Dec. 12, 1961 R. B. MULVANY 3,012,680

PHOTOELECTRIC MEMORY DEVICE

Filed June 8, 1959 4 Sheets-Sheet 1

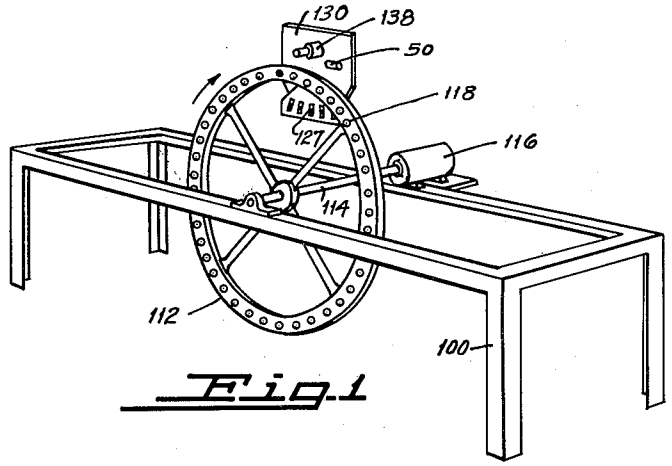



Fig. 1

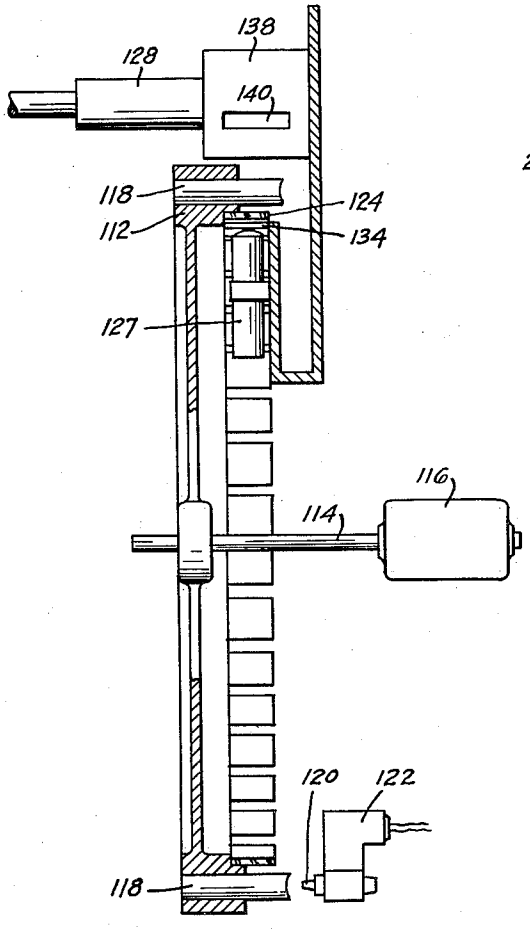



Fig. 2

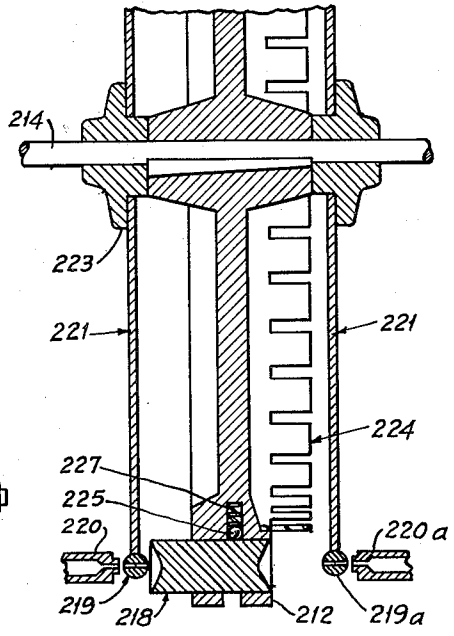



Fig. 4

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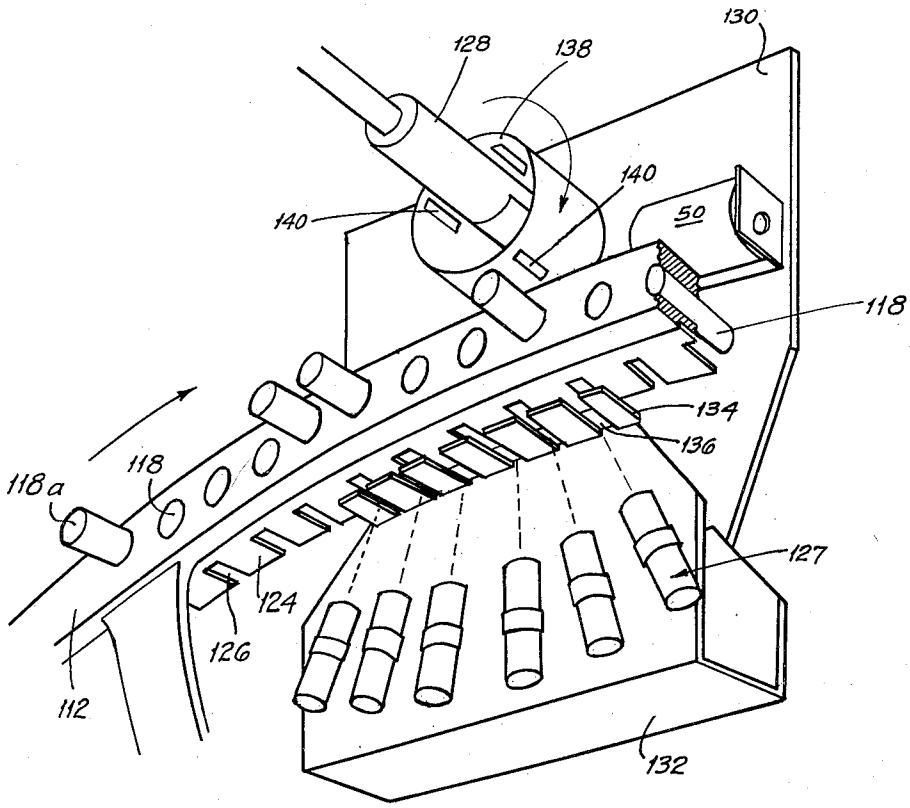



