Dec. 31, 1968 M. R. KAUFFMAN ET AL 3,419,190

TREATING AGENT DISPENSING MEANS FOR AUTOMATIC WASHING MACHINE

Filed Oct. 27, 1966 Sheet 1 of 2

FIG.2

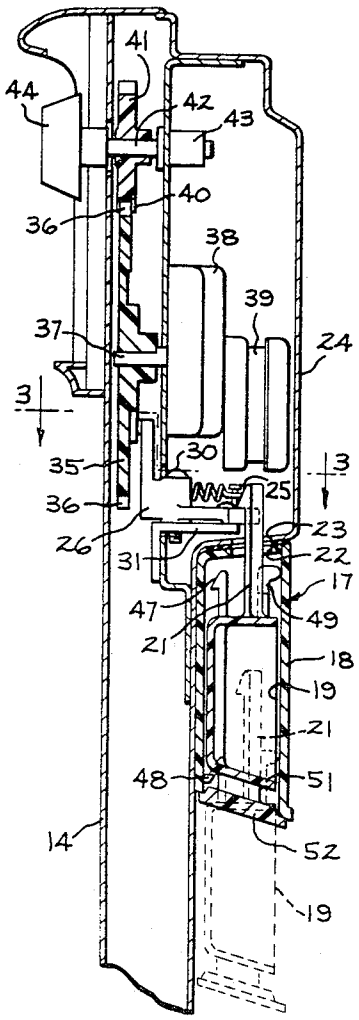


FIG.3

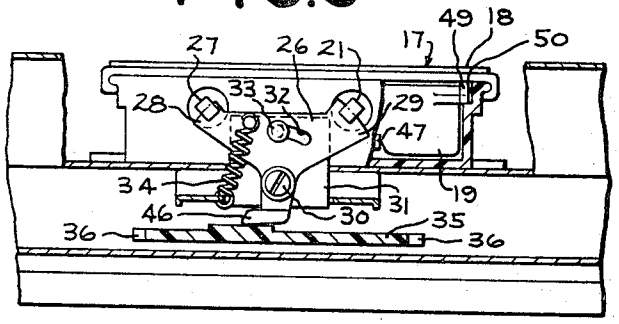


FIG.1

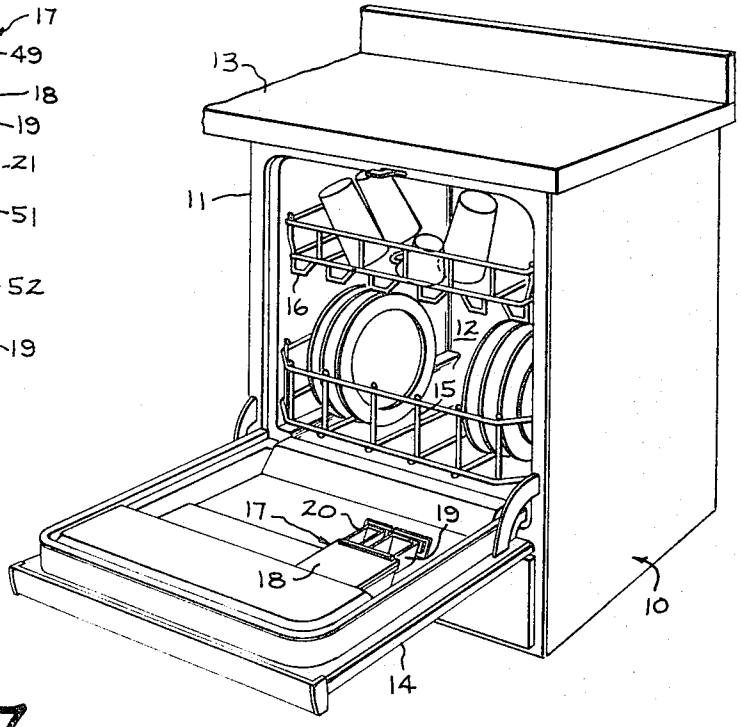
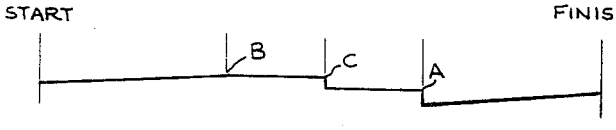


