-pawl, a transferrer, one having a slot and the other provided with a pin entering the slot, whereby the transferrer and pawl are capable of limited relative movement, said parts moving in unison
45 to set the pawl as the transferrer completes its operative stroke, and a spring to actuate the feed-pawl and advance the hopper as the transferrer returns to its normal position.
50

14. A rotatable hopper to hold a series of filling-carriers, a ratchet movable therewith, a transferrer, a feed-pawl carried by and also
55 movable relatively to the transferrer, means acting by or through operative movement of the latter to set the feed-pawl, a spring to actuate the pawl and advance the hopper on the return of the transferrer, a detent-pawl, and
60 means to disengage both pawls from the ratchet by manual retraction of the feed-pawl.

15. A rotatable hopper to hold a series of filling-carriers, a ratchet movable therewith,
65 a transferrer, means, including a feed-pawl,

to advance the hopper upon each operation of the transferrer, a detent-pawl, a stop-pawl to positively limit each advance of the hopper, and means to disengage all of said pawls from the ratchet by manual retraction of the
70 feed-pawl.

16. A rotatable hopper to hold a series of filling-carriers, a ratchet movable therewith, a transferrer, a feed-pawl carried by and also
75 movable relatively to the transferrer, and positively set by operative movement of the latter, a spring to act through said pawl to advance the hopper upon return movement of the transferrer, a detent to prevent retrograde rotation of the hopper, and a stop-co-
80 operating with the ratchet to limit advance of the hopper and rendered inoperative by the setting movement of the feed-pawl.

17. A rotatable hopper adapted to hold a series of filling-carriers and having an attached
85 iatchet, a transferrer, a spring-actuated feed-pawl to cooperate with the ratchet and advance the hopper after each operative movement of the transferrer, a detent to prevent reverse rotation of said hopper, and a
90 stop cooperating with the ratchet to limit advance of the hopper and rendered inoperative by the setting movement of the feed-pawl.

18. A rotatable hopper adapted to hold a
95 series of filling-carriers and having an attached ratchet, a transferrer, a spring-actuated feed-pawl to cooperate with the ratchet and advance the hopper after each operative movement of the transferrer, a movable stop
100 to engage the ratchet and limit advance of the hopper, and means to render the stop inoperative by setting movement of the feed-pawl.

19. A rotatable hopper adapted to hold a
105 series of filling-carriers and having an attached ratchet, a transferrer, a spring-actuated feed-pawl to cooperate with the ratchet and advance the hopper after each operative movement of the transferrer, a pivotally-
110 mounted, spring-controlled stop-pawl to cooperate with the ratchet and limit advance of the hopper, and positively-acting means to render said stop-pawl inoperative by setting movement of the feed-pawl.
115

20. A rotatable hopper adapted to hold a series of filling-carriers and having an attached
120 ratchet, a transferrer, a spring-actuated feed-pawl to cooperate with the ratchet and advance the hopper, a connection between said pawl and the transferrer, to set the former by the operative movement of the latter, a spring-controlled stop-pawl to cooperate with the ratchet and limit advance of
125 the hopper, and means to disengage the stop-pawl and ratchet by the setting movement of the feed-pawl or by its manual disengagement from the ratchet.

21. A rotatable hopper adapted to hold a series of filling-carriers and having an at-
130

tached ratchet, a transferrer, a spring-actuated feed-pawl to cooperate with the ratchet and advance the hopper, a connection between said pawl and the transferrer, to set the former by the operative movement of the latter, a spring-controlled stop-pawl, to cooperate with the ratchet and limit advance of the hopper, a detent-pawl cooperating with the ratchet, and means to simultaneously disengage both the stop and detent pawls from the ratchet by or through manual retraction of the feed-pawl to inoperative position.

22. A rotatable hopper adapted to contain a series of filling-carriers and having an attached ratchet, a transferrer to remove the filling-carriers one by one, a feed-pawl operatively connected with and set by operative movement of the transferrer, an actuating spring to cause the pawl to advance the hopper on return movement of the transferrer, a detent-pawl and a stop-pawl, both cooperating with the ratchet to respectively prevent retrograde motion and limit the advance of the hopper, a yielding connection between said pawls, and means to retract the stop-pawl by or through setting movement of the feed-pawl.

23. A rotatable hopper adapted to contain a series of filling-carriers and having an attached ratchet, a transferrer to remove the filling-carriers one by one, a feed-pawl operatively connected with and set by operative movement of the transferrer, an actuating spring to cause the pawl to advance the hopper on return movement of the transferrer, a detent-pawl and a stop-pawl, both cooperating with the ratchet to respectively prevent retrograde motion and limit the advance of the hopper, a yielding connection between said pawls, means to render inoperative both of said pawls by manual disengagement of the feed-pawl from the ratchet, and means to positively retract the stop-pawl by or through setting movement of the feed-pawl.

24. A rotatable hopper adapted to contain a series of filling-carriers and having an attached ratchet, a transferrer to remove the filling-carriers one by one, a feed-pawl operatively connected with and set by operative movement of the transferrer, an actuating spring to cause the pawl to advance the hopper on return movement of the transferrer, a detent-pawl and a stop-pawl, both cooperating with the ratchet to respectively prevent retrograde motion and limit the advance of the hopper, a yielding connection between said pawls, to normally effect their cooperation with the ratchet, the stop-pawl being fulcrumed coaxially with the transferrer, a separate fixed fulcrum for the detent-pawl, and means to render inoperative the stop-pawl during a portion of the setting and operating movement of the feed-pawl.