Fig. 3

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PHOTOELECTRIC MEMORY DEVICE

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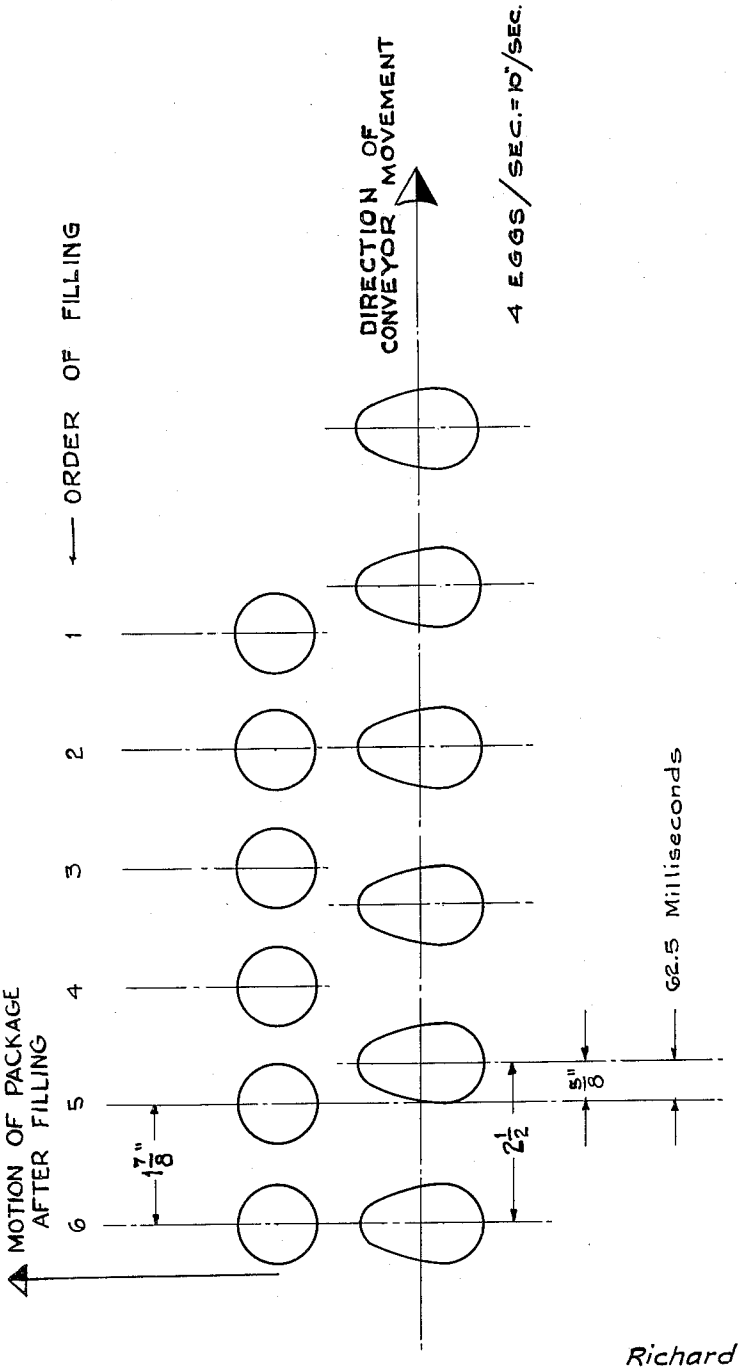



