

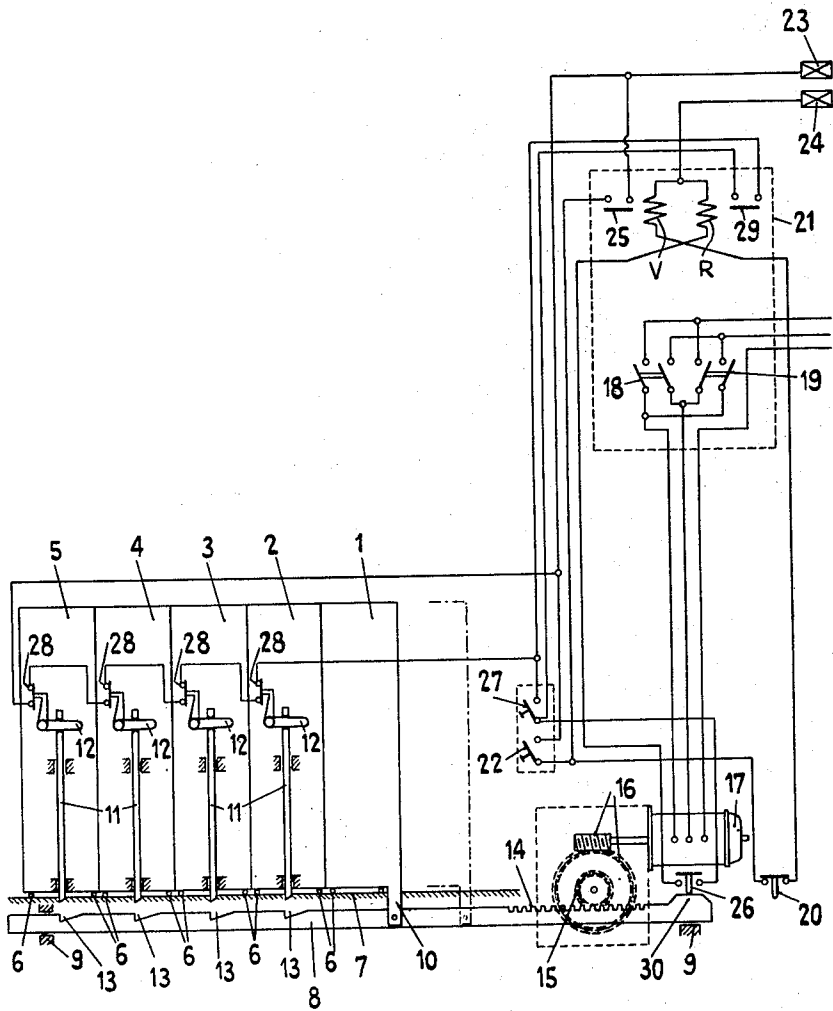
Oct. 6, 1953

H. INGOLD

2,654,489

STORAGE ARRANGEMENT

Filed March 23, 1948



Inventor:
H. Ingold
By E. F. O'Kendroth
Atty

UNITED STATES PATENT OFFICE

2,654,489

STORAGE ARRANGEMENT

Hans Ingold, Lucerne, Switzerland

Application March 23, 1948, Serial No. 16,588
In Switzerland June 13, 1947

10 Claims. (Cl. 214-16)

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This invention relates to storage installations or equipment for various articles, such as documents, goods or commodities that are usually stored in containers, on shelves, etc., whereby food stuffs, commodities, as well as various articles of manufacture, samples, models, tools, etc., are arranged in such a manner that the same can be found immediately without waste of time. Storage units, in the form of book cases with shelves, are usually placed in a storage room with a certain amount of space between said units, to provide access to the articles that are stored from at least one side of the respective storage unit. The free space between the storage units however necessitated a considerable loss of floor space in the storage room. Documents and various articles are often stored which are needed for reference infrequently, so that in this instance particularly the available floor space is not utilized to the full possible extent or advantage. Accordingly, a great deal of space is wasted and the space taken up by the storage units is larger than that which is actually needed.

One of the primary objects of the present invention is to provide means affording better use of the space available in a storage room to thereby permit storing of books, documents, commodities, samples, etc., in a very economical way, the separate storage units being arranged so that they can be moved relative to each other or together with the intermediary of a certain mechanism.

Another object of the invention is to provide means markedly enlarging the capacity of a storage space.

Still a further object of the invention is to provide means conducive to easy handling and grouping together of predetermined storage units which may move or travel in a direction transversely to the storage or container units, the power for moving same being transmitted to coupling means, so that the units can be moved singly or severally and in such a manner that some of the units are moved close together for obtaining access or a free space between groups of any selected units to which access is desired.

These and other objects and advantages of the invention ensue from the description of the invention and drawing pertaining thereto.

The drawing in a more diagrammatic form illustrates one embodiment of the invention.

Reference numerals 1, 2, 3, 4 and 5 designate the container or storage units in elevation. These containers are provided with rollers 6 so that the containers can move or roll along the floor 7.