FIG.7



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Filed Oct. 27, 1966 Sheet 2 of 2

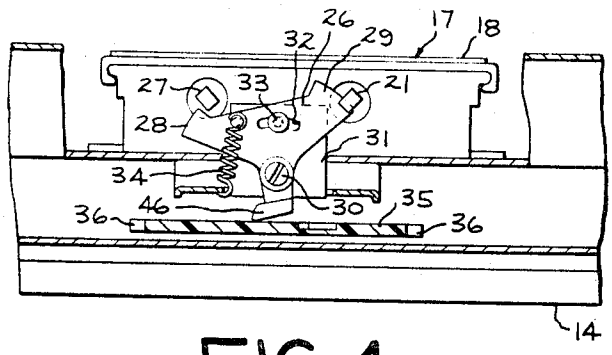


FIG. 4

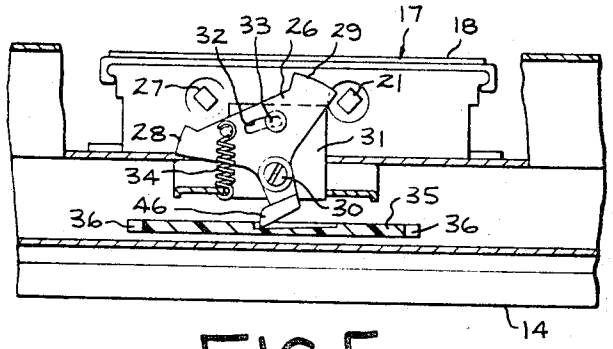


FIG. 5

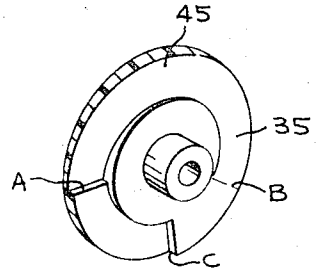


FIG. 6

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TREATING AGENT DISPENSING MEANS FOR AUTOMATIC WASHING MACHINE

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4 Claims. (Cl. 222—70)

ABSTRACT OF THE DISCLOSURE

Improved treating agent dispensing means for an automatic washing machine of the type having a wash chamber access door pivotal between a horizontal open position and a vertical closed position. The means comprise a hollow housing having an opening which faces downwardly when the access door is on its closed position. The detergent is held in a drawer-like container that is mounted for sliding movement through the housing opening. Means are provided for retaining the container substantially totally within the housing until they are released by cam means operated by a sequence control device within the access door, whereupon the force of gravity slides the container to a dispensing position substantially totally outside the housing.

This invention relates generally to automatic washing machines and, more particularly, to an improved treating agent dispensing means for an automatic washing machine.

Although not limited in its usefulness thereto, the present invention is particularly adapted for use in an automatic dishwasher. In an automatic dishwasher, it is desirable to provide one or more pre-rinses with hot water to warm the dishes and remove gross food soil. The pre-rinses are followed by a wash operation wherein detergent is added to the water. This is followed by one or more post-rinses and then a drying operation. The need for an automatic treating agent dispensing means or detergent dispenser should be apparent. If the detergent were deposited within the wash chamber simultaneously with the insertion of the articles to be washed, it would go into solution with the water for the pre-rinse. If the operator were required to manually deposit the detergent in the wash chamber at the beginning of the wash operation, the automatic aspects of the machine would be greatly compromised.

Moreover, it is sometimes desirable to provide two separate wash operations when heavily soiled articles, such as pots and pans, are being washed. This can be achieved, when the dishwasher is properly programmed, by adding detergent to either the last pre-rinse or the first post-rinse thus converting one of the rinses into a wash operation. Accordingly, it would be desirable to provide a treating agent dispenser which would allow the option of two wash operations.