Fig. 6

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PHOTOELECTRIC MEMORY DEVICE

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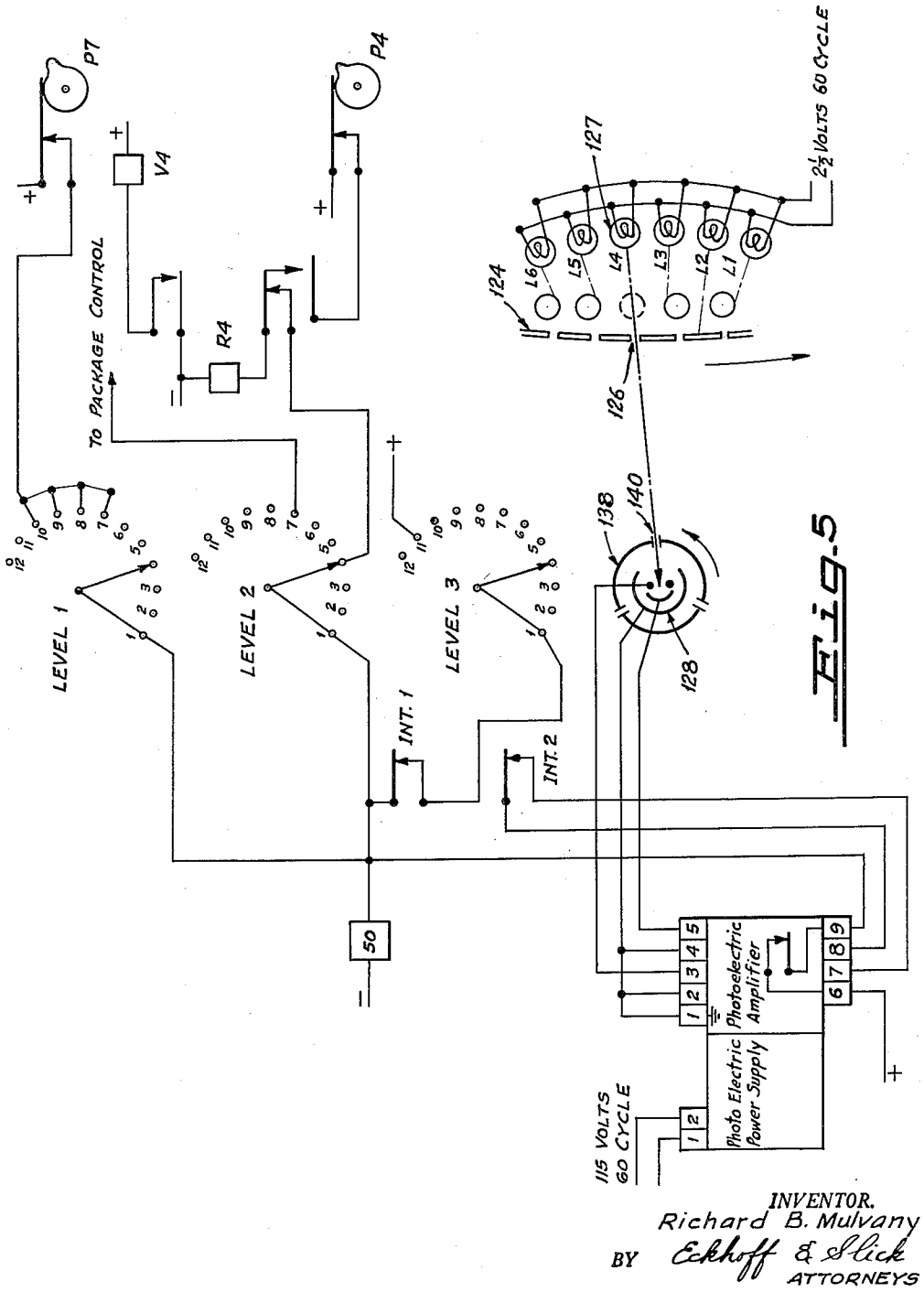



FIG. 5

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United States Patent Office 3,012,680 Patented Dec. 12, 1961



3,012,680

# PHOTOELECTRIC MEMORY DEVICE

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Filed June 8, 1959, Ser. No. 818,818
17 Claims. (Cl. 214—11)

This invention relates to a memory device and more particularly to a memory device capable of storing information regarding a large number of items, such as eggs in transit on a conveyor.

Co-pending application Serial No. 719,621, filed March 6, 1958, now for Egg Handling Device, shows a machine capable of using a conveyor to transport eggs to cartons and discharging the eggs from the conveyor into appropriate cells in the cartons. In advance of this packaging function, however, it is necessary that the eggs be graded according to such factors as interior quality and weight and sorted into different quality and weight classifications. Only thereafter are they allowed to proceed to the appropriate cartons.

Various devices have been developed for sorting eggs, and the customary approach is first to sort them immediately after the grading has been completed, all eggs of one grade being placed on one conveyor and all eggs of a different grade being placed on another conveyor. Physical sorting of this type immediately following grading is a customary procedure in nearly all present-day egg weighing machines.

It is more expeditious, however, to remove eggs in a single stream from the grading devices used for transit to the packaging area, the grade information for each egg being stored temporarily in a suitable memory device. The machine of the afore-mentioned co-pending application is especially designed for use with such a memory device. A single file conveyor is used which may transport eggs of varying grades. However, where eggs of varying grades are transported by the single file conveyor of the afore-mentioned co-pending application, it is necessary that the machine shown there be modified and partially duplicated to the extent of providing separate carton stations positioned along the single file conveyor for the various grades of eggs. Sorting is accomplished by removing each egg according to its grade from the conveyor when its travel along the single file conveyor has brought it to the correct packaging station.

It is therefore an object of this invention to provide means for temporarily storing information, especially information regarding eggs or other items to be packaged or otherwise handled in various alternative fashions.

It is a further object of this invention to provide means for reading out stored information regarding items, especially items on a conveyor, so as to control the operation of an additional unit which acts on such objects carried by a conveyor, such as by removing the objects from the conveyor at an appropriate point.

Still another object of this invention is to provide means for reading out grade information from a memory device so as to permit the automatic filling of a multicellular egg package with eggs in transit on a single file conveyor.

Yet another object of this invention is to provide improvements in memory media and information read-in and read-out devices for general use as well as for use in processing and packaging eggs.

In the drawings:

FIGURE 1 is a perspective view of the memory device of this invention.

FIGURE 2 is an enlarged fragmentary view of one portion of the memory wheel of this invention, showing both the fashion in which the pins are held and the exterior structural characteristics of the read-out mechanism.



FIGURE 3 is an end elevation, partially in section, showing the structure of a portion of the wheel and associated read-in and read-out mechanisms.

FIGURE 4 is an end elevation, partially in section, showing a portion of a modified wheel and read-in mechanism.

FIGURE 5 is an electrical schematic diagram of the photoelectric read-out system of this invention.

FIGURE 6 demonstrates the manner in which read-out is timed so that the read-out device may efficiently be used in conjunction with an egg packaging apparatus.

