United States Patent

[11] 3,595,282

[72] Inventors **Francis B. Fishburne;**
Clarence H. Hinnant, Jr., both of c/o Arnold Roylance Kruger and Duke, Suite 315, 1225 Connecticut Ave. N.W., Washington, D.C. 20036

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[45] Patented **July 27, 1971**

[54] **APPARATUS FOR COMPRESSING LOOSE MATERIAL INTO CONTAINERS**
13 Claims, 11 Drawing Figs.

[52] **U.S. Cl.** **141/73,** 141/286, 100/215
[51] **Int. Cl.** **B65b 1/24**
[50] **Field of Search** ..... 141/71-—81, 286; 100/215

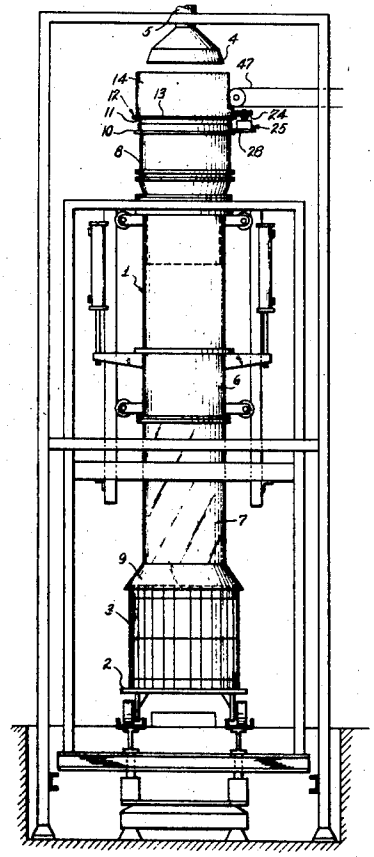
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Primary Examiner—Houston S. Bell, Jr.
Attorney—Roylance, Abrams, Berdo & Kaul

ABSTRACT: In apparatus for packing fragmentary compressible material, typically tobacco, into containers by delivering the loose fragmentary material into an upright charger disposed above the container and passing a press ram downwardly through the charger to pack the material into the container, a distributor is provided at the top of the charger to assure even distribution of the loose material throughout the cross section of the charger and thus throughout the container. The distributor includes at least one deflector plate which can be moved from a stowed position, in which the press ram is allowed to pass, to a deflecting position in which the plate slants downwardly and inwardly relative to the top of the charger and is effective to deflect incoming loose material across the top portion of the charger. When only one deflector plate is used, the plate is oscillated through a horizontally extending arcuate path at the top of the charger when the plate is in deflecting position. A plurality of plates arranged in a series about the top of the charger can be used, in which case the plates are actuated to deflecting position successively. Presentation of the deflecting plate in its deflecting position successively at a plurality of points spaced about the top of the charger achieves even distribution of the incoming loose material.

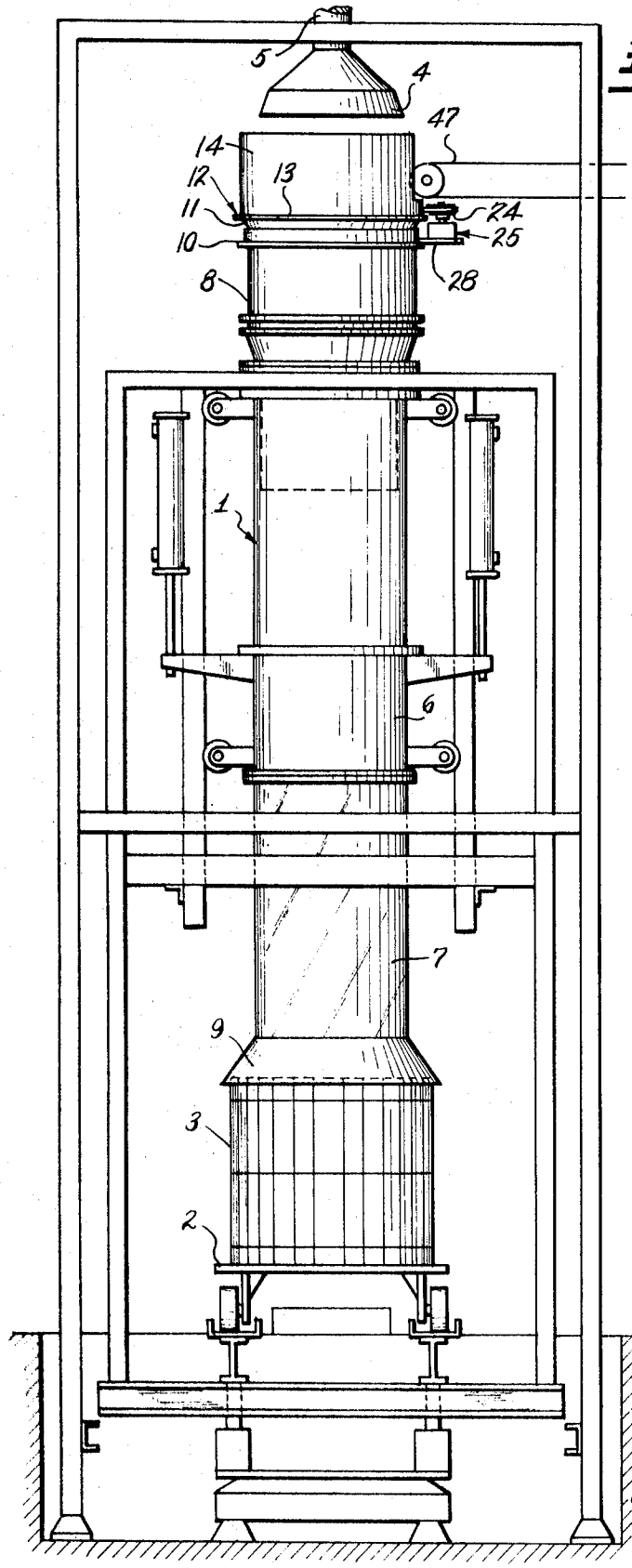


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SHEET 1 OF 7

Fig. 1.



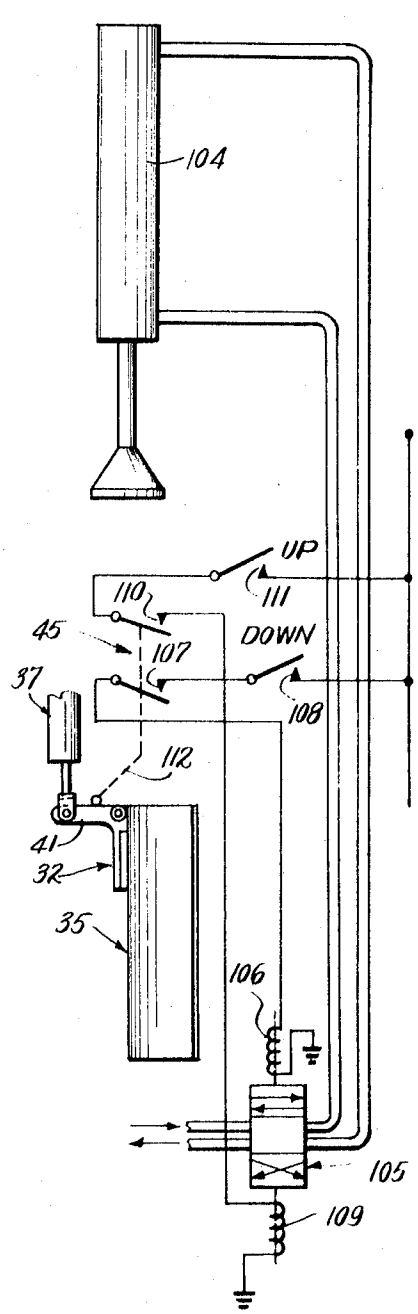


Fig. 6.

INVENTORS
FRANCIS B. FISHBURNE
CLARENCE H. HINNANT, JR.
BY
Arnold, Roylance, Kruger & Dunkee
ATTORNEYS

