Feb. 20, 1968 E. D. PIERSON ET AL 3,369,805

APPARATUS FOR LOADING WRAPPERS INTO A BUNDLE UNDERWRAPPER

Filed Feb. 23, 1967 3 Sheets-Sheet 1

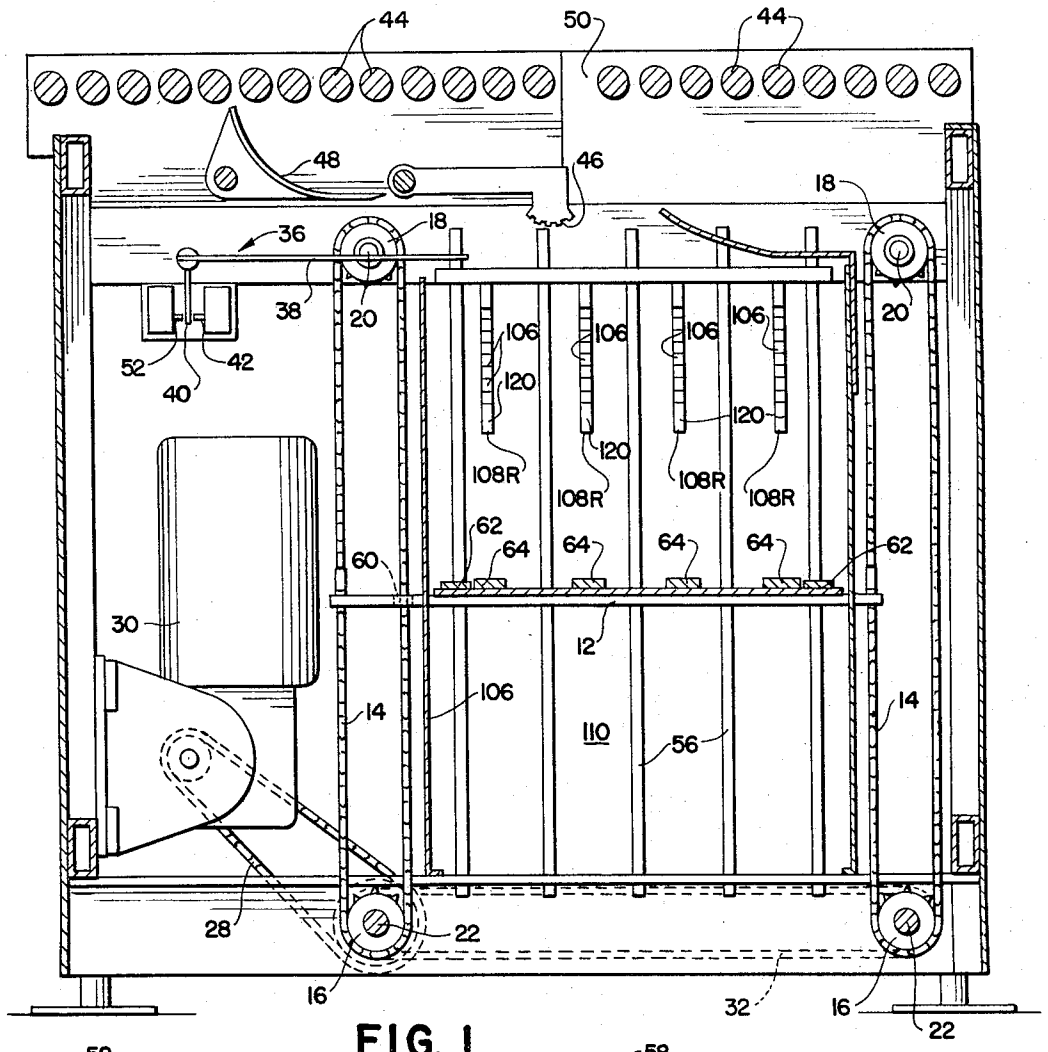