Broadly, this invention comprises a moving carrier member, preferably a wheel having a plurality of movable elements thereon, preferably slidably mounted pins secured in individual holes along the periphery of the wheel, an associated air blast mechanism for displacing the movable elements and means for thereafter sensing that the elements have been so moved. The pins or flags should be made of some light material, such as nylon or aluminum, which may be moved along its major axis by a stream of air for information read-in. These pins retain the information until such time as it is desired to make such information available for use, at which time the memory pins can, at the read-out area, operate any one of several different types of read-out devices, including small limit switches, photoelectric circuits or inductance-sensitive A.C. bridge-type circuits. The preferred structure to be described in detail below is a photoelectric read-out system, this being particularly suitable for light-weight non-magnetic pins. The photoelectric read-out means is especially suitable with the type of pin described, since inductance or switch-type read-outs require either pins of substantial mass or pins constructed of a ferro-magnetic material.

Referring now to the drawings, wherein like characters refer to like parts throughout, there is seen in FIGURE 1 a frame **100** which provides support for a wheel **112** mounted on a journaled shaft **114**. The shaft is driven at a relatively low speed (depending on the speed of the conveyor to be described) by a prime mover **116**, such as an electric motor having a gear reducer. Closely adjacent one another about the periphery of the wheel are a plurality of cylindrical holes suitable in size for receipt of pins **118**. The pins have flanges on their far ends, or otherwise are constructed to prevent them from being pushed completely through and out of the cylindrical holes in the rim of the wheel. Preferably, these dowel-shaped pins are formed, as aforementioned, of a light material such as nylon or aluminum.

Positioned at one point along the rim of the wheel is an air nozzle **120** which is supplied with air under pressure from a suitable source, not shown. Used in conjunction therewith is a control means for the air nozzle, such as an electric solenoid valve **122** mounted adjacent the nozzle. A suitable type is Model No. 82622, normally closed solenoid valve, manufactured by the Automatic Switch Company of Florham Park, New Jersey. The air blast assembly is supported by a suitable frame therefor.

The wheel **112** has a louvered flange **124** which extends transversely beyond the edge of the wheel. The flange has a series of slots **126** therein, one slot being provided for each pin **118**, so positioned that each pin may be seen through its slot and, when a pin is moved into the position of pin **118***a* of FIGURE 3, light may pass freely from one side of the wheel to the other.

In the particular application for which this device is designed (but to which it is not necessarily limited), wherein eggs of various grades are to be packaged, each pin in the memory wheel corresponds to a position on a conveyor, and thus each pin which has been displaced, e.g. **118***a* of FIGURE 3, represents an egg at a point on the conveyor which can be determined by noting the spot

on the conveyor corresponding to the displaced pin. Since a single pin wheel is allocated to each grade of eggs (extra large to peewees), a pin wheel or equivalent will be necessary for each grade of eggs which may be carried on a conveyor moving past various packaging stations. Also, with respect to the specific application for which this memory instrument is especially adapted, the number of pins separating the point at which the memory pins are moved for information read-in to the point where information in the memory wheel is read out corresponds to the number of positions upon the egg-carrying conveyor which will be found between the point where the eggs are loaded from a grading device (scale) to a point where they will be packaged into packages after having been removed from the single file conveyor.

Information read-out is accomplished by means of a photoelectric device which is basically nothing more than a light source, generally designated **127**, and a photocell **128** positioned opposite thereto.

In the commercial embodiment of this structure, the light source used is Model 40PY1 made by the Photoswitch Division of the Electronics Corporation of America. These lights are aimed at the photocell **128**, which is RCA-type 927, mounted on a photoswitch miniature side-view scanner assembly. The entire unit is mounted on a suitable support therefor **130** and the light source is mounted on a suitable bracket **132** which, in turn, is secured to the plate **130**. Support means, not shown, are provided for the plate. At right angles to the top of support bracket **132** and the beam of light shining from light source **127** is a flange having a series of slots therein which together form a second louvered arrangement **134**. Individual slots or louvers **136** are so positioned and shaped that they may register with the slots **126** of the memory wheel, whereby to allow for the passage of light from light source **127** through both slots. In the commercial embodiment of this structure, the light beam from the individual light source passes through stationary slot **136** which is approximately ⅛" wide by 7/16" in length. This slot is provided for purposes of dividing the light beam down into a relatively narrow slit of light which will pass through the slot of the moving memory wheel whenever a pin has been depressed by the read-in circuit. Since the slots **126** are also approximately ⅛" wide by 7/16" in length and move perpendicularly to the long axis of the slots **136**, a beam of light coming from a stationary slot is lined up with the moving slot for only a very short time, making possible accurate timing of the operation of removing the egg from a single file conveyor. The stationary slots **136** could, of course, be dispensed with, but not without the loss in function described above.

Essentially, only a single light source **127** need be provided for the device to represent the simplest embodiment of this invention, but since this device is specifically designed for packaging eggs from a single file conveyor into a package of six egg cells width (the package being positioned adjacent the single file conveyor with each row of 6 egg cells aligned parallel to the direction of conveyor travel; after each row of 6 egg cells is filled, the package being moved perpendicularly to the direction of travel of the single file conveyor one egg row at a time), six-read-out positions are required for each photoelectric readout unit associated with the individual memory pinwheel relating to a specific grade of egg, and this is accomplished by directing six light beams from different light sources through the slots in the memory wheel toward the photocell. The selection of a particular light beam to impinge upon the photocell is dependent upon which individual egg cell in the egg package row of six egg cells is next to be filled when an individual moving slot **126** with a depressed pin **118***a* passes through the selected light beam, the moving slot and depressed pin representing one egg in a given position on the aforementioned single-file conveyor.