Since the detergent must be dispensed automatically, for the reasons set forth above, the sequence control device normally provided to control the admission of water, the energization of the spray and drain mechanisms, and the energization of the heating means for drying, is utilized to operate the detergent dispenser. This can be accomplished electrically, i.e., with a solenoid-operated dispenser, or mechanically, i.e., by mechanically tripping a dispenser by means of linkage between the dispenser and the sequence control device. Since solenoids are relatively expensive, mechanical means have met with acceptance; however, the sequence control device is conventionally driven by a synchronous electric motor which is capable of driving only relatively light loads. Accordingly, when forced to operate a detergent dispenser mechanically, with

arrangements heretofore available, stalling of the synchronous motor is a real possibility. Since the sequence control device controls energization of the other elements of the dishwasher, its stalling creates complete malfunction of the dishwasher. Thus it would be desirable to provide a treating agent dispensing means which is mechanically operated, to avoid the expense of a solenoid or similar device, but which will not create excessive load on the sequence control device motor.

It is an object of this invenfion to provide an improved treating agent dispensing means for an automatic washing machine.

It is another object of this invention to provide a treating agent dispensing means which automatically dispenses treating agent into the wash chamber of an automatic washing machine.

It is another object of this invention to provide a treating agent dispensing means which will automatically dispense two separate charges of treating agent into the wash chamber thus providing for two separate wash operations.

It is another object of this invention to provide a treating agent dispensing means which is mechanically tripped by the sequence control device but which minimizes the possibility of stalling the sequence control device.

Briefly stated, in accordance with one aspect of the present invention, a treating agent dispensing means is provided for use in an automatic washing machine having a wash chamber, an access opening for the wash chamber and a closure member for the access opening. The closure member is pivotal between a substantially horizontal open position and a substantially vertical closed position. The treating agent dispensing means comprises a housing carried by the closure member and having an opening in one wall thereof. At least one container is provided and has an open side with the container being adapted to receive and contain a treating agent. The container is movable through the opening in the housing between a first position substantially totally within the housing and a second position substantially totally outside the housing. The open side of the container faces upwardly when the closure member is in its open position and faces toward the wash chamber when the closure member is in its closed position. Means are provided to retain the container in its first position. A sequence control device is provided within the closure member to actuate the means at a predetermined time to release the container. The opening in the housing faces downwardly when the closure member is in its closed position whereby the container will move to its second position under the force of gravity as the means is actuated to release the container.

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention, it is believed the invention will be better understood from the following description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a perspective view of an automatic washing machine employing the present invention;

FIGURE 2 is a fragmentary sectional view of the closure member of the automatic washing machine of FIGURE 1;

FIGURE 3 is a fragmentary sectional view taken along line 3—3 of FIGURE 2;

FIGURE 4 is a view similar to FIGURE 3 but showing the elements of the present invention in a different condition of operation;

FIGURE 5 is a view similar to FIGURES 3 and 4 but showing the elements in yet another condition of operation;

FIGURE 6 is a fragmentary perspective view of one element of the present invention; and,

FIGURE 7 is a graphic representation of the surface of the element of FIGURE 6.

Referring now to the drawings, and initially to FIGURE 1 thereof, there is illustrated an automatic washing machine in the form of an automatic dishwasher **10** having an outer cabinet **11** defining therein a wash chamber **12**. Dishwasher **10** may be of the undercounter type wherein it would be built into the kitchen cabinet with a conventional kitchen countertop **13** disposed thereabove. A large access opening is provided in one wall of cabinet **11** to provide access to wash chamber **12**. A closure member or door **14** is provided to close the access opening to prevent escape of liquid therethrough during operation of dishwasher **10**. Door **14** is pivotal about its lower edge between a substantially horizontal open position, as seen in FIGURE 1, and a substantially vertical closed position. Disposed within wash chamber **12** are a pair of dish-supporting racks **15** and **16** which are adapted to receive and support articles to be washed within wash chamber **12**. It is to be understood, that racks **15** and **16** are supported in a manner whereby they may be at least partially withdrawn from wash chamber **12** through the access opening to facilitate loading and unloading of the articles to be washed. A conventional dishwasher, such as dishwasher **10**, would include the following elements which are not specifically shown in the drawings. Means to control the admission of water to wash chamber **12** would be provided and would conventionally take the form of an electrically-operated valve. Additionally, an electric motor and pump assembly would be provided to effectuate a wash action within wash chamber **12** by splashing, agitating or spraying fluids about and also to drain liquids from wash chamber **12** into the conventional household sewer system. An electrical resistance heating element would be provided to effectuate drying of the articles upon completion of the normal wash and rinse operations. The foregoing elements are not shown nor discussed in detail since such elements are well known in the dishwasher art and, with respect to the present invention, may be conventional in every detail.