FIG. 1

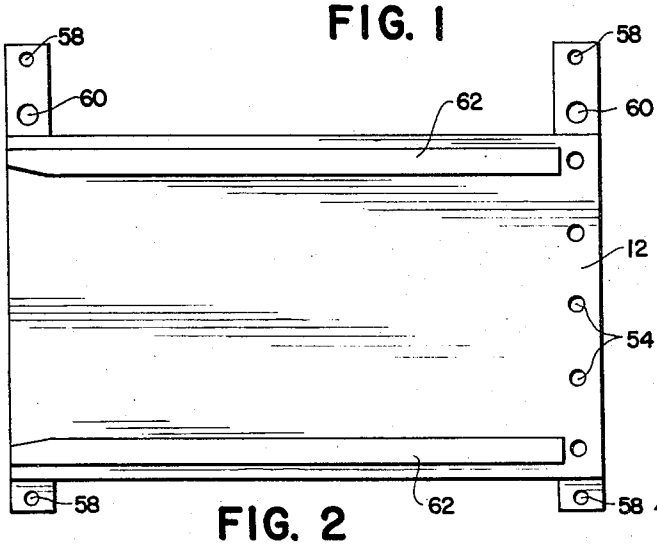



FIG. 2

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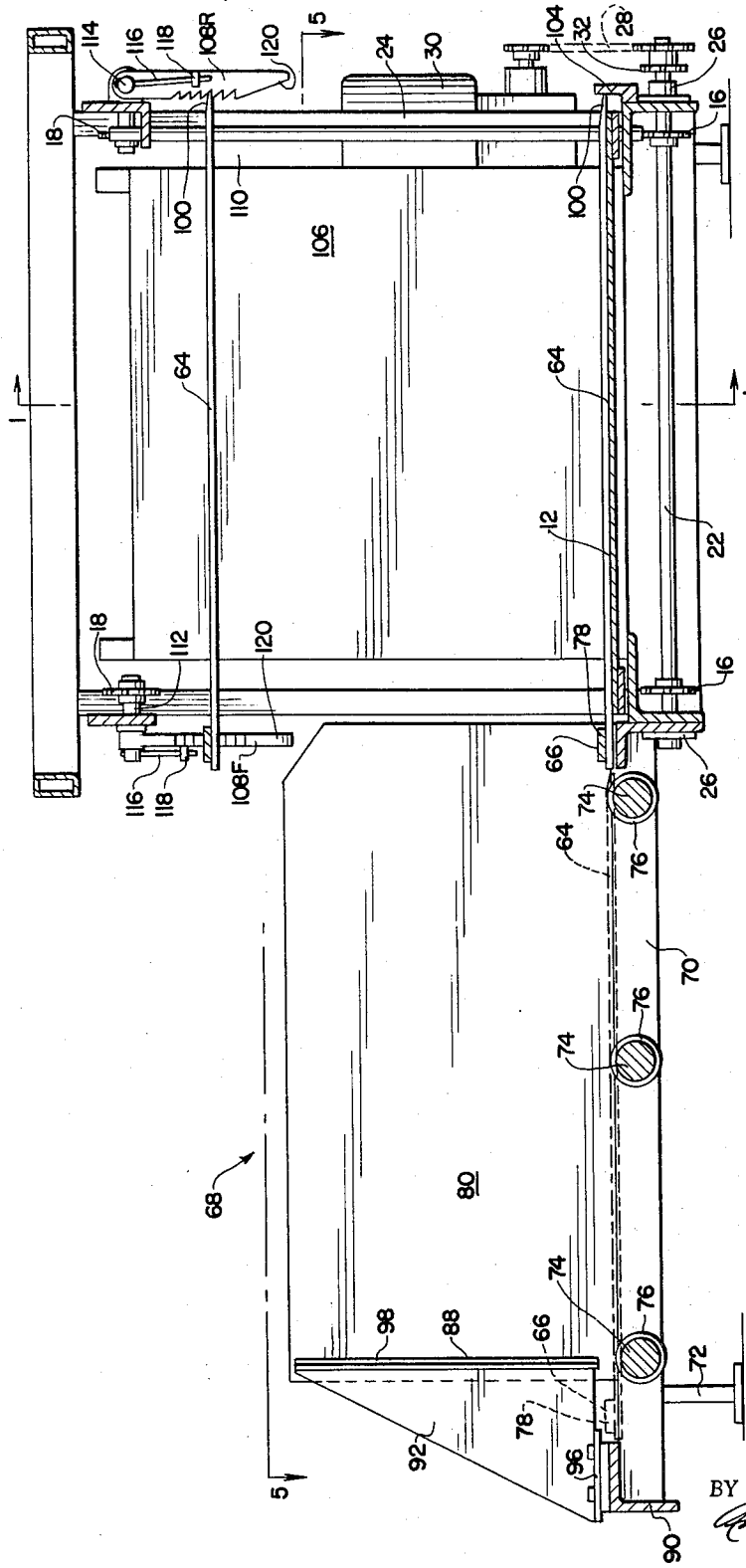