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These containers are fitted with shelves (not shown) to receive any articles, books for instance. A coupling member or rod 8 is carried underneath the floor in bearings 9 in a direction transversely to the length of the containers. The first container 1 is rigidly fixed to or coupled with the rod at 10. The remaining containers 2 to 5, are each provided with coupling means comprising a bar or bolt 11 with a handle 12, by means of which the bar can be reciprocally moved, the end of each bar being shaped so as to engage with a respective notch provided in the coupling rod 8 forming a driven means. The coupling rod 8 is extended beyond the container 1, and is provided with teeth forming a rack 14 that engages with a pinion 15 rotatable by a worm gear drive 16 operatively connected with the motor 17 forming a drive means.

The position of the container units as shown in the drawing is the rest position or the normal position with the units juxtaposed (containers 1 to 5). The containers are close together and the bars 11 of the containers 2 to 5 are arranged to engage with the corresponding notches 13 in the coupling rod 8.

The motor 17 is of the reversible type, there being two main contact switches 18, 19 in the main circuit, the contact switch 18 being for the forward movement and the contact 19 for the reverse movement of the motor 17. A contact switch 20 within a control circuit limits the forward motion of the coupling rod 8, while a coil V of a reversing relay 21 cooperates with a push button 22 in the forward control circuit. This circuit contains the protective devices (fuses) 23 and 24 and a holder contact 25 included in the circuit. The contact switch 26 limits the reverse motion of the coupling rod 8, while a coil R of the reversing relay 21 cooperates with a push button 27 and a contact 28 of a locking device provided on each of the containers (2 to 5) in series. This control circuit for the reverse movement of the motor 17 is provided with the protective devices 23 and 24 (fuses) as well as with holder contact 29.

The coupling rod 8 has a cam or stem 30 that is shaped to engage with the limit contact switches 20 and 26.

The contacts 28 of the locking devices are connected with or actuated by the handles 12 of the bars of the containers 2 to 5, the arrangement being such that the contacts 28 are closed when the bars 11 are out of engagement with the notches 13 of the coupling rod 8.

The mode of operation of the installation will

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be clear with reference to the drawing, in which the initial or normal position of the containers 1 to 5 is shown in full lines. The container units are shown in closed position and in contact with each other and without any clearance between the separable units so that they are not accessible from either longitudinal side. In this position of the container units 1 to 5 the stem or cam 30 of the coupling rod 8 has opened the reverse limit contact switch 26 in the control circuit for reversal of the motor 17, further the main contact switches 18, 19 are open, also the holder contacts 25 and 29 as well as the push buttons 22 and 27. The contacts 28 of the container locking arrangement are closed. Let us assume that it is desirable to obtain a space between the container units 3 and 4. By means of the handle 12 the bar 11 of unit 3 is depressed so that the bar 11 thereof engages with the corresponding notch 13 of the coupling rod 8. The contact 28 incorporated in said locking arrangement is interrupted and on depressing the push button 22 the following circuit for the control current is formed: protective fuse 23, push button contact 22 (closed), the limiting contact 20, the coil V of the reversing relay 21 and the protective fuse 24 of the control circuit. The reversing relay comes into operation and the main switch 18 with the coil V connects the motor with the current supply. This sets the motor in operation, the power being transmitted to the rack 14 of the coupling member 8 through the transmission members 16, 15, the coupling member being caused to move to the right. The container units 1, 2 and 3 are also moved as coupled units to the right, the units 1 and 3 because they are mechanically connected to the coupling member 8 and the container 2 since it is encased and maintained between the two units 1 and 3. If the push button 22 is released after the motor 17 has been set in motion, the motor will still continue to operate, causing the units 1 to 3 to continue their motion to the right, as the control current now flows over the self holding contact switch 25. The motion will continue till the stem 30 of the member 8 reaches the limit contact 20, the stem 30 thereby lifting and opening the switch 20 and the current will be cut off from the coil V, the main switch 18 will be opened and the motor 17 cut off from the current supply. The container units 1 to 3 will remain stationary (unit 1 being in the position displaced as far to the right as indicated by the dotted lines). Thus, it will be sufficient space formed between the units 3 and 4 so that access can now be obtained to the units 3 and 4 from the sides thereof. During the course of the forward motion of the rack of the coupling member 8 the contact limiting switch 26 slides off the cam or stem 30 so that the switch becomes now closed and the circuit for the control current for the reverse motion of the motor is put in a state ready for operation. This circuit however cannot yet be closed by operating the push button 27 of the control circuit, since the contact 28 of the locking device of the container 3 is still interrupted. It is first necessary to lift the bar 11 so as to remove it from the corresponding notch 13 in the member 8 and to close the contact 28 by operating the handle 12. Upon operating the push button 27 the following circuit for the control current is established: fuse 23, contact 28 of the locking device, push button 27, limit switch 26, coil R of the reversing

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relay 21 and fuse 24, so that the main contact switch 19 can now be closed. The motor 17 now rotates in the reverse direction and the coupling member 8 travels in the direction from right to left, the container units 1—3 being thus brought back to their initial position. The control circuit will be maintained during this operation, by the action of the self holding contact switch 29 even after the push button 27 has been released. When the container units 1—3 in the course of their travel get near their initial or normal position the cam or stem 30 on member 8 lifts the limit switch 26 so that the control circuit is interrupted, the container units 1 to 3 being brought back toward and in contact with the other container units 4 to 5 thus forming a closed block again without any space between the separate container units.