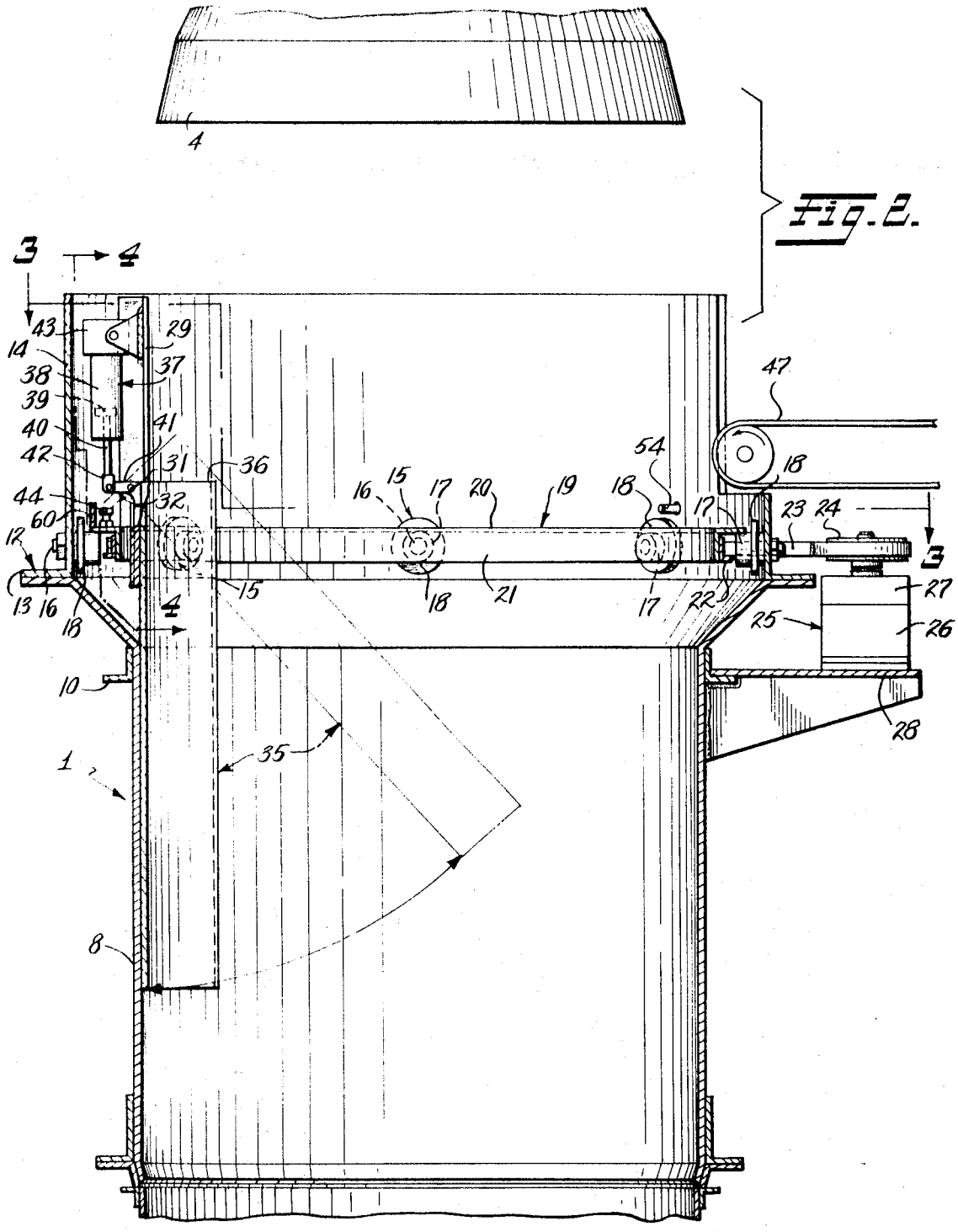


Fig. 2.

INVENTORS
FRANCIS B. FISHBURNE
CLARENCE H. HINNANT, JR.
BY
Arnold, Roylance, Kruger & Durkee
ATTORNEYS

PATENTED JUL 27 1971

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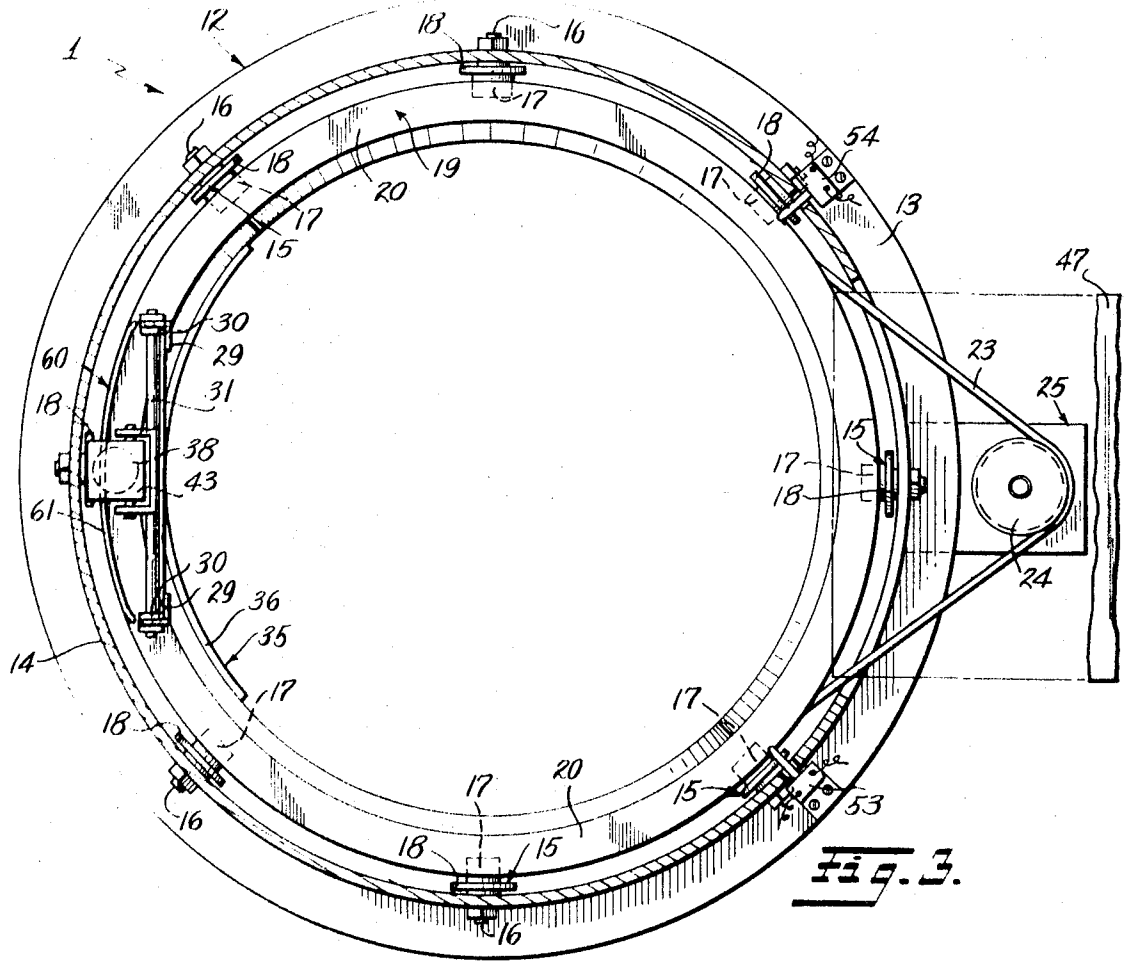


Fig. 3.

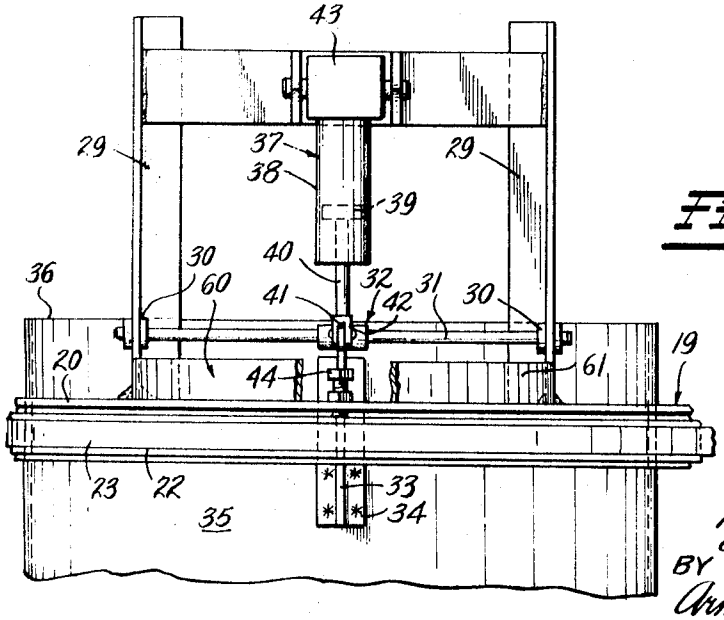


Fig. 4.

INVENTORS
FRANCIS B. FISHBURNE
CLARENCE H. HINNANT, JR.
BY
Arnold, Roylance, Kruger & Durkee
ATTORNEYS