25. A rotatable hopper adapted to contain

a series of filling-carriers and having an attached ratchet, a transferrer to remove the filling-carriers one by one, a spring-actuated feed-pawl to advance the hopper step by step, a connection between said pawl and the transferrer to set the former by operative movement of the latter, a hopper-detent and a hopper-stop, normally acting to prevent retrograde motion and to limit advance of the hopper, respectively, and means to free the hopper from the control of said feed-pawl, detent and stop by or through manual retraction of the feed-pawl.

26. A rotatable hopper adapted to contain a series of filling-carriers and having an attached ratchet, a transferrer to remove the filling-carriers one by one, a feed-pawl fulcrumed on the transferrer, a slot-and-pin connection between them, a spring to retain the pawl in cooperation with the ratchet and also to effect feed movement of said pawl to advance the hopper, operative movement of the transferrer setting the feed-pawl, a detent-pawl provided with a projection, a pivotally-mounted stop-pawl to cooperate with the ratchet and prevent overrunning of the hopper, a spring to normally control the stop-pawl, two cams on the latter, a lug on the feed-pawl to cooperate with one cam and disengage the stop-pawl from the ratchet when the feed-pawl is set, and to cooperate with the other cam when the feed-pawl is retracted manually, and a finger on the feed-pawl to engage the projection on the detent-pawl and disengage the latter from the ratchet when the feed-pawl is retracted manually.

27. A rotatable hopper adapted to contain a series of filling-carriers and having an attached ratchet, a transferrer to remove the filling-carriers one by one, a feed-pawl fulcrumed on the transferrer, a slot-and-pin connection between them, a spring to retain the pawl in cooperation with the ratchet and also to effect feed movement of said pawl to advance the hopper, operative movement of the transferrer setting the feed-pawl, a detent-pawl and a stop-pawl, mounted to rock on separate fulcra, a spring connecting said pawls and normally effecting their cooperation with the ratchet, and separate devices on the feed-pawl to engage respectively the detent and stop pawls to free the hopper from control thereof by or through manual retraction of the feed-pawl.

28. A rotatable hopper having an attached ratchet and adapted to contain a series of filling-carriers, a rocking transferrer to remove the latter one by one, feed mechanism for the hopper, comprising feed and stop pawls to cooperate with the ratchet and advance the hopper a predetermined distance upon each operation of the transferrer, a spring to effect advance of the hopper by or through the feed-pawl, a detent-pawl to prevent retrograde rotation of the hopper, and

means to free the hopper from the control of all of said pawls by or through manual retraction of one of them.

29. A rotatable hopper having an attached
5 ratchet and adapted to contain a series of
filling-carriers, a rocking transferrer to re-
move the latter one by one, feed mechanism
for the hopper, comprising feed and stop
pawls to coöperate with the ratchet and ad-
10 vance the hopper a predetermined distance
upon each operation of the transferrer, the
stop-pawl being fulcrumed coaxially with
the transferrer, a lost-motion connection be-
15 tween the feed-pawl and transferrer, to set
the former positively upon operative move-
ment of the latter, an actuating-spring for
the feed-pawl, a detent-pawl coöperating
with the ratchet, a spring connecting the de-
20 tent and stop pawls adjacent their ratchet-
engaging portions, means to render inoper-
ative the stop-pawl by setting movement of
the feed-pawl, and means to free the hopper
from the control of all of said pawls by or
through manual retraction of one of them.

25 30. A rotatable hopper having an attached
ratchet and adapted to contain a series of
filling-carriers, a rocking transferrer to re-
move the latter one by one, feed mechanism
for the hopper, comprising feed and stop
30 pawls to coöperate with the ratchet and ad-
vance the hopper a predetermined distance
upon each operation of the transferrer, the
stop-pawl being fulcrumed coaxially with
the transferrer, a lost-motion connection be-
35 tween the feed-pawl and transferrer, to set

the former positively upon operative move-
ment of the latter, an actuating-spring for
the feed-pawl, a detent-pawl coöperating
with the ratchet, a spring connecting the de-
tent and stop pawls adjacent their ratchet- 40
engaging portions, means to render inoper-
ative the stop-pawl by setting movement of
the feed-pawl, a finger-piece on the latter,
and means to free the hopper from the con-
trol of all of said pawls by manual retraction 45
of the feed-pawl through its finger-piece.

31. A rotatable hopper having an attached
ratchet and adapted to contain a series of
filling-carriers, a rocking transferrer to re-
move the latter one by one, feed mechanism 50
for the hopper, comprising feed and stop
pawls to coöperate with the ratchet and ad-
vance the hopper a predetermined distance
upon each operation of the transferrer, a
spring to effect advance of the hopper by or 55
through the feed-pawl, a detent-pawl coöper-
ating with the ratchet between the feed
and stop pawls, to prevent retrograde rota-
tion of the hopper when the feed-pawl is be-
ing set, and means to render inoperative said 60
stop-pawl by or through setting movement
of the feed-pawl.

In testimony whereof I have signed my
name to this specification in the presence of
two subscribing witnesses.

JONAS NORTHROP.

Witnesses:

CLARE H. DRAPER,
FRANK J. DUTCHER.