FIG. 3

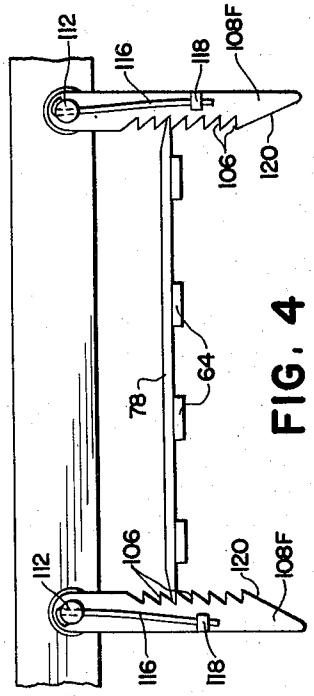



FIG. 4

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APPARATUS FOR LOADING WRAPPERS INTO A BUNDLE UNDERWRAPPER

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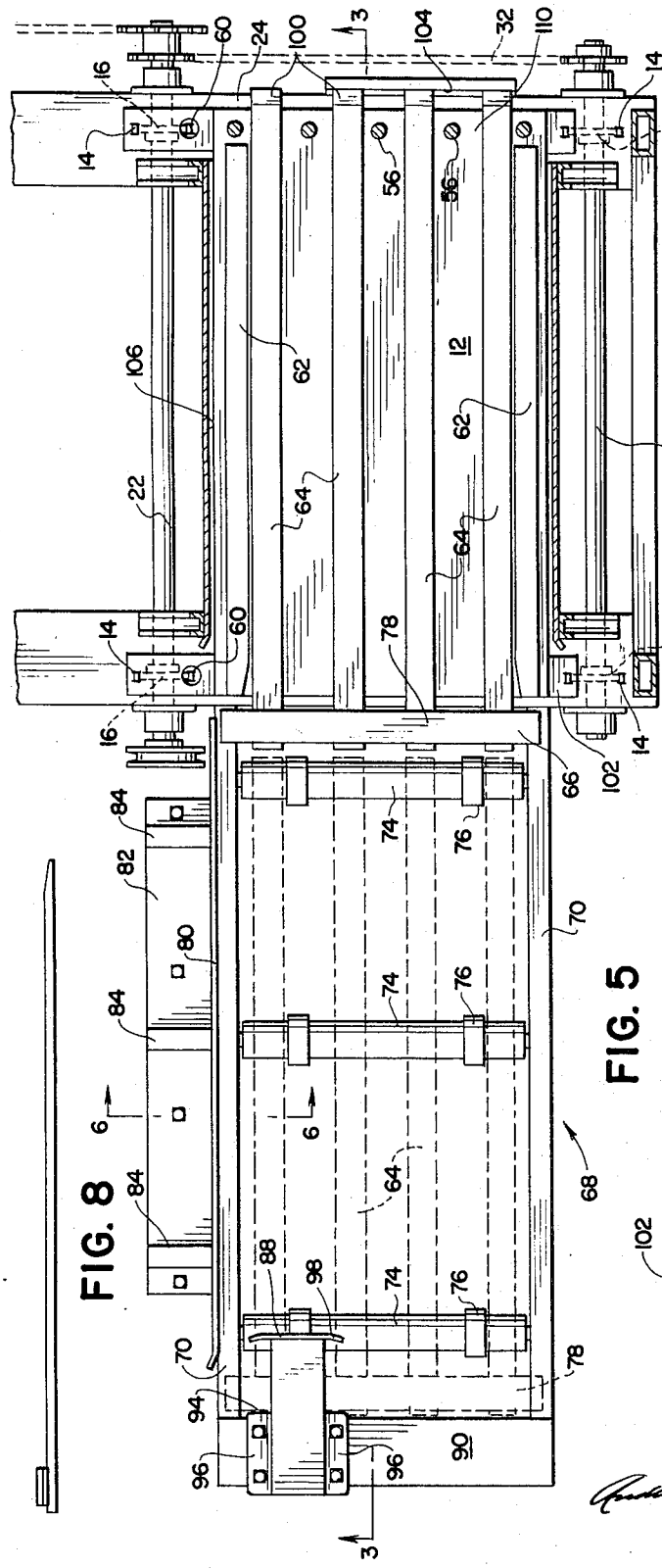


FIG. 5

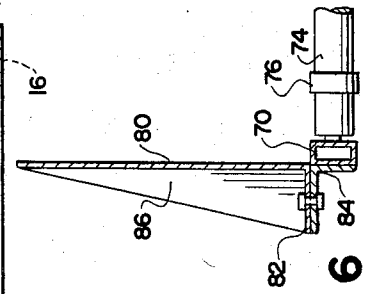


FIG. 6

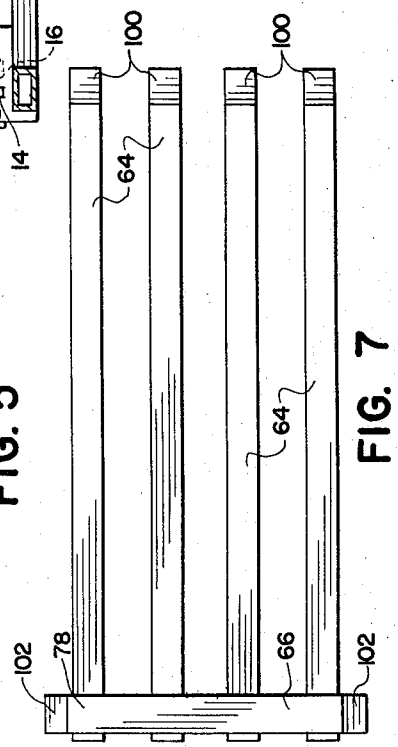


FIG. 7



FIG. 8

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United States Patent Office 3,369,805 Patented Feb. 20, 1968