Intersection of the six light beams with the memory wheel slots corresponds to the relationship between the centers of the egg pockets in the multi-cellular packages and the center distance between the eggs on the single file conveyor. For example, FIGURE 6 shows the relationship between egg center distances in a package (1⅞") and center distances on the single file conveyor (2½"). Note that the six slots in flange **134** thus correspond to the six positions in an egg carton row, while centers of the slots in the memory wheel correspond to the centers of the egg supporting elements on the conveyor. Thus, while less than 5 conveyor positions will be opposite the six carton-cell positions at any one point, as shown in FIGURE 6, there will similarly be less than 5 spaced slots on the memory wheel distributed opposite plate **134** which contains six slots.

Each of the indivadual light sources represents a position for an egg in a carton and means must be provided for ensuring that it will be possible for only a single beam to pass at one time, specifically the beam representing the position in the carton which is next to be filled with an egg. This means is an intermittenly-rotating drum or shutter **138** having slots **140** in its side so as to provide means for selecting the incoming light beam. As will be understood from the above, the shutter operates in such a fashion that at any given moment a light beam is receivable only from that light source which represents the next empty cell in the carton adjacent the single file conveyor, so that this beam will be allowed to strike the photocell only when an open slot **126** passes through the light beam, the slot being open by virtue of the fact that its memory pin **118** has been moved longitudinally.

Three slots **140** are provided in the rotating shutter, the three slots being spaced equidistantly about the shutter. Three are provided for convenience in that if only a single slot were provided, it would be necessary to provide means for moving the shutter through about 240° after the single slot had been allowed to register successively with the light beam from each of the individual light sources. The individual slots **140** are again approximately ⅛" by 7/16". By the use of three slots, a simple stepping switch of a conventional structure such as Automatic Electric Type **44**, a telephone stepping switch, may be employed. Drum **138** rotates with the switch's wiper assembly. This particular switch requires 33 steps for one complete revolution, and the same switch may be energized by the photocell circuit.

The switch wiper assembly has several intermittently-rotating wiper contact arm assemblies rotating in planes perpendicular to the wiper assembly axis of rotation. Each wiper arm assembly is electrically insulated from all other wiper arm assemblies and each wiper arm assembly has three contact points evenly spaced at 120° intervals in the plane of rotation. Each wiper arm assembly during rotation sequentially engages a series of stationary bank contacts mounted in separate levels, with twelve bank contacts located in each level at 10.9° intervals, there being one level of bank contacts for each wiper arm assembly. The wiper arm assemblies are aligned so that all assemblies engage the same bank contact position in each respective bank contact level.

These functions may be accomplished by other commercially-available switches or by a shutter disc operated by a stepper, a moving shutter loop with one or more light apertures operated by a stepping switch, or by any of the above operated by any convenient source of intermittent motion, including a Minor switch, or a stepping motor such as the Model PM11283 motor made by the Instrument Division of American Electronics, Inc.

The structure is so wired that when a light beam strikes the photocell, it will cause the stepping switch to make one step, thus moving the shutter drum slit into a position ready to receive a signal from the number two light source in the read-out circuit.

Where the structure is used in packaging eggs, as men-

tioned above, the difference in spacing of egg positions between the multi-cellular carton on the one hand and the single file conveyor on the other preferably allows about 62.5 milliseconds time between the coincidence of the first light beam in the photoelectric read-out and a moving slot and the coincidence of a second light beam in the next slot and a moving slot. In other words, there is preferably about 62.5 milliseconds between the time the first egg is to be removed from the conveyor and placed in the package and the time when the next egg must be forced to move from a single file conveyor and placed in the number two position in the package. The use of the afore-mentioned telephone-type stepping switch to select one of the six light beams directed at a photocell is a convenient means for achieving this multiple position read-out for one memory channel within the time limitations described. Only one photoelectric tube and amplifier circuit is required for each memory channel.

The reason for the differential between the spacing of the egg receiving pockets in the standard egg carton and the eggs on a single file conveyor, thus necessitating a differential spacing between the slots and light beams described above, is the fact that it is far more convenient to utilize a single file conveyor of slightly more than 1⅞" spacing between the eggs. Egg machines are commonly fed by transferring eggs from a 30 egg pattern and placing them on their sides on a six-abreast conveyor. In this pattern, the distance between eggs from one end to the other is more than 1⅞". In fact, it is approximately 2⅝" when customary commercially-available spool conveyors are utilized. When this type of conveyor feeds into a single file conveyor, it is more convenient to have the single file conveyor use center distances approximately those of the six-abreast conveyor. Since some eggs are nearly 1⅞" in diameter, it is easier to prevent the eggs from checking one another if more than 1⅞" is utilized on the conveyor. Where a single file conveyor of more than 1⅞" center distance between eggs is utilized and where it is desired to transfer the eggs from the conveyor directly into multiple positions in a container, it is necessary that the most advanced egg along the conveyor be packaged first if any one package is to be capable of accommodating six eggs moving sequentially down the conveyor. This will further explain the necessity for differential spacing between the two sets of slots.

The entire read-out assembly is mounted on aluminum frame **130** described above, and is preferably so mounted that it can be moved along the length of travel of the moving memory wheel so as to change or adjust the read-out timing to begin removal of eggs from a single file conveyor at the correct moment.