In an automatic dishwasher of the type just described, a complete cycle of operation conventionally includes an initial charge of water to wash chamber **12** followed by energization of the motor and pump assembly wherein the water is moved about within wash chamber **12** to effectuate a pre-rinse. After a predetermined time interval, the motor and pump assembly drains the water from wash chamber **12** thus completing the first pre-rinse. The first pre-rinse may be followed by a second pre-rinse identical to the first. This is followed by a wash operation which is substantially identical to the pre-rinse operations except that it is of longer duration and includes the admission of detergent to the water. The wash operation is followed by one or two post-rinses which are identical to the above-described pre-rinses. Following the final post-rinse, the electrical resistance heating element is energized and the articles within wash chamber **12** are dried by evaporation.

The present invention is particularly concerned with means to dispense the detergent in the wash chamber **12** at the appropriate time during the afore-described cycle of operation. In accordance with the present invention, an improved treating agent dispensing means, shown generally at **17**, is provided to automatically dispense detergent into wash chamber **12**. Dispensing means **17** includes a housing **18** carried by door **14**. A relatively large container **19** and a relatively small container **20** are provided and are individually movable between a first position wherein the containers are substantially totally within housing **18** and a second position wherein the containers are substantially totally outside housing **18**. Housing **18** has an opening one wall thereof which faces downwardly when door **14** is in its closed position, as illustrated in FIGURE 2, and containers **19** and **20** move between their first and second positions through this opening. With the foregoing arrangement, containers **19** and **20** can be conveniently filled with granular detergent when door **14** is in its open position since the open side of each of containers **19** and **20** faces upwardly when door **15** is opened as illustrated in FIGURE 1.

Once containers **19** and **20** have been filled with detergent, they are moved to the position shown in solid lines in FIGURE 2 wherein the containers are substantially totally within housing **18** so that liquid being moved about within wash chamber **12** will not have access to the detergent within the containers. Moreover, housing **18** will retain the detergent within the containers even though door **14** is pivoted through 90° to its closed position. Container **19** has a hook-like element **21** which projects through an opening **22** in housing **18** and an opening **23** in inner wall **24** of door **14**. Element **21** has a chamfered end **25** which allows element **21** to slip over and then engage a retaining means comprising a lever **26**. Engagement between element **21** and lever **26** retains container **19** within housing **18**. Similarly, container **20** is provided with a hook-like element **27** (FIGURE 3) which is not visible in FIGURE 2 inasmuch as it is disposed directly behind element **21** of container **19**.

The operation of lever **26** can best be understood from reference to FIGURES 3, 4 and 5. In FIGURE 3, lever **26** is illustrated in the position wherein it retains both of containers **19** and **20** substantially totally within housing **18**. In FIGURE 4, lever **26** has been moved, in a manner to be discussed hereinafter, so that element **27** of container **20** has been released. In FIGURE 5, lever **26** has moved to an extent wherein element **21** has also been released so that both containers **19** and **20** have moved to their positions outside housing **18**. Lever **26** has a relatively narrow leg **28** and a relatively wide leg **29**. Thus, as lever **26** moves from the retaining position of FIGURE 3 to the intermediate position of FIGURE 4, the narrowness of leg **28** results in release of element **27** while the width of leg **29** results in continued retention of element **21**. Continued movement of lever **26** to the position of FIGURE 5 results in leg **29** also moving out of retaining relationship with element **21**.