3,369,805

# APPARATUS FOR LOADING WRAPPERS INTO A BUNDLE UNDERWRAPPER

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Continuation-in-part of application Ser. No. 406,472, Oct. 26, 1964. This application Feb. 23, 1967, Ser. No. 617,966

12 Claims. (Cl. 271—62)

## ABSTRACT OF THE DISCLOSURE

This invention concerns a palette and palette supporting mechanism that will hold a partially-used stack of folded wrappers in an elevated operative position while the stack elevator shown in our application Ser. No. 406,472 is dropped down to receive a second palette containing an additional wrapper supply. The elevator is employed to elevate the second palette and fresh wrapper supply into position underneath the first palette, whereupon, said first palette is withdrawn from between the stacks and used to receive a fresh supply of wrappers in the same manner as the second palette while the underwrapper continues to operate.

The present application is a continuation-in-part of our copending application Ser. No. 406,472, filed Oct. 26, 1964, and entitled "Method and Apparatus for Separating Folded Wrappers and Placing Same Under Goods To Be Packaged."

In the above-identified application, we disclose a machine for withdrawing folded wrappers one at a time from a stack thereof and placing same underneath goods, such as bundles of newspapers, moving along a superimposed roller conveyor. The stack of wrappers is supported by an elevator that operates intermittently and automatically to always maintain the uppermost wrapper at a predetermined level necessary for it to be engaged by the pickup mechanism. It has now been found, however, that it is a distinct disadvantage to have to stop the underwrapper and associated conveyor line in order to recharge the unit with a new supply of folded wrappers. If the underwrapper is used on an intermittent production line, many opportunities exist during lulls in the production cycle when it can be recharged; however, in the case of a high-speed production line such as, for example, a newspaper mailing room, even a brief interruption in the flow of bundles from the counter-stacker units creates many problems. Thus, it became necessary to design a mechanism to be incorporated into applicants' underwrapping machine aforementioned whereby the supply of folded wrappers could be replenished periodically without having to interrupt the wrapping cycle for even an instant.

The above requirements have been met through the use of a pair of interchangeable palettes used to support, respectively, the partially-used stack and the fresh supply thereof. Initially, one of the palettes is placed upon the bedplate or floor of the stack elevator while the latter is at or near its lowermost position. The stack of folded wrappers is then placed atop the palette and the elevator energized to raise same and bring the top of the stack up against the actuator of a limit switch which controls the elevator and keeps the top of the stack at a predetermined level automatically. As the supply of wrappers in the original stack diminishes, the palette supporting them eventually reaches a height at which a ratchet mechanism engages the sides thereof and supports it independently of the elevator. Once the palette



is thus independently supported, the elevator can be dropped down again to receive the second of the two palettes and an additional supply of wrappers. The final operation in the reloading cycle is to raise the elevator along with the second palette and new supply of wrappers up until the new stack supports the partially-used stack from underneath with the first palette therebetween; whereupon, the first palette can be withdrawn for use in place of the second palette to initiate a second reloading cycle.

It is, therefore, the principal object of the present invention to provide a novel and improved apparatus for recharging a supply of folded wrappers to an underwrapper while the latter continues to operate.

A second objective of the invention herein disclosed and claimed is the provision of a unique method for reloading underwrapping units without interrupting the wrapper-dispensing cycle.

Another object is to provide a system for replenishing a supply of wrappers to a wrapping machine that employs a pair of interchangeable palettes and a means for holding one in elevated stack-supporting position while the stack elevator is dropped from therebeneath into position to raise a fresh supply of wrappers on the second palette.

Still another object is to provide a wrapper-stack replenishing mechanism that can easily be incorporated into applicants' patented underwrapper without substantial modification.

An additional objective of the invention forming the subject matter hereof is to provide a reloading mechanism that complements and improves the functions of the underwrapper unit without detracting therefrom in any manner.

Further objects are to provide an improved method and apparatus for recharging wrappers into an underwrapper that is simple, compact, efficient, reliable, foolproof, inexpensive and versatile.

Other objects are in part apparent and in part pointed out specifically hereinafter in connected with the description of the drawings that follows, and in which:

FIGURE 1 is a vertical section showing the pertinent portions of our patented underwrapper that relate to the improved wrapper loading system which is also shown;

FIGURE 2 is a top plan view of the elevator floor;

FIGURE 3 is a vertical section taken along line 3—3 of FIGURE 5 showing the apparatus for loading the wrappers and one of the palettes onto the elevator;

FIGURE 4 is a fragmentary detail to a slightly enlarged scale showing the ratchet mechanism that retains the palette and partially-consumed stack of wrappers in elevated position while the elevator is dropped down and reloaded;

FIGURE 5 is a horizontal section taken along line 5—5 of FIGURE 3;

FIGURE 6 is a fragmentary section taken along line 6—6 of FIGURE 5;

FIGURE 7 is a top plan view of one of the interchangeable palettes; and

FIGURE 8 is an edge view thereof.