Referring now to FIGURE 5, the electrical schematic diagram of the photoelectric-controlled six-position air packaging unit, it is seen that the circuit uses a three-level Type 44 Automatic Electric stepping switch with a shutter drum attached to the rotating wiper assembly. The square marked **50** at the left side of the drawing is the coil or the motor magnet of the stepping switch. As shown in the drawing, the number four position of the photoelectric read-out is operative with light beam L4 being directed through one of the slots of the memory wheel louver to the photo tube. The photoelectric amplifier now operates, which engages an internal locking circuit and closes its relay completing a circuit between terminal points **6** and **9**, which puts 24 volts into the stepping switch coil, as well as directing 24 volts through level **2**, bank contact **4**, to pick up relay R–4 through its make-before-break contacts. As R–4 picks up, its make contacts close the circuit to P–4, a pulsing cam and switch, which then serves to lock relay 4 in for the length of time to satisfactorily remove an egg from the conveyor position 4. The break contacts separate this pulse from the stepper circuit; at the same time, its upper contacts also close, operating V–4 or valve 4, shown only schematically here, but which is preferably an electric solenoid valve such as Model No. 82622 normally closed solenoid valve manufactured by the Automatic Switch Co. of Florham Park, New Jersey. This valve is placed at an air nozzle in the fashion described in co-pending application Serial No. 719,621, filed March 6, 1958, wherein a similar structure is set forth. This valve will continue to be open so as to allow a blast of air to remove an egg from the conveyor so long as P–4 holds relay R–4 in. The stepper used here requires approximately 20 milliseconds to operate—relay R–4 approximately 15 milliseconds. As soon as the stepper has cocked or operated, its lower set of interrupter contacts (Int. 2) open. This deenergizes the photoelectric amplifier (and its internal locking circuit) and operates an RC time delay disabling circuit in the amplifier to prevent the circuit from again operating on the light beam from light 4. The opening of the photoelectric amplifier by the interrupter springs also immediately causes its relay to drop out, opening the circuit between its terminal pins **6** and **9** and discontinuing the 24 volts to the stepper coil and through level **2**. Relay R–4, of course, by this time has already operated. The interruption of the circuit through the motor magnet of the stepper causes the stepper to move to bank contact **5** awaiting its next operation.

The circuitry shown, together with the relay valve and pulsing cam, are duplicated for each of the bank contacts **2–6** and **12**, bank contact **12** being operatively associated with relay R–1, valve V–1 and pulsing cam P–1 and all others being operatively associated with the corresponding bank contacts. Hereinafter, reference will be made to various other valves, relays and pulsing cams by means of their symbols (e.g., P–7, V–7 and R–7) and it will be understood that reference is being made to elements identical to those pictured in FIGURE 5 in connection with bank contact 4 of switch level **2**.

The sequence of operations noted above continues, controlled by the pins in the moving memory wheel through position 6. After the sixth egg has been removed from the conveyor and the last egg pocket in a six-row carton has been filled, the stepper steps to bank contact **7**, where, through level **1**, it is connected to a pulsing cam which serves to further step the relay back around to its number 1 position. This pulse coming from P–7 also serves at position 7 to put a pulse into the package conveyor control and index the next egg row to be filled forward in the packaging unit. The operation of the pulse P–7 is controlled so as to return the stepper and its shutter drum to the number 1 position only after the open louver in the memory wheel that was operated by light beam **6** has passed the number 1 position and, of course, before the next opening in the memory wheel arrives at the number 1 position. The correct time required for this operation in a situation where the package spaces are 1⅞" and the single file conveyor spaces are 2½" is that time required for approximately four egg spaces to pass a given point, or 10" of conveyor travel. P–7 is thus tied to this operation of the single file conveyor as are relay pulse cams P–1 through P–6; P–1 through P–7 are all mounted on one cam shaft, the shaft making one revolution for every egg cup on the single file conveyor or, in other words, for every 2½" of travel of the single file conveyor. The four pulses received from P–7 place the stepping switch on bank contact **11** where current is supplied to level **3**. This current is fed through the upper interrupter springs (Int. 1) of the stepping switch, the switch thus cocking, interrupting its current, and then stepping around to put its wipers back on the number 1 position as well as the number **12** on level **3**. The switch is now set up for another sequence of six operations.

It would also be possible to utilize multiple photosensitive cells with a single amplifier, switching means being required for switching the amplifier to the individual photocell to be activated at any given moment. Obviously, it would be possible to duplicate the ampli-

fiers, but this is manifestly less desirable from the cost standpoint than merely having a single amplifier which can be switched. The use of multiple photocells would allow for the selection of one or another in other than normal sequence, if desired.

It should be pointed out that eggs are packaged into the package in a direction opposite to the travel of the eggs along a single file conveyor in order to achieve time after the sixth egg has been placed in the package to move the next row in the package to be filled forward. This being the case, it is necessary in each instance to assure that the sensing units in the read-out assemblies are returned to their number 1 position only after the memory pin which actuated the sixth egg into its position has passed the number 1 position in the read-out, and, of course, before the next pin which might represent an egg arrives. This, again, is accomplished in all of these units through the use of a pulse cam operating with one revolution per egg cup travel of the single file conveyor.

Where eggs are passed through more than one grading device in series, it may be desirable to have the grade information from the second grading device cancel out the grade information put into the memory from the first grading device. This is the case where eggs are passed first over a sizing device and then through a blood detector where it is desired to put all bloods into one package and avoid packing them into any other station. The preferred air-operated pin-type memory medium very easily lends itself to this type of operation.