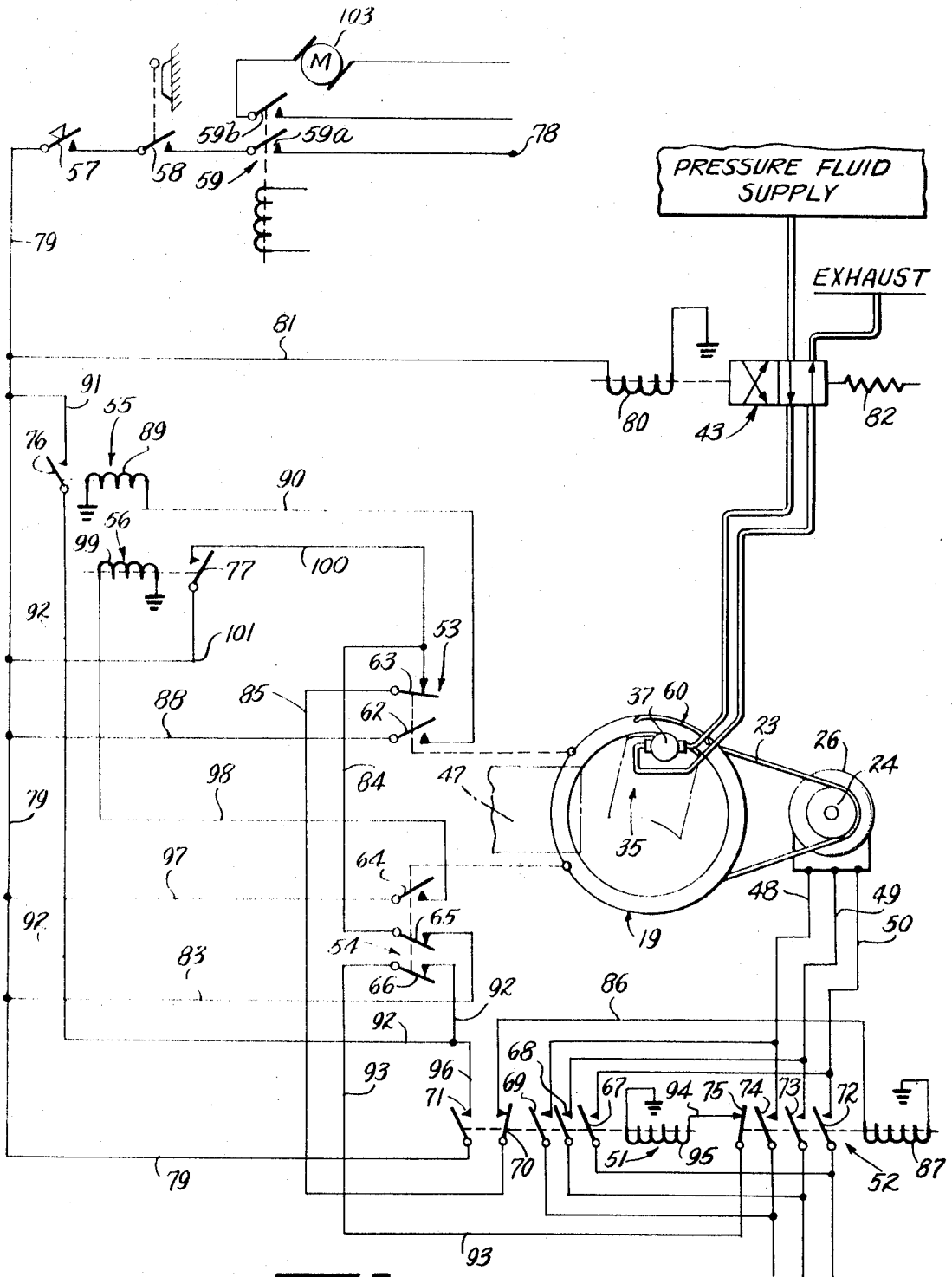


Fig. 5.

INVENTORS
FRANCIS B. FISHBURNE
CLARENCE H. HINNANT, JR.
BY
Arnold, Roylance, Kruger & Dunkee
ATTORNEYS

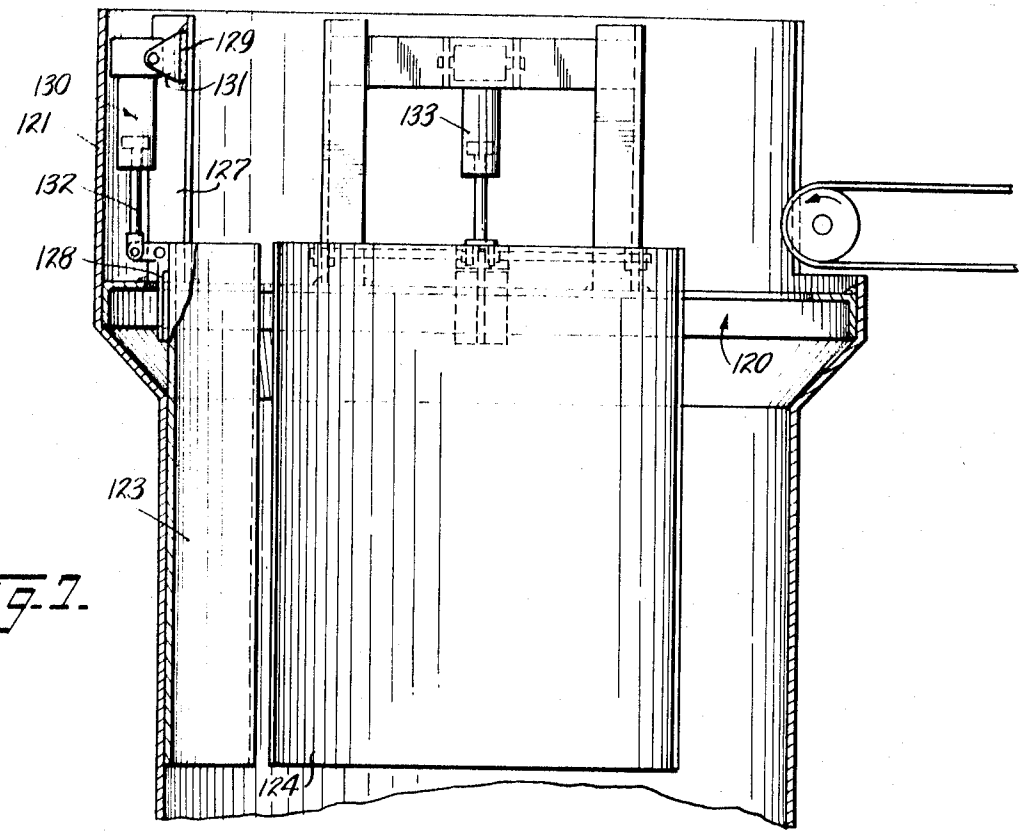


Fig. 7.

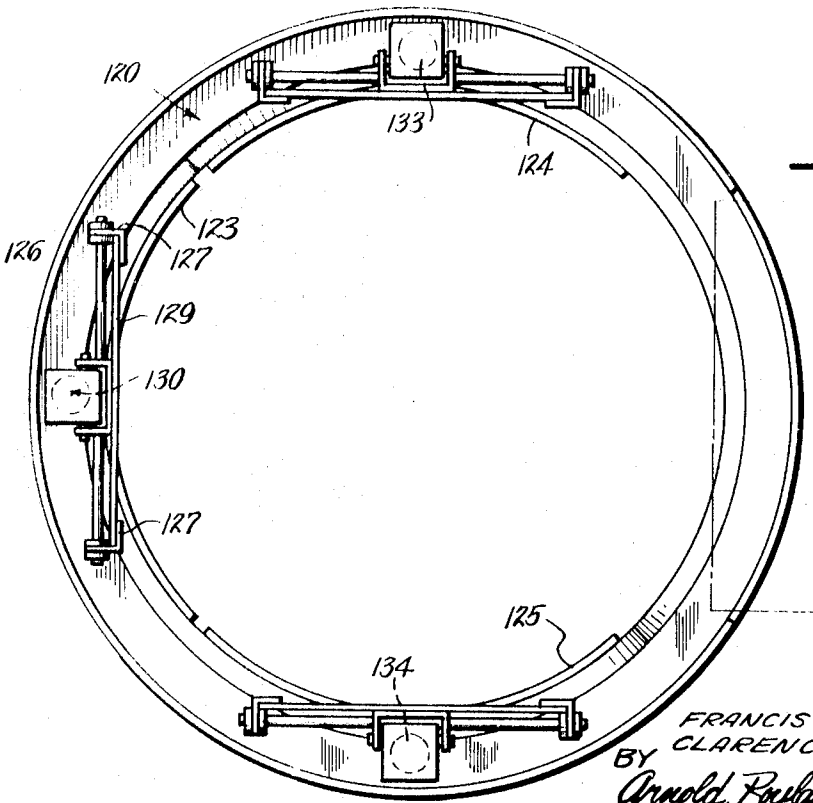
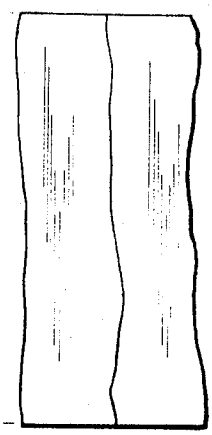


Fig. 8.



INVENTORS
FRANCIS B. FISHBURNE
CLARENCE H. HINNANT, JR.
BY Arnold, Pogliance, Krueger & Durkee
ATTORNEYS