Referring now to the drawings for a detailed description of the present invention and, initially, to FIGURES 1, 3 and 5 for this purpose, reference numeral **10** has been employed to designate broadly our patented underwrapper equipped with the improved loading mechanism that forms the subject matter of the instant application. A brief review of the function, operation and more important apparatus incorporated in our patented underwrapper will be helpful in understanding the improvements to which the instant application is directed, although reference should be made to our application Ser.

No. 406,472, for a detailed description of the basic machine.

A stack of folded wrappers oriented such that their folds lie along the left edge thereof as viewed in FIGURE 1 are placed atop the elevator floor **12**. This elevator is attached at all four corners to endless sprocket chains **14** that pass around vertically-spaced pairs of sprockets **16** and **18**. Extending transversely of the machine are pairs of aligned stub shafts **20** that receive the sprockets **18** for rotation thereon. Longer common shafts **22** paralleling the stub shafts, but along the bottom of the cabinet **24**, are journaled for rotation within bearings **26** and carry the sprockets **16**.

A chain-and-sprocket drive **28** operatively connects reversible electric gear motor **30** to one of the longer shafts **22** and the shaft so driven is connected in driving relation to its companion shaft **22** by still another chain-and-sprocket drive **32**. Thus, all four shafts **22**, **22**, **20** and **20** turn in unison in response to actuation of gear motor **30** so as to raise and lower elevator **12** with the stack of folded wrappers resting thereon.

No useful purpose would be served by going into detail concerning the control circuitry employed in the unit as it remains exactly the same as that disclosed in our earlier application Serial No. 406,472, and in particular FIGURE 19 thereof, to which reference may be made quite readily. It should suffice to point out that reversible gear motor **30** which raises and lowers the elevator includes, among other controls, a three-position manual switch (not shown) which has a "NEUTRAL," "UP" and "DOWN" position. Ordinarily, this switch remains in its "NEUTRAL" position where operation of the motor is controlled automatically by a stack-height sensing mechanism that has been designated in a general way by numeral **36** and which will be described in some detail later because it does have some effect on the reloading mechanism even though, as was the case with the other control circuitry, it remains identical to that of our earlier patent. Thus, a manual operating mode is provided by means of which the elevator can be lowered for the purpose of recharging the machine with a stack of wrappers and then raising the elevator to place the stack in operative position. When the manual-mode motor-control switch is actuated into the "UP" position to raise the elevator, stack-height sensing mechanism **36** comes into play to override the manual control and shut off motor **30** automatically. This occurs when the top of the wrapper stack contacts the underside of feeler arm **38**, raises the latter slightly causing it to pivot about its other end and bring switch actuator **40** connected thereto into contact with normally-closed "STOP" switch **42** that opens the motor circuit and shuts motor **30** off. The unit is thus prepared to receive its first bundle passing from left to right as viewed in FIGURE 1 along roller conveyor **44**.

The actual operating cycle is fully described in our earlier patent to which reference should be made for details in that much of the apparatus included within the underwrapper has been left out of the drawings of the present application because they have nothing to do with the reloading function and they would tend to obscure certain pertinent portions of the latter. A brief general description of the operating cycle would, however, appear to be helpful in understanding the reloading sequence to be described presently.

As a bundle, stack of newspapers or other goods move onto conveyor **44**, a switch (not shown) is tripped to initiate the wrapper pick up cycle. Wrinkle finger **46** and its associated supporting structure moves to the right as viewed in FIGURE 1, drops down on top of the uppermost wrapper of the stack and, upon continued movement to the right, raises the left-hand folded edge by sliding the upper fold across the lower. Pick up shoe **48** is, at the same time, moving to the right behind the wrinkle finger **46** and, at the appropriate time, its leading edge drops down onto the second wrapper in the stack that



has been exposed when the wrinkle finger lifted up the folded edge of the top one. As the shoe **48** moves on toward the right, it moves underneath the top wrapper and curls it up and to the right so that the folded edge thereof passes through the gap **50** in the roller conveyor. As this occurs, the bundle, which has in the meantime been moving along the conveyor, reaches the gap **50** and engages the folded edge of the uppermost wrapper projecting therethrough pulling it from the stack and leaving it underneath the bundle. Once the wrapper has left the stack, automatic sensing means (not shown) operates to return the pick up shoe **48** and wrinkle finger **46** to their original starting positions.