FIGURE 4 shows a cross-section of a modified memory-pin wheel with provisions for both reading information into the wheel from a scale and canceling it with information from another source, such as a blood detector. The memory wheel **212** has pins **218** resting in holes about its periphery as shown earlier. The pins are prevented from sliding free of the rim by rings **219**, which are supported by disks **221** mounted on hubs **223**, supported by the rotating memory drive shaft **214**. The rings have provision for mounting of air nozzles **220** and **220***a* to operate the memory pins. The memory pin **218** can be restrained from moving by vibration by the use of a ball and spring **225** and **227**, which apply a side pressure against the pin if desired. Air impinging against the memory pin from the left nozzle **220***a* will move the pin into an operative position as shown in the drawing. Ring **219** serves as a back-up to prevent the pin from moving farther than desired. The movement shown in the figure will move the pin away from the slotted louver assembly **224** opening one slot to provide for a later read-out by the photoelectric read-out system. If, after weight information, as an example, has been read in by nozzle **220***a*, it should be desired to cancel out this weight information because the egg may have been found to have blood in it by a blood detector, nozzle **220** can move the pin back against the opposite restraining ring, again closing the opening through the louver assembly. As is evident from the just-completed description of the nozzles **220** and **220***a*, it is essential that these two nozzles not be directly opposite one another, since nozzle **220** will be called upon to operate subsequent to the operation of **220***a*. Hence, nozzle **220** is positioned at a point advanced from the position of nozzle **220***a*, such that nozzle **220***a* is capable of moving a pin and thereafter nozzle **220** is capable of replacing the same pin after only a short interval.

In the preferred embodiment of this invention, prime mover **116** shown in FIGURES 1 and 2 is directly connected to the single file egg conveyor also, the function and appearance of the conveyor being more completely described in the afore-mentioned co-pending application Serial No. 719,621. Thus, the movement of the pin wheel and movement of the conveyor are directly tied together.

As pointed out above, the preferred embodiment of the invention incorporates air nozzles as means for moving light-weight pins. Other types of pin wheels are known to the art, but the use of air to move the pins has not been suggested heretofore. Some of the advantages of using air rather than other mechanical means to move the pins are that when pins or flags must be displaced, air offers means of achieving this with less wear than the conventional electromagnetically-operated hammer. Further, air offers an opportunity to operate at high speeds since, when one uses such a hammer or pusher mechanism, it is essential that this mechanism be promptly retracted after striking a pin, since otherwise it may impede the passage of a subsequent pin. The use of air eliminates any concern in this regard.

Obviously, many modifications and variations of this invention may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

I claim:

1. In a memory unit for retaining information relating to a plurality of individual items on a conveyor, a memory medium comprising a plurality of freely-moveable elements mounted on a support therefor, first means in association therewith for directing a stream of air against said elements of sufficient force to move said elements, a first grading device operatively associated with said first means for directing an air stream, second means in association with said memory medium for directing a second stream of air against said elements from the opposite direction of sufficient force to restore said elements individually to their original positions and a second grading device operatively associated with said second means for directing a stream of air and means for moving said support relative to said air stream means.

2. In a memory unit for retaining information relating to a plurality of individual items in transit on a conveyor, a memory medium comprising a supporting element having pins slideably mounted in a plurality of holes positioned transversely of said element; slots in said element opposed to each of said pins whereby when said pins are moved longitudinally in the holes therefor, a light beam may pass through said element; means in association with said pins for moving said pins longitudinally thereof whereby to allow for the passage of light through said slots of said element; means for advancing said supporting element relative to said pin-moving means; a photosensitive device mounted adjacent said supporting element opposite said slots whereby light passing through said slots will strike said photosensitive device when said pins are moved longitudinally in the holes therefor; a plurality of light sources mounted opposite said photosensitive device on the far side of and opposite said slots in the said supporting element; and means for receiving the said light beams from the said light sources one at a time and sequentially at the said photosensitive device.

3. The structure of claim 2 wherein the means for moving said pins comprises an air nozzle mounted adjacent said supporting element and means in association therewith for supplying to said nozzle a stream of air under sufficient pressure to move said pins.

4. The structure of claim 2 wherein the spacing of each of the light sources from one another is such that light beams therefrom strike the said supporting element in such a manner that the spacing of the slots of said supporting element relative to the spacing of the light beams where said light beams strike said supporting element is proportional to the spacing of the items on a conveyor relative to the spacing of the positions of a package into which the items carried by said conveyor are moved.

5. In a memory unit for retaining information relating to a plurality of individual elements in a predetermined sequence, a memory medium comprising a moveable support having thereon a plurality of individual flags capable of being moved into the path of a light beam and out of the path of a light beam directed at a photo-sensitive

device, a source of said light beam, and an intermittently operating shutter element interposed between the said photo-sensitive device and the said source of light, whereby to prevent contact of the said light beam with the said photosensitive device.

6. The structure of claim 5 wherein a plurality of individual light sources are directed at the said cell simultaneously.

7. The structure of claim 5 wherein the flags are lightweight pins mounted in holes on said support.

8. The structure of claim 6 wherein the said support has a plurality of slots extending therethrough, the said support being so positioned that the said slots are directly between the said shutter and the said light sources, whereby the said slots allow for the passage of light intermittently to the said shutter, the said support having the said flags so positioned that they may obstruct the said slots whereby light is prevented from passing therethrough or, by movement, may open the said slots for the passage of light.