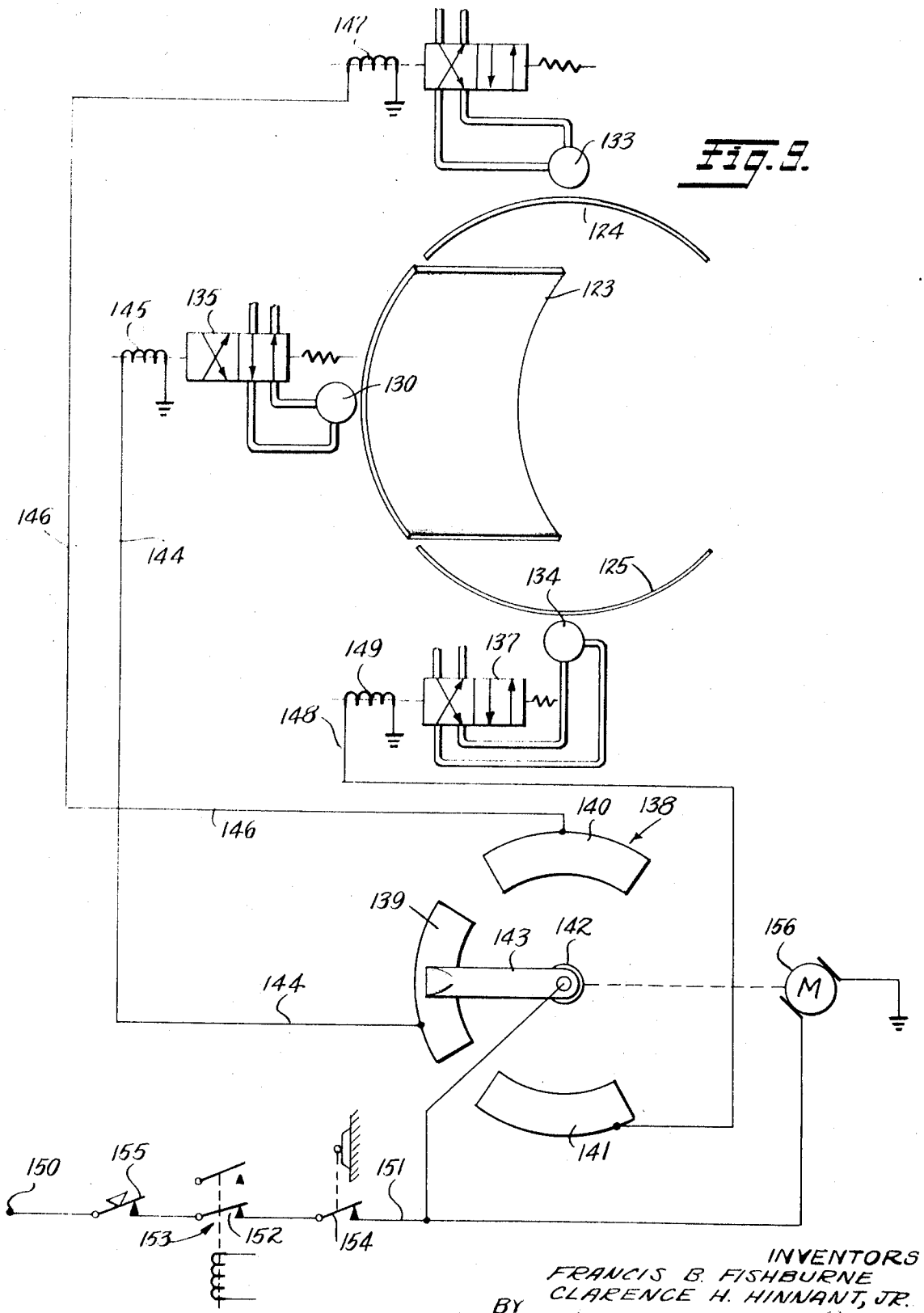


Fig. 9.

INVENTORS
FRANCIS B. FISHBURNE
CLARENCE H. HINNANT, JR.
BY
Arnold, Roylance, Kruger & Durkee
ATTORNEYS

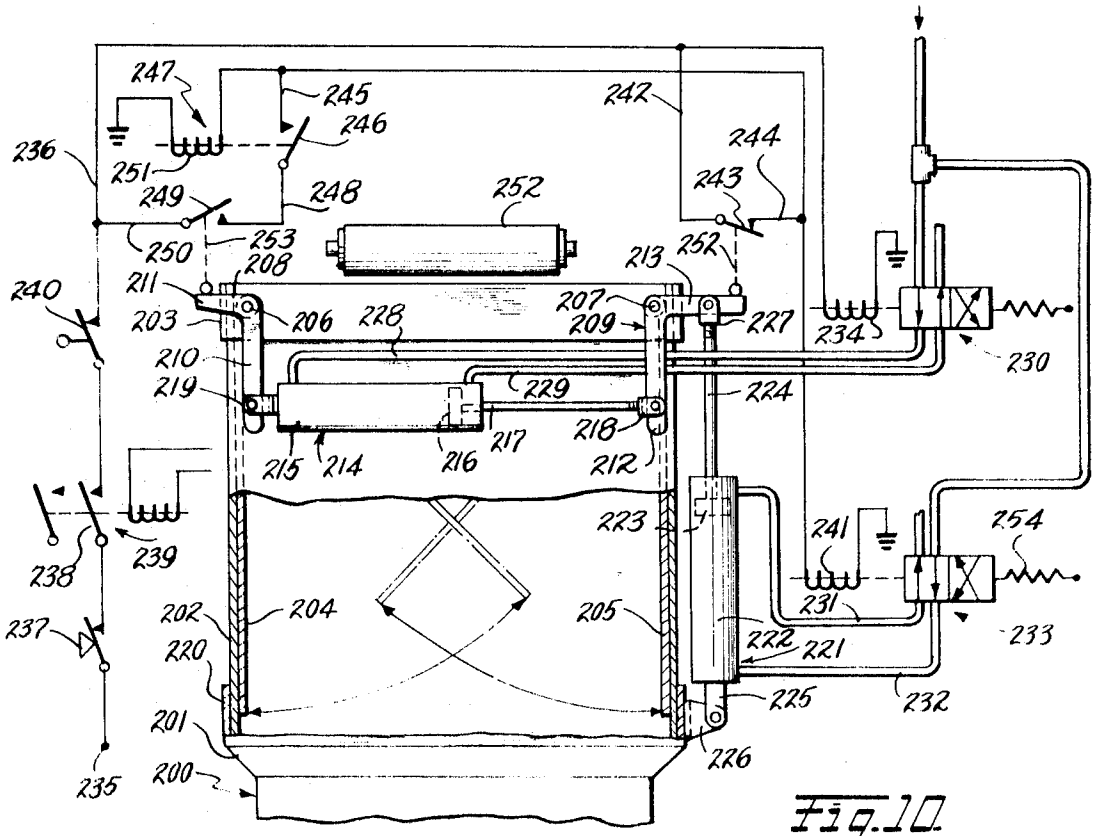


Fig. 10.

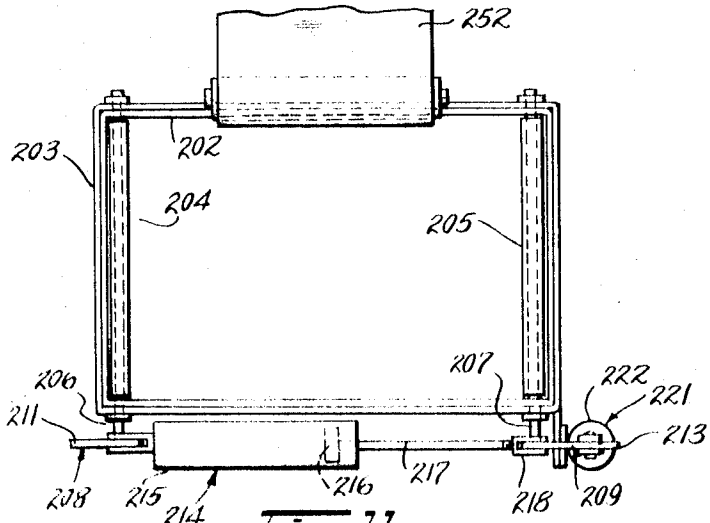


Fig. 11.

INVENTORS
FRANCIS B. FISHBURNE
CLARENCE H. HINNANT, JR.

BY Arnold, Roylance, Kruger & Durkee.
ATTORNEYS

APPARATUS FOR COMPRESSING LOOSE MATERIAL INTO CONTAINERS

This invention relates to apparatus for packing fragmentary compressible material into containers, and finds particular application to apparatus for packing tobacco into hogsheads and cases.

It is common practice to pack tobacco into hogsheads and other containers by employing a vertically acting reciprocatory press equipped with an upright charger, the charger serving to retain a mass of tobacco suitable to be compressed into the container, and the press having a ram which is passed downwardly through the charger to compress the tobacco. Typical apparatus of this type are disclosed in U.S. Pats. No. 2,596,018, issued May 6, 1952, to F. B. Fishburne et al., and 2,675,154, issued Apr. 13, 1954, to F. B. Fishburne. Since it is necessary that the tobacco be distributed uniformly in the packed container, so that each portion of the space within the container is occupied by essentially the same quantity of tobacco, compressed to the same extent, apparatus of the type referred to have employed distributors of various kinds, located at the top of the charger and serving to distribute the incoming tobacco uniformly.

As usually employed, distributors embodied in such packing apparatus have been such as to require that the entire distributor be moved out of the way of the press ram before the ram descends, and such movement of the distributor has required a period of time on the order of 7 seconds or longer, depending upon the design of the particular distributor. Since the press ram is operated at speeds on the order of 4 feet per second, the time required to shift the distributor out of the way has represented a significant and undesirable delay. Such packing apparatus have also suffered from the disadvantage that the distributors employed have been relatively tall, typically on the order of 7 feet, so that the height of the frame had to be increased, or the effective height of the charger reduced, to accommodate the distributor. Additionally, the distributors heretofore employed have been more complicated and expensive than desired, and have had the further disadvantage that the distributing action provided could not be adjusted easily and to a sufficient extent. Thus, despite the fact that the apparatus provided heretofore have been widely adopted, there has been a continuing need for improvement.

It is accordingly a general object of the invention to device apparatus of the type described which overcomes the disadvantages which have characterized the packing apparatus heretofore available to the trade.

Another object is to provide such an apparatus wherein the time required for removal of the distributor from the path of travel of the press ram is reduced to a minimum and does not impair the operating efficiency of the apparatus.

A further object is to provide a distributor for such apparatus which is simpler, less expensive and more compact than has been the case with prior art devices, and particularly to provide such a distributor which requires several feed less vertical space than has been necessary heretofore.

Yet another object is to provide a more efficient distributor which can be controlled at will to adjust the distributing action in accordance with observations of the tobacco or like material falling into the lower portion of the charger.

A still further object is to provide a packing apparatus of the type described wherein the entire area at the top of the charger occupied by the distributor is laterally enclosed, so that particles or fragments of the material being packed cannot escape from the charger and fall as waste material.