Now, as successive wrappers are taken off the top of the stack, the top level thereof gradually drops down permitting feeler arm **38** of the stack-height sensing mechanism **36** to drop lower also. After the upper level of the stack and the feeler resting thereon have dropped down between approximately ¼ to ½ inch, switch actuator **40** contacts normally-closed "START" switch **52** closing the circuit to the motor **30** so as to start the elevator **12** up once again. When "START" switch **52** is actuated to closed position, the motor continues to run raising the elevator and wrapper stack resting thereon until the feeler is, once again, raised up to a level where switch **42** closes to shut off the motor. This cycle repeats over and over again until the supply of wrappers diminishes to a point where it needs to be replenished. With our earlier machine, the cycle had to be interrupted while the elevator was dropped down and more wrappers added. This undesirable feature of our earlier machine has now been eliminated as will appear presently. Before proceeding to describe the novel method and apparatus for loading the unit while the underwrapper continues to run, it is worth noting that a certain amount of leeway, say a half inch or so, in the location of the upper level of the stack can be tolerated and still have the underwrapper unit function perfectly. This is because both the pick up shoes **48** and the wrinkle fingers **46** drop freely onto the top of the wrapper stack once they leave their respective cam tracks (not shown) and these elements perform their functions just as well if the stack is up or down by a half inch or so. This becomes significant in recharging the wrapper stack because some slight change in the position of the top wrapper in the stack invariably occurs as the new supply of wrappers is moved into supporting position underneath the partially-consumed stack and again when the palette is withdrawn from therebetween.

In FIGURES 1, 2 and 5, it will be seen that the elevator floor **12** is provided at its rear end with several holes **54** that loosely receive vertical guide rods **56** fastened to the frame. Apertures **58** in the elevator pass, and are fastened onto, the elevating chains **14** while the larger apertures **60** allow the return runs thereof to pass freely therethrough. A pair of parallel transversely-spaced guide rails **62** are attached to the top of the elevator floor and function, as shown most clearly in FIGURE 5, to guide the tines **64** of the palettes **66** thereon.

Looking next at FIGURES 3, 5 and 6, it will be seen that a wrapper-loading unit indicated in a general way by reference numeral **68** extends laterally from one side of the underwrapper at a height corresponding to the level of the elevator when in its lowermost position. This unit is used in place of the tray in our previous patented design. It comprises a pair of transversely-spaced parallel frame members **70** fastened to the frame at their inner ends and supported on upstanding feet **72** near their outer ends. Three longitudinally-spaced parallel rollers **74** equipped with alignment collars **76** are journaled for rotation between the frame members **70** and support the palettes with the supply of wrappers resting atop thereof while they are moved into position on the elevator floor **12**. The alignment collars **76** lie closely adjacent the inside edges of the outboard tines **64** and serve to keep the palette properly oriented as it moves onto the elevator.

The thickness of these collars is such as to permit the transverse element **78** extending across the palette tines **64** to pass over the top thereof as seen in FIGURE 3.

Along one side of the loader unit **68** is an upstanding abutment **80** adapted to align the folded edges of the wrappers. In the particular form shown, this abutment is a sheet metal plate having an outturned flange **82** along its lower edge that is bolted or otherwise attached to an angle iron **84** extending along the outside of frame element **70**. Triangular reinforcing struts **86** (FIGURE 6) reinforce the vertical wall of the abutment. A similar, but narrower, abutment **88** is fastened to another transverse angle iron **90** that spans the distance between the roller-supporting frame elements **70**. This abutment comprises, in the particular form illustrated, a pair of right triangular pieces of sheet metal **92** arranged in spaced parallel relation and joined together along their hypotenuses by a web **94**. The horizontal legs of the triangular pieces have outturned flanges **96** that bolt to angle iron **90**. Faceplate **98** is attached to the vertical legs of the triangular pieces and it occupies a right-angular relation to upstanding wall **80** of the other abutment so as to cooperate therewith in engaging the outside corner of the wrapper stack adjacent the folded edges. Abutment **88** sits above the rollers **74** so that the palette can move therebeneath as shown in FIGURE 3. Note, also, that abutment **88** is displaced from the longitudinal centerline of the rollers toward the side of the unit carrying the other abutment **80** so as to leave the mid-portion unobstructed for access to the end of the palette thereby enabling the latter to be pushed onto the elevator with its load of wrappers.

Next, with reference to FIGURES 1, 3, 5, 6 and 7, it will be seen that the free ends of the tines **64** are chamfered to a feathered edge **100** as are the projecting ends of transverse element **66** seen at **102**. When the palette is rolled across rollers **74** and onto the surface of the elevator floor **12**, the tine ends **100** engage an upturned stop **104** that is fastened to the frame of the underwrapper unit. Also, once the folded edges of the wrapper stack leave the surface of vertical abutment **80**, they come into contact with a similar wall surface **106** inside the machine that keeps them aligned as they move up on the elevator.