9. In a memory unit for retaining information relating to a plurality of individual items in transit on a conveyor wherein the said conveyor has a carton positioned adjacent thereto for the receipt of individual elements from the said conveyor, the spacing of the elements on the said conveyor being different than that of element-receiving pockets in the said package, and wherein means for dislodging the said elements from the said conveyor and moving them in to the said package are provided, the improvements comprising: a memory system for use in association therewith comprising an arcuate supporting member and means for moving the said arcuate supporting member; a photosensitive device positioned on one side of the arcuate supporting member; a plurality of light sources positioned on the opposite side of the said arcuate supporting member and directed toward the said photo-sensitive device, the said arcuate supporting member having a plurality of slots therein, the arcuate supporting member being so positioned that light from a light source may pass through the said slots towards the said photo-sensitive device; means mounted in said arcuate supporting member for obstructing passage of light through the said slots; a rotating drum mounted about the said photo-sensitive device having at least a single slot therein; and means in association with the said drum for intermittently rotating the said drum and aligning said slot thereof with light beams from said light sources sequentially.

10. The structure of claim 9 wherein the distance between elements carried by said conveyor relative to the distance between receiving pockets of the said package is proportional to the distance between slots on the said arcuate supporting member relative to the distance between points where the said light beams strike the said arcuate supporting member.

11. The structure of claim 10 wherein the means for moving the said shutter whereby to align the slot therein sequentially with different beams from the said light sources is actuated to advance the said slot one position by actuation of the photo-sensitive device by a light beam from one of the said light sources.

12. In a memory device for retaining information relating to individual items in a predetermined sequence, a memory medium comprising a circular wheel having means in association therewith for slowly rotating said wheel, said wheel having a plurality of slots along one edge passing entirely through the rim thereof; means for interposing an element in said slot whereby to prevent passage of light through said slot; means for moving said element into and out of the light-blocking position as required; a photo-sensitive device mounted on one side of said rim of said wheel opposite the slots in said wheel; a plurality of light sources mounted opposite said photo-sensitive device and on the far side of said wheel so directed that the light from the said light sources will pass through slots of the said wheel and strike the said photo-sensitive device, the said light sources being arranged generally adjacent one another and being directed toward the single point represented by the said photo-sensitive device; a shutter in association with said photo-sensitive device for intermittently and sequentially allowing the passage through said shutter to said photoelectric device of one of the beams of light from one of the said light sources.

13. In a memory unit for retaining information relating to individual items in transit on a conveyor, a memory medium comprising a plurality of opaque, moveable elements, said elements having conveying means therefor, said conveying means acting to convey said moveable elements in series past means for moving the said elements relative to the said conveying means, said conveying means acting to thereafter convey said moveable elements past an information read-out device at a speed proportional to the speed of travel of the conveyor carrying the said items in transit, the read-in device serving to displace the said moveable elements into a first position, said read-out means comprising a multiple-position, photoelectric read-out means employing light sources on one side of the said moveable elements, a photo-sensitive device positioned on the opposite side of said moveable elements and so positioned that in the first position, the said moveable elements will be interposed between the said light source and the said photo-sensitive device; and an intermittently-moveable light aperture positioned to intermittently block access of light to the said photo-sensitive device and means for intermittently and sequentially positioning the said aperture between one of the said light sources and the photo-sensitive device.

14. The structure of claim 13 wherein the movement of the said aperture is controlled by the operation of the said photo-sensitive device.

15. In a memory unit for retaining information relating to a plurality of individual items in transit on a conveyor, a memory medium comprising a supporting element having pins slideably mounted in a plurality of receptacles positioned transversely of said element; openings in said element opposed to each of said pins whereby, when said pins are moved longitudinally in the receptacles therefor, a light beam may pass through said element; means in association with said pins for moving said pins longitudinally thereof whereby to allow for the passage of light through said openings of said element; means for advancing said supporting element relative to the said pin-moving means; photo-sensitive means mounted adjacent to said supporting element opposite said openings whereby a light beam passing through one of said openings will strike said photo-sensitive means and operate an external circuit by actuating said photo-sensitive means when one of said pins is moved longitudinally in the receptacle therefor; a plurality of light sources mounted opposite said photo-sensitive means on the far side of and opposite said openings in said supporting element; and means for sequentially selecting one of said light sources to operate said photo-sensitive means and external circuit.

16. In a memory unit for retaining information relating to a plurality of individual items in transit on a conveyor, a memory medium comprising a movable supporting element having a plurality of opaque elements fixed therealong, each of the said opaque elements being movable to a first position to obstruct the passage of a light beam and to a second position to permit the passage of a light beam; means mounted adjacent said supporting element for moving said opaque elements individually; means for advancing said supporting element relative to the said opaque elements moving means; photo-sensitive means mounted adjacent said supporting element; a plurality of light sources mounted opposite said photo-sensitive means on the far side of said supporting element relative to said photo-sensitive means whereby a light beam not obstructed by one of said opaque elements in said first position will strike said photo-sensitive means and operate an external

circuit by actuating said photo-sensitive means; and means for sequentially selecting one of said light sources to operate said photo-sensitive means and external circuit.

17. In a memory unit for retaining information relating to a plurality of individual items in transit on a conveyor, a memory medium comprising: a movable supporting element having a plurality of flags fixed therealong, each of the said flags being movable to a first position to obstruct the passage of a light beam and to a second position to permit the passage of a light beam; means mounted adjacent said supporting element for moving said flags individually; means for advancing said supporting element relative to said flag moving means; photo-sensitive means mounted adjacent said supporting element; a plurality of light sources mounted opposite said photo-sensitive means



on the far side of said supporting element relative to said photo-sensitive means whereby a light beam not obstructed by one of said flags in said first position will strike said photo-sensitive means and operate an external circuit by actuating said photo-sensitive means; and means for sequentially selecting one of said light sources to operate said photo-sensitive means and external circuit.

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