Apparatus according to the invention are characterized by provision, at the top of the upright charger, of an infeed conveyor or equivalent supply means arranged to project the loose tobacco or other fragmentary material in a stream directed across the top of the charger, and deflecting means which is stowed adjacent the wall of the charger to allow passage of the pressing ram but which is presented in a

downwardly and inwardly slanting position, to intercept and deflect the tobacco or other fragmentary material, at a plurality of different positions spaced about the top of the charger when the infeed conveyor is in operation. In a particularly advantageous embodiment of the invention, a single deflecting plate is employed, the plate being mounted at the top of the charger for pivotal movement between a stowed position, in which the plate is parallel with and adjacent the wall of the charger so as to allow free passage of the passing ram, and a deflecting position, in which the plate slants downwardly and inwardly, relative to the top of the charger, to intercept the incoming stream of tobacco or other material, operating means being provided not only to pivot the deflecting plate but also to cause the same to move in oscillatory fashion in a circular path about the top of the charger so that the plate can be presented in its deflecting position successively at a plurality of locations spaced in an arc about the top of the charger. With the location of the infeed conveyor fixed, such oscillatory movement of the deflecting plate results in uniform distribution of the tobacco or other material with respect to the container being filled. In other embodiments, a plurality of pivotable deflector plates are used, each at a different fixed location about the top of the charger, and the plates are moved sequentially to their deflecting positions to uniformly distribute the incoming material relative to the container.

In order that the manner in which the foregoing and other objects are attained in accordance with the invention can be understood in detail, particularly advantageous embodiments thereof will be described with reference to the accompanying drawings, which form a part of the original disclosure of the application, and wherein:

FIG. **1** is an elevational view of an apparatus constructed according to one embodiment of the invention;

FIG. **2** is a vertical sectional view, on a larger scale than FIG. **1**, of the portion of the apparatus of FIG. **1** which is located at the top of the charger;

FIG. **3** is a view taken generally on line **3–3**, FIG. **2**, partly in transverse cross section and partly in top plan elevation;

FIG. **4** is a fragmentary elevational view taken generally on line **4–4**, FIG. **2**;

FIG. **5** is a schematic diagram illustrating an electrical control system employed in the apparatus of FIGS. **1—4**;

FIG. **6** is a schematic diagram illustrating a fail-safe interlock between the pressing ram and distributor of the apparatus of FIGS. **1—4**;

FIG. **7** is a vertical sectional view, similar to FIG. **3**, of an apparatus according to another embodiment of the invention;

FIG. **8** is a top plan view of the apparatus of FIG. **7**;

FIG. **9** is a schematic diagram of a control system employed in the apparatus of FIGS. **7** and **8**;

FIG. **10** is a composite view showing in side elevation apparatus constructed according to yet another embodiment of the invention, with parts broken away for clarity of illustration, and control means shown diagrammatically; and

FIG. **11** is a top plan elevational view of the apparatus of FIG. **10**.

Turning now to the drawings in detail, FIGS. **1—5** illustrate one embodiment of the invention applied to a tobacco packing apparatus comprising a vertically arranged charger, indicated generally at **1**, FIG. **1**, a support **2** for a hogshead or like container **3** into which the tobacco is to be packed, and a pressing ram **4** carried by a shaft **5** and arranged to be reciprocated vertically, travelling first downwardly through the charger **1** to compress the tobacco into container **3** and then upwardly through the charger to its starting position spaced above the top of the charger.

Charger **1** is conventionally mounted for movement between a raised and a lowered position and includes a main body portion **6**, a lower end portion **7**, and a top portion **8** and is of circular transverse cross section throughout its length. Lower end portion **7** of the charger is fabricated from rigid translucent fiber-reenforced polymeric material, so that the flow and disposition of the tobacco in the lower portion of the

charger can be observed, for a purpose later described. A conventional bell **9** depends from charger portion **7** so as to be disposed about the top of container **3** when the charger is in the lowered position, as seen in FIG. **1**.

The upper end of top portion **8** of the charger has rigidly secured thereto, as by welding, a reenforcing ring **10** of right angle cross section, one web of the reenforcing ring directly embracing the cylindrical outer surface of portion **8** and the other web projecting transversely outwardly. The extreme top end portion **11** of charger portion **8** is located above reenforcing ring **10** and is frustoconical, tapering upwardly and outwardly, as best seen in FIG. **2**. A mounting ring **12** is welded to the top of end portion **11**, ring **12** being of L-shaped cross section, with one web **13** projecting transversely outwardly and the other web **14** projecting upwardly as a cylindrical portion concentric with the central axis of the charger, the upper edge of portion **11** being secured to ring **12** at the junction between the two webs of the ring. Upwardly projecting web **14** of ring **12** supports a plurality of rollers **15**, each roller being journaled on a stub shaft **16** which extends through and is rigidly secured to web **14**. Each roller **15** includes a short cylindrical portion **17** and an end flange **18**, the end flanges **18** being adjacent web **14** and the cylindrical portions **17** projecting therefrom, inwardly relative to ring **12**. All of stub shafts **16** lie in a common plane transverse to the vertical axis of the charger, and the stub shafts each extend radially of the charger, the stub shafts, and thus the rollers **15**, being equally spaced circumferentially of the charger.

Rotatably supported by rollers **15** is a ring **19**. Ring **19** is of L-shaped transverse cross section, one web **20** of the ring projecting outwardly as a flat annular flange, the other web **21** depending as a right cylindrical portion. The diameter of web **20** is such that the web overlies cylindrical portions **17** of the rollers **15**, with the periphery of web **20** extending immediately adjacent to the flanges **18** of the rollers. Thus, ring **19** is supported by the rollers for free rotation, yet is restrained by flanges **18** against movement transversely relative to the charger.

Adjacent the lower end of web **21**, a circular ring **22** is secured to and embraces web **21**. A drive belt **23** extends about ring **22** and also around the driven pulley **24** of a conventional electric motor drive unit **25**. Drive unit **25** includes an electric motor **26** and a gear reduction unit **27**. The drive unit is secured to a mounting bracket **28** which is welded to and projects radially outwardly from reenforcing ring **10** and the adjacent portion of upper portion **8** of the charger. Drive unit **25** is so situated that its output shaft, to which pulley **24** is secured, is upright, and pulley **24** lies in the same plane as ring **22**.

Two upright mounting bars **29** are secured at their lower ends to ring **19**, the bars being parallel and spaced-apart chordwise of the ring. Fixed to each bar **29** in a location immediately above web **20** is a bearing **30**, the bearings being aligned so that the shaft **31** journaled therein is parallel to the plane of ring **19** and extends chordwise relative to the ring and, since the ring and charger are coaxial, chordwise with respect to the charger. Secured rigidly to the center of shaft **31** is a bellcrank lever **32**. One arm **33** of lever **32** is provided with a flange **34** to which is rigidly secured a deflecting plate **35**. As seen in FIGS. **2—4**, plate **35** is a rectangular in plan, and one edge portion **36** thereof extends in a plane parallel with and adjacent to shaft **31**. Considering edge portion **36** as the top edge of the plate, the plate is of arcuate transverse cross section, its radius of curvature being only slightly smaller than that of the top portion **8** of charger **1**, so that, given the appropriate rotational position of shaft **31**, plate **35** can extend in a stowed position immediately adjacent to the inner surface of top portion **8** of the charger. Since the lower end of plate **35**, i.e., the edge portion opposite edge portion **36**, extends for substantially less than 180°, the plate can be pivoted from its stowed position to a position in which the same slants from shaft **31** downwardly and inwardly across the top of the charger at, e.g., an angle of 45° relative to the central axis of the charger.

Oscillation of shaft **31** to pivot plate **35** between its stowed and deflecting positions is accomplished by a vertically arranged conventional piston-and-cylinder-type fluid pressure-operated power device **37**. Power device **37** comprises a cylinder **38**, piston **39** and power shaft **40**, the latter extending downwardly to a point adjacent shaft **31** and being connected to arm **41** of bellcrank **32** by a clevis **42**. The power device is fixedly mounted by securing cylinder **38** to a crossmember which extends between and is fixed to mounting bars **29**. Compressed air is supplied to cylinder **38** via a suitable flexible hose, not shown, under control of a solenoid operated valve **43**. Valve **43** is so arranged that, when the valve is energized, air is supplied to the cylinder to drive the piston downwardly, pivoting the combination of shaft **31** and bellcrank **32** in a direction to swing plate **35** to its deflecting position. When deenergized, valve **43** acts to supply compressed air to cylinder **38** below the piston so that shaft **40** is driven upwardly and plate **35** is swung to its stowed position.

In order that the extent of movement of plate **35** away from its stowed position can be adjusted to predetermine the deflecting position of the plate, an adjustable stop member **44** is mounted on ring **19** below and in vertical alignment with arm **41** of bellcrank **32**.

The position of arm **41** of bellcrank **32** is sensed by a conventional normally open electrical switch **45** which is carried by ring **19**. Switch **45** is so located that its operating lever is disposed above lever arm **41** and is actuated by the arm to close the switch when plate **35** reaches its stowed position.

The tobacco to be packed is supplied, as a stream projected generally across the top of the charger, by an infeed device in the form of a horizontal endless conveyor **47** which extends radially with respect to the charger and is arranged with its delivery end immediately above ring **19** in a location near the wall of the charger. It will be understood that, save for movement of the conveyor belt and for the usual provisions for adjustment, the position of the conveyor **47** is fixed relative to the charger.