Lever **26** is pivotal about a bolt **30** which passes through lever **26** and threadedly engages a bracket **31** supported from wall **24** of door **14**. Lever **26** is provided with an arcuate slot **32** through which a stationary pin **33** extends. Pin **33**, due to its relationship with slot **32**, provides rigidity for lever **26** while still allowing lever **26** to move relative to bracket **31**. A spring biasing means **34** biases lever **26** toward the position of FIGURE 4. Movement of lever **26** is controlled by a cam **35** which has a series of gear teeth **36** about its periphery. A shaft **37** rigidly carries cam **35** whereby rotation of shaft **37** is transmitted to cam **35**. Shaft **37** is driven by a synchronous electric motor **38** which comprises a portion of a sequence control device further including a plurality of cam operated switches disposed within casing **39**. Since such sequence control devices are well known in the automatic dishwasher art, the various elements within casing **39** will not be described in detail. Gear teeth **36** mesh with gear teeth **40** on gear **41**. Gear **41** is supported by a shaft **42** which in turn is supported by a bearing **43**. Bearing **43**, of course, is supported from door **14**. A manually operable knob **44** is also secured to shaft **42** so that the sequence control device, and other elements associated therewith, may be manually adjusted or the operation thereof manually initiated by rotation of knob **44**.

Referring to FIGURE 6, cam **35** is shown in perspective. Cam **35** comprises an inclined surface **45** extending from point A to point B, a substantially flat surface from point B to point C, and a substantially flat surface from point C to point A. The graphic representation of FIGURE 7 more clearly shows the configuration of the surface of cam **35**. The end of lever **26** opposite legs **28** and **29** includes a cam follower **46** which engages the surface of cam **35** and moves lever **26**, against the biasing force of spring **34**, in response to the configuration of

cam **35**. In practice, low friction plastic or nylon materials are employed to fabricate cam **35** and lever **26**.

The sequence control device, including motor **38** and the elements within casing **39**, is programmed so that the operational cycle of dishwasher **10** begins when cam **35** is positioned such that follower **46** engages cam **35** at the point denoted "Start" in FIGURE 7. As the motor **38** is energized and rotates cam **35**, cam **35** moves relative to follower **46** so that, in effect, follower **46** moves relative to cam **35** from the "Start" point in FIGURE 7 to the "Finish" point. When point C of cam **35** passes follower **46**, lever **26** will move from the position of FIGURE 3 to the position of FIGURE 4 thus releasing container **20**. As movement continues, container **19** will be released when point A of cam **35** passes follower **46** and lever **26** moves to the position of FIGURE 5. As the dishwasher continues through the operational cycle, cam **35** will continue to rotate until follower **46** is located relative thereto at the point denoted "Finish" in FIGURE 7.

As container **19** falls, under the force of gravity, as element **21** is released, movement is limited by a second hook-like element **47** which engages a stop **48**. A second element, identical to element **47**, is associated with container **20** but is not visible in FIGURE 2 because it lies directly behind element **47**. Similarly, a stop identical to stop **48** is provided for container **20** but is not visible in FIGURE 2 since it lies directly behind stop **48**.

Container **19** is provided with a flange **49** at each side thereof which rides within a cooperating groove **50** to guide movement of container **19** in a manner similar to a drawer. Container **20** is provided with identical flanges which cooperate with identical grooves but which are not specifically shown. Also, container **19** is partially defined by an end wall **51** which has secured thereto but spaced therefrom a second wall **52** which, in cooperation with housing **18**, provides a baffle effect to prevent the ingress of fluid into container **19** when container **19** is in the position of FIGURE 2. Container **20** is provided with similar components but which once again is not visible in FIGURE 2.

The present invention provides the option of two wash operations, i.e., converting either a pre-rinse or a post-rinse into a wash operation, by providing the independently operable containers **19** and **20**. In practice, cam **35** and the sequence control device would be programmed to release container **19** during the initial portion of the regular wash operation thus automatically dispensing detergent into the wash chamber at that time. Additionally, container **20** would be programmed to be released during the initial portion of the second pre-rinse, which immediately precedes the regular wash operation. If the housewife is washing exceptionally soiled articles, she may add detergent to both containers **19** and **20** and move them to the position of FIGURE 2. This having been done, dishwasher **10** will provide one pre-rinse, a wash operation, a second wash operation, and then the regular post-rinses to be followed by the drying operation. If, on the other hand, the operator of dishwasher **10** desires only a single wash operation, container **20** will not be filled with detergent and may be left either in the released position of FIGURE 1 or may be moved to the position of FIGURE 2 with no effect on the operational cycle of the dishwasher. In this circumstance, container **20** would be released at the same time as when two wash operations are desired; however, since no detergent is contained within container **20**, the effect of the second pre-rinse will be simply a rinse and not a wash operation. Additionally, the present invention provides a mechanically tripped treating agent dispensing means, thus avoiding the relatively expensive electrical solenoid or other electrical device, but minimizes the possibility of stalling the sequence control device due to the type of cam arrangement employed. It has been found in practice that the cam and follower arrangement described herein results in a minimum load on motor **38**. It should be noted also that motor **38** is required, through cam **35**, to slowly move a release mechanism a short distance with the energy for the quick release movement coming from spring **34** rather than motor **38**.