The procedure followed in loading the initial supply of wrappers into the machine is to place the elevator in its lowermost position, lay a palette upon the rollers in the dotted line position shown in FIGURE 5, load a stack of wrappers onto the palette with their folded edges resting against abutment **80** and push the loaded palette into the underwrapper until the tine ends contact stop **104**. Next, the elevator with the palette resting thereon is actuated manually to raise same until the uppermost wrapper engages finger **38** and shuts off motor **30** by actuating switch **42**. Finally, a second palette is placed upon the rollers in the dotted line position formerly occupied by the first one and loaded with an additional supply of wrappers. The machine is now ready to begin operation.

As operation of the underwrapper continues, the wrappers will be used up one by one with the elevator acting automatically to maintain the top of the stack at a reasonably constant level in response to the action of stack-level control **36**. After about eighty percent or so of the stack has been used up, the original palette will have risen to a level where the chamfered ends **100** of each tine as well as the correspondingly-shaped portion **102** of transverse member **78** will be engaged by the ratchet teeth **106** of spring-biased ratchets **108**.

In FIGURES 1, 2 and 4 to which specific reference will now be made, it will be seen that each of the ratchet elements **108** is mounted for limited rotation on a fixed shaft. Ratchets **108***f* at the side of the underwrapper along side the entryway into the wrapper compartment **110** are mounted on stub shafts **112** that also journal the upper transversely-aligned pair of sprockets **18**. If one were to place himself beside the underwrapper in position to introduce a stack of wrappers into the wrapper compartment **110**, ratchet elements **108***f* would be at the near upper right and left hand corners of the wrapper compartment with their toothed edges facing one another and mounted to swing across in front of the opening so as to engage the chamfered ends **102** of transverse element **78** when the palette tines were in engagement with stop **104** as shown clearly in FIGURE 4. The remaining set of four ratchet members **108***r* are mounted for limited rotational movement on fixed shaft **114** with their teeth facing out through the opening into the wrapper compartment and in position to engage the chamfered free ends **100** of each palette tine **100** as shown in FIGURE 3. The latter set of four ratchet elements are biased forwardly by elongate rod-type springs **116**, the upper ends of which pass through openings in the fixed shaft **114** while the lower ends are similarly mounted in an opening provided in an integrally-formed boss **118**. Ratchets **108***f* are similarly spring-biased toward one another. The free ends of each ratchet member are provided with an inclined cam surface **120** that engages the respective chamfered ends of the tines and transverse element **78** so as to guide same up along the edge containing the ratchet teeth while, at the same time, pushing the ratchet elements **108***r* back and spreading ratchets **108***f* apart against the bias imparted thereto by springs **116**. When springs **116** attached to ratchet members **108***r* are fully relaxed, the pointed ends of the ratchets still lie behind the chamfered ends of the tines as determined by stop **104** so that the tines will always pass up in front thereof. Similarly, springs **116** in fully-relaxed condition, still leave the ratchets **108***f* far enough apart so that the element **78** can pass therebetween and strike the inclined cam surfaces **120** thereof.

It is, of course, obvious from the above that ratchet elements **108** will cooperate with one another to support the palette along with its load of partially-consumed wrappers independent of elevator **12** once the stack has diminished to a level where these ratchets can engage the palette. Note also, that the palette engaged by the ratchets can continue on upward due to the influence of the elevator pressing against the underside thereof if the operator should neglect to recharge the unit when the palette reaches the lowermost set of notches. Once the palette is independently supported by the ratchets, the operator drops the elevator down to the bottom of the wrapper compartment by manually actuating the "DOWN" control and proceeds to introduce the fresh supply of wrappers thereon that have previously been loaded onto the other palette. Next, the elevator is again raised up by manual actuation of the elevator "UP" control to bring the top wrapper of the fresh stack up against the underside of the suspended palette. Note that at this point the underwrapper resumes automatic operation because as soon as the elevator raises the combined stack up high enough to lift finger **38** and actuate switch **42**, the elevator motor **30** will shut off. The few remaining steps in the reloading cycle are to grasp cross bar **78** of the suspended palette, withdraw it from between the fresh and partially-consumed stacks, place it on the loading platform and reload it. If, perchance, withdrawing the palette allows the partially-used stack to drop down a quarter inch or so in order to rest atop the fresh stack, the wrinkle finger and pick up shoes will readily accommodate this small drop in the level of the uppermost wrapper as previously noted. Actually, due to the highly compressible nature of the wrappers, there is little, if any, detectable change in the top level of the stack when the suspended palette is withdrawn. Any major drop in stack level will, of course, energize the stack-height sensing mechanism **36** to start the elevator up again during which interval probably no more than one wrapper pick up would be missed. Sensing means (not shown) are provided on the machine to indicate a missed wrapper and reinitiate the pick up cycle as fully described in our issued patent.