Motor **26** is a conventional 3-phase synchronous electric motor powered via conductors **48—50**, FIG. **5**, to drive pulley **24** clockwise or counterclockwise, depending upon which of two reversing relays **51**, **52** is energized. Reversing relays **51**, **52** are controlled automatically by a control circuit including position switches **53**, **54** and time delay relays **55** and **56**, this control circuit being activated only when a manual switch **57**, a press ram position responsive switch **58**, and the contacts **59***a* of a relay **59**, used to control infeed conveyor **47**, are all closed.

Position switches **53** and **54** are mounted on the horizontal web **13** of ring **12**, as seen in FIG. **3**, with switch **54** being located at the other side of that conveyor. Switch **53** is actuated at the end of each cycle of counterclockwise travel of ring **12** and serves to energize relay **51**, via time delay relay **55**, to reverse the power connections to motor **26** and thereby commence clockwise rotation of ring **12**. Similarly, switch **54** is actuated at the end of each cycle of clockwise travel of ring **12**, serving to energize relay **52**, via time delay relay **56** to again reverse the power connections to motor **26** and thereby commence counterclockwise rotation of ring **12**.

Switches **53**, **54** are actuated by a cam **60** which is carried by horizontal web **20** of ring **19**. The cam consists of a metal strip, the main body **61** of the strip being arcuate, with approximately the same radius of curvature as the peripheral edge of web **20** and having one of its edges welded to the peripheral portion of web **20** in such fashion that the length of main body **61** extends generally along the peripheral edge of web **20** and the width of body **61** projects vertically upwardly from web **20**. The end portions of cam **60** are bent inwardly, toward the interior of ring **19**. Accordingly, as the assembly including ring **19** approaches the end of each counterclockwise cycle of movement, the leading end portion of the cam **60** displaces the actuating arm of switch **53** from its normal position to its actuated position, thus closing the contacts of that switch until, motor **26** having been reversed to drive the assembly including ring **19** in a clockwise direction, cam **60** is moved out

of engagement with the actuating arm of the switch. Similarly, as the assembly including ring **19** approaches the end of each clockwise cycle of movement, the then-leading end portion of cam **60** displaces the actuating arm of switch **54** from its normal position to its actuated position, thus closing the contacts of that switch until, motor **26** having been reversed to drive the assembly including ring **19** in a counterclockwise direction, cam **60** is moved out of engagement with the actuating arm of the switch.

Position switch **53** includes a set of normally open contacts **62** and a set of normally closed contacts **63**. Position switch **54** comprises a set of normally open contacts **64** and two sets of normally closed contacts **65** and **66**.

Reversing relay **51** includes three sets of normally open contacts **67—69**, one set of normally closed contacts **70**, and an additional set of normally open contacts **71**. Reversing relay **52** includes three sets of normally open reversing contacts **72—74**, and one set of normally closed contacts **75**.

The time delay relays **55** and **56** are of the conventional "on delay" time delay relay type and include normally open contacts **76** and **77**, respectively. These two relays are so constructed and arranged that the contacts are actuated to their closed position after an adjustable period of time has elapsed after first energization of the actuating winding of the relay.

The control circuit is connected between a supply terminal **78** and ground and includes a conductor **79** in which the manual switch **57**, the press ram position switch **58** and the contacts **59*a*** of relay **59** are all connected in series so that the manual switch **57**, position switch **58** and relay contacts **59*a*** must all be closed before the control circuit can be energized.

The actuating winding **80** of solenoid-operated valve **43** is connected between conductor **79** and ground via conductor **81**. As previously explained, valve **43** is so constructed and arranged as to control the flow of pressure fluid to power device **37** to cause deflector plate **35** to be swung to its deflecting position whenever the winding **80** has been energized. When winding **80** is deenergized, a spring **82** automatically returns the valve to a normal position in which power device **37** is operated to swing plate **35** to its stowed position. Accordingly, whenever switch **57**, position switch **58** and contacts **59*a*** are all simultaneously closed, winding **80** of the valve will be energized and deflecting plate **35** will accordingly occupy its deflecting position but, whenever any of switch **57**, position switch **58** and contacts **59*a*** are open, winding **80** cannot be energized, and spring **82** will maintain valve **43** in a condition such that the deflecting plate occupies its stowed position. Contacts **65** of position switch **54** are connected, on one side, via conductor **83** to conductor **79**, and, on the other side, via conductor **84** to one side of contacts **63** of position switch **53**. The other side of contacts **63** is connected by conductor **85** to one side of contacts **70** of reversing relay **51**. The other side of contacts **70** is connected via conductor **86** to one terminal of winding **87** of reversing relay **52**, the other terminal of that winding being connected to ground. Accordingly, when neither switch **53** nor switch **54** is in its actuated position, closing of the series combination of switch **57**, position switch **58** and contacts **59*a*** will result in energization of the winding **87** of reversing relay **52** via the circuit just described, the result of such energization being to close contacts **72—74** and to open contacts **75**. Closing of contacts **72—74** energizes motor **26** to drive the distributor assembly, including ring **19** and plate **35**, in a counterclockwise direction and such driving action will continue until the cam **60** engages the actuating arm of switch **53** to actuate that switch.

One side of contacts **62** of switch **53** is connected to conductor **79** by conductor **88**. The other side of these contacts is connected to one terminal of winding **89** of time delay relay **55** via conductor **90**, the other terminal of that winding being connected to ground. One side of contacts **76** of relay **55** is connected to conductor **79** via conductor **91**. The other side of contacts **76** is connected by conductor **92** to one side of the contacts **66** of position switch **54**. The other side of contacts **66** is connected by conductor **93** to one side of contacts **75** of reversing relay **52**, the other side of that set of contacts being connected by conductor **94** to one terminal of the actuating winding **95** of reversing relay **51**. The remaining terminal of winding **95** is connected to ground. Conductor **92** is also connected to one side of the normally open contacts **71** of reversing relay **51** via conductor **96**, the other side of contacts **64** being connected to conductor **79**.

Actuation of switch **53** by cam **60** causes contacts **62** to close and contacts **63** to open. Opening of contacts **63** deenergizes winding **87** of relay **52**, so that contacts **72—74** open to interrupt current flow to motor **26**. Closing of contacts **62** completes the circuit to winding **89** of relay **55** so that this winding is energized and contacts **76** are closed after a predetermined time delay. With contacts **76** now closed, a circuit is completed which includes conductors **91** and **92**, contacts **66**, conductor **93**, contacts **75** of reversing relay **52**, conductor **94**, and the actuating winding **95** of reversing relay **51**. Since position switch **54** is not actuated, contacts **66** are in their normally closed position. Similarly, since winding **87** of relay **52** is deenergized, contacts **75** are in their normally closed position, and the winding **95** is accordingly energized to cause contacts **67—69** to close, contacts **70** to open, and contacts **71** to close. Closing of contacts **67—69** causes motor **26** to be energized to rotate the distributor assembly, including ring **19** and deflector plate **35**, in a clockwise direction. Opening of contacts **70** assures that winding **87** of reversing relay **52** cannot be energized again until reversing relay **51** has been deenergized. Closing of contacts **71** and **66** completes a holding circuit, including conductors **79**, **96**, **92** and **93**, contacts **75**, and conductor **94** to maintain winding **95** energized regardless of the condition of contacts **76** of time delay relay **55**. This holding circuit is necessary to assure continued energization of winding **95** during the clockwise cycle of movement of the distributor after that time when the cam **60** has disengaged from the actuating arm of switch **53**.

One side of contacts **64** of position switch **54** is connected to conductor **79** by conductor **97**. The other side of this set of contacts is connected by conductor **98** to one terminal of winding **99** of time delay relay **56**, the other terminal of winding **99** being connected to ground. Accordingly, when the distributor has completed its clockwise cycle of movement, so that cam **60** actuates position switch **54**, closing of contacts **64** of switch **54** causes winding **99** of relay **56** to be energized. As a predetermined period after such energization, relay **56** operates to close contacts **77** which are connected between one side of contacts **63** and conductor **79** by conductors **100** and **101**. With contacts **63** occupying their normally closed position, and the contacts **77** closed as a result of energization of winding **99**, a circuit comprising conductor **100**, contacts **77**, conductor **101**, contacts **63**, conductor **85**, contacts **70**, and conductor **86** is completed to energize winding **87** of reversing relay **52**. Energization of winding **87** again actuates contacts **72—74** to their closed position to energize motor **26** to drive the distributor assembly in its counterclockwise direction, as hereinbefore described.

Switch **58** can be of any conventional normally open type equipped with a suitable actuating arm to be engaged by a cam, indicated diagrammatically at **102** in FIG. 5 and secured to the press ram, the location of the cam and switch being such that the switch will be closed only when the press ram is in its fully elevated position and, therefore, completely clear of the charger. Relay **59** is employed to control the driving motor **103**, FIG. 5, for the infeed conveyor **47**, this control being via normally open contacts **59*b*** of the relay. Manual switch **97** is provided as a manual override for the automatic operation which would otherwise result when both switch **58** and contacts **59*a*** of relay **59** are closed.

From the foregoing, it will be understood that the normal operation of the distributor, under the control of the system illustrated in FIG. 5 and just described, is to provide automatic sequential clockwise and counterclockwise rotary movement of the distributor assembly including deflector plate **35** whenever the press ram is fully elevated and the infeed conveyor is

operated to supply loose material to be packed. Though the distributor assembly is driven at a constant rate by motor **26**, the effective overall rate of the distributor assembly can be adjusted by adjusting time delay relays **55** and **56** to vary the residence time of the deflector blade at the end of its counterclockwise and clockwise movement, respectively. Such adjustment can be the same for each relay, so as to change the overall distributing effect, or selectively different for the two relays, so as to distribute more material to one side or the other of conveyor **47**. The control system further assures that the deflector plate **35** will automatically be actuated to its deflecting position whenever the distributor is in operation, yet will be automatically moved to its stowed position whenever the press ram descends, as detected by opening of switch **58**.