As will be evident from the foregoing description, certain aspects of the invention are not limited to the particular details of construction of the example illustrated, and it is contemplated that various other modifications or applications will occur to those skilled in the art. It is therefore intended that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of the invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. In an automatic washing machine comprising a wash chamber, an access opening for said wash chamber and a closure member for said access opening, said closure member being pivotal between a substantially horizontal open position and a substantially vertical closed position, treating agent dispensing means comprising:

(a) a housing carried by said closure member and having an opening in one wall thereof,

(b) at least one container having an open side and adapted to receive and contain a treating agent,

(c) said container being movable through said opening in said housing between a first position substantially totally within said housing and a second position substantially totally outside said housing,

(d) said open side facing upwardly when said closure member is in said open position and facing toward said wash chamber when said closure member is in said closed position,

(e) retaining means to retain said container in said first position, and

(f) a sequence control device within said closure member to actuate said retaining means at a predetermined time to release said container,

(g) said housing opening facing downwardly when said closure member is in said closed position whereby said container will move to said second position under the force of gravity as said retaining means is actuated,

(h) said retaining means comprising:

(1) a lever mounted for pivotal movement relative to said closure member,

(2) a cam driven by said sequence control device,

(3) means to bias one end of said lever into engagement with said cam, and

(4) a hook extending from said container and adapted to be engaged by the other end of said lever whereby release of said container is effected by said cam moving said lever to the extent that said other end of said lever moves out of engagement with said hook.

2. The invention of claim **1** wherein said cam has a cam surface and an axis of rotation with said cam surface being generally in a plane perpendicular to said axis of rotation.

3. In an automatic washing machine having a wash chamber, an access opening for said wash chamber and a closure member for said access opening, said closure member being pivotal between a substantially horizontal open position and a substantially vertical closed position, treating agent dispensing means comprising:

(a) a housing carried by said closure member,

(b) a first container having an open side and adapted to receive and contain a treating agent,

(c) a second container adjacent said first container and having an open side and adapted to receive and contain a treating agent,

(d) each of said containers being movable between a first position substantially totally within said housing and a second position substantially totally outside said housing,

(e) said open side of said first container and said open

side of said second container each facing upwardly when said closure member is in said open position and facing towards said wash chamber when said closure member is in said closed position,

(f) retaining means to retain said first and said second containers in said first positions, and

(g) a sequence control device within said closure member to actuate said retaining means to release said first container and then subsequently release said second container,

(h) said housing having at least one opening, facing downwardly when said closure member is in said closed position, through which said first container and said second container will move from said first position to said second position under the force of gravity as said retaining means is actuated,

(i) said retaining means comprising:

(1) a lever mounted for pivotal movement relative to said closure member and having first, second and third legs,

(2) a cam driven by said sequence control device,

(3) means to bias said first leg of said lever into engagement with said cam,

(4) a first hook extending from said first container and adapted to engage said second leg of said lever to retain said first container in said first position, and

(5) a second hook extending from said second container and adapted to engage said third leg of said lever to retain said second container in said first position,

(6) said cam being configurated to move said first leg to remove said second and third legs from engagement with said first and second hooks whereby said containers are released.

4. The invention of claim 3 wherein said second leg is narrower than said third leg whereby movement of said lever by said cam results in said second leg moving out of engagement with said first hook prior to said third leg moving out of engagement with said second hook.

References Cited

UNITED STATES PATENTS

Re. 25,814	6/1965	Buzicky et al.	222—129
3,012,565	12/1961	Lines	222—70 X

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U.S. Cl. X.R.

222—129, 160, 500; 134—93