Having thus described the several useful and novel features of our improved underwrapper reloading system and method of using same, it should be apparent that the many worthwhile objectives for which it was developed have been realized. While but a single specific embodiment of the invention has been illustrated and described herein, we realize that certain changes and modifications will occur to those skilled in the art within the broad teaching hereof; hence, it is our intention that the scope of protection afforded hereby shall be limited only insofar as said limitations are expressly set forth in the appended claims.

What is claimed is:

1. In a device for delivering foldable sheet materials one at a time from atop a stack thereof that includes a wrapper stack magazine, a horizontal elevator platform mounted within the magazine for vertical movement between the top and bottom thereof, reversible electric drive means connected to the elevator platform and operative upon actuation to raise and lower same, stack-height sensing means located above the stack in position to engage the topmost wrapper thereon, and stack-level control means connected to the drive means that is responsive to movement of the stack-height sensing means so as to raise the height of the stack whenever it drops below a first predetremined level and shut off said drive means at a second predetremined level above the first, the improvement which comprises: a pair of rigid relatively flat palettes sized to rest atop the elevator with portions thereof projecting beyond both its sides and at least one of its ends, at least three ratchet-toothed arms pivotally mounted in the top of the magazine for movement in a direction substantially normal to the adjacent projecting palette portion, and spring means connected between a fixed abutment and each arm normally-biasing the toothed portions thereof into supporting engagement with the adjacent projecting portions of a palette raised into position therebetween on the elevator, said spring-biased arms and palette cooperating to support a partially-consumed stack of wrappers independent of the elevator while the latter is lowered from therebeneath and loaded with a fresh supply of wrappers stacked atop the second palette.

2. The improvement as set forth in claim 1 in which: the lower end of each arm is provided with an upwardly and inwardly inclined cam surface adapted to engage the adjacent projecting portion of the palette and force said arm away therefrom in opposition to the spring bias exerted thereon while guiding said palette up along the edge of said arm having the toothed surface.

3. The improvement as set forth in claim 1 in which: the ratchet teeth are provided with a substantially horizontal bottom edge adapted to engage and hold the underside of the projecting palette portion in supporting relation.

4. The improvement as set forth in claim 1 in which: the ratchet teeth are provided with an upwardly and inwardly inclined top edge adapted to permit the projecting portion of the palette engaged thereby to move upwardly thereover into the next higher notch in response to the lifting action exerted thereon by the elevator.

5. The improvement as set forth in claim 1 in which: each palette comprises a transversely elongate element whose extremities project beyond the side edges of the elevator in position for engagement with the ratchet-toothed arms positioned alongside thereof, and a plurality of transversely-spaced substantially parallel tines having their near ends attached to the transversely-elongate element and their remote ends projecting beyond the corresponding end of the elevator in position to engage the ratchet-toothed arm located at said end.

6. The improvement as set forth in claim 1 in which: a horizontal loading platform is positioned alongside entry into the magazine at the level of the top surface of the elevator when the latter occupies its lowermost position, said loading platform including a plurality of transversely-extending longitudinally-spaced parallel rollers sized to support a palette atop thereof and adapted to introduce same when loaded with a supply of wrappers onto the elevator.

7. The improvement as set forth in claim 5 in which: the projecting ends of the tines and transverse element are chamfered to a feathered edge adapted to engage readily in the ratchet teeth.

8. The improvement as set forth in claim 5 in which: a ratchet-toothed arm is provided for engagement with both projecting extremities of the transverse element and the projecting end of each tine.

9. The improvement as set forth in claim 5 in which: the transverse element of the palette lies wholly outboard of the elevator in accessible position between the bottom wrapper of the partially-used stack supported thereon and the top wrapper of a fresh wrapper stack raised against the underside thereof by the elevator so that said palette can be withdrawn from within said combined stacks.

10. The improvement as set forth in claim 6 in which: an upstanding substantially vertical abutment rises along side the loading platform along the edge thereof against which the folds in the wrappers are placed.

11. The improvement as set forth in claim 6 in which: a fixed upstanding abutment is provided on the end of the loading platform remote from the end from which the wrapper stack and palette are dispensed into the magazine, said abutment being positioned in spaced relation above the roller conveyor surface in overhanging relation thereto and inwardly of the adjacent end of a palette resting thereon so as to leave said palette end projecting beyond the wrapper stack in position for eventual withdrawal from therebeneath.

12. The improvement as set forth in claim 6 in which: each palette comprises a plurality of longitudinally-extending transversely-spaced substantially parallel tines interconnected at one end by a transverse member and in which at least two of the rollers have their cylindrical surfaces provided with at least one annular enlargement positioned in the space between the palette tines and adapted to guide said palette into the magazine.

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ALLEN N. KNOWLES, *Primary Examiner.*