FIG. **6** illustrates diagrammatically a portion of the control system for a press constructed in accordance with the invention and embodying an additional safety feature to further assure that the deflecting plate **35** will be in its stowed position whenever the press ram is not in its fully raised position. Here, the power cylinder for the press is indicated at **104**, and a conventional double-solenoid, three-position control valve **105** is shown, connected to control the flow of pressure fluid to the cylinder **104**. Valve **98** includes a solenoid winding **106** to operate the valve for control of cylinder **104** in driving the press ram downwardly through the charger. Winding **106** is energized via a circuit including contacts **107** and **108** in series. Valve **105** further includes a second solenoid winding **109** to place the valve in condition for flow of pressure fluid in a direction to cause cylinder **104** to raise the press ram, and winding **109** is connected to be energized by a circuit including contacts **110** and **111** in series. Contacts **107** and **110** are portions of position switch **45** provided with an operating arm, indicated at **112**, the switch being so positioned that operating arm **112** is engaged by arm **41** of bellcrank lever **32** to actuate the normally open contacts **107** and **110** to their closed position only when arm **41** occupies that position resulting when deflector plate **35** has been pivoted to its stowed position. Accordingly, the presence of normally open contacts **107**, **110** assures that, regardless of the position of control contacts **108** and **111**, valve **105** cannot be energized to supply pressure fluid to cylinder **104** until deflector plate **35** has moved to its stowed position.

In the embodiment of FIGS. **1—6**, a single deflector plate **35** is employed, the deflector plate is moved to its deflecting position whenever distributing of tobacco is to be accomplished and, with the deflecting plate in its deflecting position, the entire distributor assembly is then rotated to present the deflector plate, still in its deflecting position, successively at all locations along the arc of the charger top not occupied by the infeed conveyor. FIGS. **7—9** illustrate another embodiment of the invention which employs the same broad mode of operation but without rotation of the deflector plate means. In this embodiment, a plurality of deflector plates are employed and are actuated successively to their deflecting positions, the previously actuated deflector plate being stowed simultaneously with actuation of the next deflector plate to its deflecting position.

As seen in FIG. **7**, an internally disposed ring **120** of right-angle cross section is secured to a cylindrical shroud portion **121** at the charger top in such fashion that the horizontal web **122** of ring **120** projects inwardly. Three identical deflector plates **123—125** are pivotally supported by ring **120**, the mounting and actuating arrangement for all three of the deflector plates being identical. Thus, deflector plate **123** is suspended from a shaft **126** journaled in uprights **127** fixed to the horizontal flange of ring **120** and projecting upwardly therefrom. Shaft **126** is equipped with a bellcrank lever **128**. The upper end portion of a cylinder-and-piston-type power device **130** is pivotally attached to crossmember **129**, as by means of a bracket **131**. Power device **130** thus depends from crossmember **129**, and the free end portion of the piston rod **132** of power device **130** is pivotally connected to the free end of the horizontal arm of bellcrank **128**. Deflector plates **124** and **125** are similarly equipped with power devices **133** and **134**, respectively.

Turning to FIG. **9**, each of the power devices **130**, **133** and **134** is equipped with a solenoid-operated control valve **135—137**, respectively. The power devices **130**, **133** and **134** are in all respects identical to power device **37** of the embodiment of FIGS. **1—6**, energization of the solenoids of the respective valves **135—137** serving to cause the power device to swing the corresponding deflector plate upwardly and outwardly to its deflecting position. And, upon deenergization of the solenoid valve, a spring is employed to return the valve to it normal position causing the power device to return the deflecting plate to its stowed position.

The valves controlling power devices **130**, **133** and **134** are energized sequentially, as by the rotary switching device indicated diagrammatically at **138**. The switch **138** includes three arcuate fixed contacts **139—141** which are equally spaced in a circularly arranged series centered on the axis of rotation of a shaft **142** which carries the rotary contact **143**. Fixed contact **139** is connected via conductor **144** to one terminal of the solenoid winding **145** of valve **135**, the other terminal of the winding being connected to ground. Similarly, contact **140** is connected by conductor **146** to one terminal of winding **147** of valve **136**, the remaining terminal of the winding being connected to ground. Finally, fixed contact **141** is connected by conductor **148** to one terminal of the actuating winding **149** of valve **137**, the other terminal of the winding being connected to ground. Rotary contact **143** is connected to supply terminal **150** via conductor **151** and the series combination of contacts **152** of infeed conveyor control relay **153**, press ram position switch **154** and manual switch **155**. Shaft **142** is driven by a constant speed motor **156** which can be supplied from terminal **150**, as shown.

In operation, assuming that all of contacts **152**, switch **154** and switch **155** are closed, rotary switch **138** is operated continuously to energize the solenoid windings of valves **135—137** sequentially, so that power devices **130**, **133** and **134** are sequentially operated to move their respective deflector plates **123—125** from stowed to deflecting positions. As soon as one of the deflector plates has been swung to its stowed position, the next-operated deflector plate is automatically swung to its deflecting position. Thus, the operation of moving the deflector plates to their deflecting positions proceeds progressively around that arc of the top of the charger which is not occupied by the infeed conveyor and the operation of the device in distributing the tobacco supplied by the infeed conveyor is broadly the same as that hereinbefore described with reference to FIGS. **1—6**.

FIGS. **10** and **11** illustrate another embodiment of the invention, applied to a press for packing tobacco or the like into rectangular containers, the press being of that general type which is equipped with an upright charger having a rectangular transverse cross section corresponding to the rectangular shape of the case or other rectangular container into which the tobacco or the like is to be compressed. Here, the charger **200** includes, at its upper end, a short upwardly and outwardly flaring portion **201** to which is secured a top portion **202** of somewhat larger transverse dimensions than the charger proper. The open rectangular upper end of portion **202** is provided with an externally located stiffening collar **203**.

Two deflector plates **204** and **205** are employed, each suspended pivotally from collar **203** by means of shafts **206** and **207**, respectively. The end portions of shafts **206**, **207** are respectively journaled in two parallel sides of collar **203** and one end portion of each shaft projects outwardly for a short distance beyond one of the sides. At this one side of charger portion **202**, there is secured to the outwardly projecting end portion of shaft **206** a bellcrank lever **208**. At the same side of charger portion **202**, a bellcrank lever **209** is secured to shaft **207**. Lever **208** includes a depending arm **210** and a laterally projecting arm **211**. Similarly, lever **209** includes a depending arm **212** and a laterally projecting arm **213**. Levers **208** and

209 are so disposed that the arms 211 and 213 project in opposite directions, each extending beyond the side limits of the adjacent wall of charger portion 202.

A pressure fluid-operated rectilinearly acting power device 214 is provided which comprises a cylinder 215, a piston 216, and a piston rod 217. The free end of the piston rod 217 is pivotally connected to the lower end of arm 212 of lever 209 by a clevis 218. The closed end of cylinder 215 is connected to the lower end of arm 210 of lever 208 by a clevis 219. The dimensions of power device 214 are so chosen that, when piston 216 is moved to the right, as viewed in FIG. 9, levers 208 and 209 are pivoted in opposite directions to move the deflector plates 204, 205 to their stowed positions, against the respective sides of charger portion 202. On the other hand, when power device 214 is energized to move piston 216 to the left, as viewed in FIG. 9, the effective overall length of the power device is shortened, swinging the deflector plates 204, 205 toward the interior of charger portion 202.

The bottom end of charger portion 202 is provided with an exterior stiffening collar 220. A second rectilinearly acting, fluid pressure-actuated power device 221 is provided, comprising a cylinder 222, a piston 223, and a piston rod 224. The closed end of cylinder 222 is mounted on stiffening collar 220 by a clevis 225 and bracket 226. Power device 221 is disposed vertically, so that piston rod 224 projects upwardly, terminating adjacent the free end of arm 213 of lever 209. The free end of piston rod 224 is pivotally connected to the free end of arm 213 by clevis 227.

Pressure fluid lines 228 and 229 are connected respectively to the ends of cylinder 215 of power device 214 and to a solenoid-operated reversing valve 230. Similarly, pressure fluid lines 231 and 232 are connected to the respective ends of cylinder 222 of power device 221 and to a solenoid operating reversing valve 233. Actuating winding 234 of valve 230 is connected between supply terminal 235 and ground via conductor 236. The series combination of a manual switch 237, contacts 238 of a relay 239, and a position switch 240 is connected in conductor 236 so that the actuating winding 234 is energized whenever all of switch 237, contacts 238 and switch 240 are closed, but is deenergized when any of those three switching devices is opened.

The actuating winding 241 of valve 233 is connected between ground and conductor 236 by a circuit comprising conductor 242, the contacts of a position switch 243, and conductor 244. Winding 241 can also be energized via a second circuit comprising conductor 245, normally open contacts 246 of a relay 247, conductor 248, the contacts of a position switch 249, and conductor 250, conductor 250 being connected to conductor 236, and conductor 245 being connected to conductor 244. The actuating winding 251 of relay 247 is connected between ground and conductor 245, as shown. Position switch 243 comprises an actuating arm indicated diagrammatically at 252, the actuating arm being so disposed the switch 243 is closed when the arm 213 of lever 209 is in its uppermost position (when the piston rod 224 of power device 221 is extended), switch 243 opening whenever power device 221 is energized to pivot lever 209 to move arm 213 downwardly, out of engagement with the operating arm 252. Position switch 249 comprises an actuating arm indicated generally at 253 and so arranged as to be engaged by arm 211 of lever 208. Switch 249 is open whenever arm 211 is in its uppermost position (when the piston rod 217 of power device 214 is extended), and closes whenever arm 211 of lever 208 swings downwardly, as when power device 214 is energized to move its piston 216 to the left, as viewed in FIG. 9. Power device 214 is constructed and arranged to operate at a faster rate, under the control of valve 230, than does power device 221, under the control of valve 233.

In operation, switch 240 is closed in response to movement of the press head to its fully raised position, contacts 238 are closed in response to activation of the infeed conveyor for supplying tobacco or the like to the top of the charger, and manual switch 237 is closed, so that winding 234 of valve 230 is energized, actuating that valve to a position which supplies pressure fluid to the cylinder of power device 214 via line 229, so that the overall length of power device 214 is shortened. Simultaneously with energization of winding 234, winding 241 is energized via conductor 242, contacts 243 of switch 252, and conductor 244, so that pressure fluid is supplied to power device 221 via line 231. However, since the response of power device 221 is distinctly slower than that of power device 214, lever 209 will not have been pivoted by power device 221 to any significant extent by the time that power device 214 becomes fully actuated. Accordingly, the effect of actuation of power device 214 is to swing deflector plate 204 inwardly and upwardly away from its stowed position to its deflecting position, shown in broken lines in FIG. 10.

When winding 241 is energized, winding 251 of relay 247 is also energized, via conductor 245, so that contacts 246 of the relay are closed. Meanwhile, switch 249 has closed, as a result of counterclockwise (as viewed) pivotal movement of lever 208. Accordingly, a holding circuit is completed to maintain winding 241 in energized condition, via conductors 250, switch 249, conductor 248, contacts 246, conductor 245, and conductor 244. Power device 221 is accordingly energized, with the result that piston 223 is driven downwardly, pivoting lever 209 in a clockwise direction. Such motion of lever 209 swings deflector plate 205 inwardly and upwardly to its deflecting position, while simultaneously swinging deflector plate 204 back to its stowed position. When deflector plate 204 reaches its stowed position, arm 211 of lever 208 is swung upwardly to actuate switch 249 to its open position. At this point, with switch 249 open and, since power device 221 has been energized to drive piston 223 downwardly with switch 243 open, winding 241 is deenergized. Spring 254 of valve 233 causes that valve to reverse the pressure fluid supply connection to power device 221, so that piston 223 is driven upwardly, returning lever 209 to its original position, so that deflector plate 205 is swung to its stowed position and deflector plate 204 is swung to its deflecting position. As a result of this action, switch 243 is closed. Accordingly, lever 209 is again pivoted to swing plate 205 to its deflecting position and return plate 204 to its stowed position. The cycle of operation just described is repeated automatically for so long as the combination of switch 237, contacts 238 and switch 240 remains closed. However, as soon as the infeed conveyor has been stopped by deenergization of relay 239, opening of contacts 238 results in deenergization of both windings 234 and 241, so that valves 230 and 233 return to their initial positions, causing power devices 214 and 221 to return both deflector plates 204 and 205 to their stowed positions, preparatory to movement of the press ram downwardly through the charger.

In this embodiment, the relay 239 controls operation of an infeed conveyor 252 which, as best seen in FIG. 11, extends parallel to shafts 206, 207 and has its delivery end centered between shafts 206 and 207 and located immediately above the side of charger portion 202 which is opposite power device 214.

In this embodiment, employing a charger portion having flat sidewalls, deflector plates 204 and 205 are flat plates. When either deflector plate occupies its deflecting position, while tobacco or the like is being supplied by infeed conveyor 256, the effect of that deflector plate is to deflect the falling tobacco toward the side of the charger which is opposite to the side at which the particular deflecting plate mounted. Accordingly, cyclic operation of the deflector plates during continuous supply of material by the infeed conveyor, results in the material being distributed substantially uniformly with respect to the total cross-sectional area of the charger, rather than being concentrated predominantly in the central portion of the charger.

We claim:

1. In apparatus for packing fragmentary compressible material into containers, which apparatus comprises an upright charger via which the compressible material can be fed to the container, and a reciprocatable pressing ram ar-

ranged for movement from an initial position above the charger downwardly through the charger to compress the material into the container and then upwardly through the charger to the initial position, the combination of

infeed means constructed and arranged to direct the compressible material along a path generally across the top of the charger;

deflector plate means mounted at the top of the charger and movable between a stowed position, in which said plate means is disposed in at least substantially vertical position at the side of the charger to allow the pressing ram to pass through the charger, and a deflecting position, in which said plate means slants downwardly and inwardly relative to the top of the charger to intercept the compressible material and deflect the same toward a location which is generally across the charger;

operating means for said deflector plate means constructed and arranged to cause at least a portion of said deflector plate means to assume said deflecting position successively at a plurality of different positions spaced about the top of the charger as the compressible material is being supplied by said infeed means; and

control means connected to said operating means and operable to cause said operating means to move said deflector plate means to said deflecting position when the pressing ram is in its initial position and to allow said deflector plate means to assume said stowed position whenever the pressing ram is not in its initial position.

2. The combination defined in claim **1** and further comprising

a support; and

means mounting said support at the top of the charger for at least generally circular movement in a path lying in a plane which is generally transverse to and centered on the axis of reciprocatory movement of the pressing ram;

said deflector plate means comprising a deflector plate mounted on said support for pivotal movement between said stowed position and said deflecting position;

said plate being of arcuate transverse cross section and of such dimensions as to lie in immediate proximity to and at least substantially parallel to the wall of the top of the charger when in said stowed position;

said operating means comprising

a first power device carried by said support for moving said plate between said stowed position and said deflecting position, and

a second power device connected to said support to move the same in said path.

3. The combination defined in claim **2** wherein

said control means is constructed and arranged to operate said second power device to move said support, and thereby causing said plate to traverse said path, when said plate is in said deflecting position.

4. The combination defined in claim **3** wherein

said control means comprises

two position responsive devices arranged at predetermined points along said path to respond to presence of said plate, and

means controlled by said position responsive devices and connected to said second power device to control the same to so move said support that said plate oscillates along said path with said points determining the limits of such oscillatory movement.

5. The combination defined in claim **2** and further comprising

an annular shroud disposed at the top of the charger and extending upwardly therefrom,

said support and said deflector plate means being disposed within said shroud.

6. The combination defined in claim **2**, wherein

said support is a ring having an outwardly projecting circular flange; and

said means mounting said support comprises a plurality of rollers spaced-apart in a circular series and each journaled for rotation about a horizontal axis,

said rollers being engaged beneath said flange.

7. The combination defined in claim **6**, wherein

said first power device is a fluid pressure-operated motor of the piston and cylinder type disposed with its operating axis upright,

the combination further comprising

a fixed upright annular shroud surrounding the top of the charger and projecting upwardly therefrom,

said shroud surrounding said ring, said means mounting said ring, and said first power device.

8. The combination defined in claim **6**, wherein

said second power device is located outside of the circular series of said rollers and comprises a driven member arranged for rotation about an upright axis,

the combination further comprising

a flexible drive belt engaged about said ring and driven by said driven member of said second power device.

9. The combination defined in claim **8**, and further comprising

a fixed upright annular shroud surrounding the top of the charger and projecting upwardly therefrom,

said shroud surrounding said ring, said means mounting said first ring, and said first power device,

said first power device being located outside of said shroud, and said shroud being provided with opening means through which said drive belt extends.

10. Apparatus according to claim **1**, wherein

said deflector plate means comprises

a stationary support mounted at the top of the charger,

a plurality of deflector plates, and

means mounting each of said plates on said support swinging movement between said stowed and deflecting positions with said plates occupying different locations spaced about the top of the charger; and

said operating means is constructed and arranged to operate said plates successively.

11. Apparatus according to claim **10**, wherein

said deflector plate means comprises at least three deflector plates arranged in a series spaced about that portion of the top of the charger not occupied by said infeed means.

12. Apparatus according to claim **10**, wherein the top of the charger is of rectangular transverse cross section;

said deflector plate means comprises two flat deflector plates each mounted to swing about an axis parallel to and immediately adjacent a different one of two opposite sidewalls of the top of the charger; and

said operating means is constructed and arranged to swing first one of said plates to its deflecting position while maintaining the other of said plates substantially in its stowed position and then to swing said other other plate to its deflecting position while returning said one plate to its stowed position.

13. Apparatus according to claim **12**, wherein

said operating means comprises

adjustable length means connected between said two plates, adjustment of the length of said adjustable length means in one direction operating to pivot said plates toward each other and said adjustable length means then being operative to maintain the resulting angular disposition of said plates relative to each other, and

power means connected to one of said plates to swing the combination of both of said plates.

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,595,282 Dated July 27, 1971

Inventor(s) Francis B. Fishburne and Clarence H. Hinnant, Jr.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 46, "device" should read --devise--.

Column 1, line 57, "feed" should read --feet--.

Column 3, line 61, "a" should be deleted.

Column 6, line 44, "As" should read --At--.

Column 11, line 53, "causing" should read --cause--.

Column 12, line 38, --for-- should be inserted before "swinging".

Signed and sealed this 8th day of February 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

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