In a similar way by manipulating the handle of any one container unit the same can be separated from the others and access obtained to the contents of the container from the longitudinal side thereof.

The containers that have been removed from the closed block can only be brought back to their original position after the circuit for the control current has been established so that there is no danger of any accidents or of a person getting jammed between the previously opened or spaced containers that have remained stationary and these that are being returned to the closed block of containers.

It is evident that by this arrangement in which a required definite and limited space is obtained between any containers to which access is desired, a great deal of floor space can be saved in store rooms, libraries, offices, etc., in which documents or any goods are stored. Much better use is made of the floor space available, since a great many more containers can be accommodated in a given room than is possible with the storage arrangements now in use. This also applies to the storage of food stuffs, samples, working models and goods of all kinds.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. A device for storing documents, goods and like articles, comprising a plurality of container units for storing said articles, said container units being movable in parallel relation to each other, a power driven reversible electric motor, a member actuated by said motor and movable in a direction transverse to said container units, said member being connected with the first of said container units and forming a rod having a cam thereon, a forward circuit and a reverse circuit, respectively, for the forward and reverse movement of said motor, first limit switch and second limit switch, respectively, positioned in the path of and operable by said cam, said first limit switch being in said circuit for the forward movement of said motor, said second limit switch being in said circuit for the reverse movement of said motor, both limit switches for the forward movement and for the reverse movement of said motor being normally closed, a first push button in said forward circuit and in series with said first limit switch, a first main contact switch in said forward circuit and a self holding contact switch therefor in parallel with said first push button and said first limit switch, and a second push button in said reverse circuit in series with said second limit switch, respective

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coupling means on the remainder of said containers and each manually operable to connect a respective container of said remainder of said containers with said rod, contact switches incorporated in said coupling members in the reverse circuit and in series with said second push button and said second limit switch, and a second main contact switch in said reverse circuit and a second self holding contact switch therefor, said second push button being in parallel with said second self holding contact.

2. A device for storing documents, goods and like articles, comprising a plurality of separate longitudinally extending container units for storing said articles and each movable out of an initial position, said units being movable transverse to their longitudinal axes and extending parallel to each other, a reversible electric motor including a control circuit for the reverse movement of said motor, a coupling member operatively connected with said motor and attached to the first of said container units, whereby said first container unit moves together with said coupling member manually operated coupling means operatively connected to each of the remaining container units for selectively attaching each of said remaining container units to said coupling member, and an electric contact switch incorporated in each of said coupling means, said contact switch being in said control circuit for the reverse movement of said motor and rendering said control circuit inoperative in response to operation of respective coupling means by which a respective one of said remaining container units is attached to said coupling member, reverse movement of said motor being operable to return said container units to said initial position.

3. A device according to claim 2, wherein said coupling member is provided with a cam, limit switch means in said control circuit for the reverse movement of said motor arranged in the path of said cam, said cam operating said limit switch means during the reverse movement of said motor and being connected in series with said control circuit of said motor.

4. The combination with a plurality of movably arranged, separable container units normally disposed in juxtaposition with each other, of driven means extending adjacent said container units and arranged for movement with one of said container units, drive means, control means for said drive means and including first switch means adapted to operate said control means so that said drive means imparts movement to said driven means in a predetermined direction, second switch means for each of the remaining container units and connectable to said control means, and further means coordinated to and actuatable together with said second switch means, said further means of each of the remaining container units being engageable with said driven means whereby upon engagement of said further means of a predetermined container unit of said remaining units with said driven means the respective second switch means is operated to prevent movement of said driven means in a direction opposite to said predetermined direction.

5. The combination with a plurality of movably disposed separable container units, of driven means connectable with at least one of said units and arranged for movement with respect to the remaining units, coupling means for each of said remaining units and operable for selectively connecting one or more of said remaining units to

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said driven means, drive means for effecting the movement of said driven means, first control means operable for moving said driven means in a predetermined direction, second control means operable for moving said driven means in a direction opposite to said predetermined direction, and means rendering said second control means inoperative in response to the respective coupling means being operated to connect one of said remaining units to said driven means.

6. The combination according to claim 5, wherein the respective control means comprise circuit means including switch means in normally open condition and operable for completing said circuit means, and electro-responsive holding means in said circuit means and maintaining the latter completed upon restoration of said switch means to the normally open condition.

7. The combination according to claim 6, wherein the respective control means further comprise limit switch means in said circuit means for interrupting said circuit means in response to a predetermined movement of said driven means.

8. The combination with a plurality of movably arranged, separable container units normally disposed in juxtaposition with each other, of driven means connectable to said units and operatively connected to at least one of said units for moving the latter into an operative position relative to the remaining units, coupling means connected to each of said remaining units and operable for connecting a predetermined one of said remaining units to said driven means for movement with said one unit, drive means for moving said one unit into and out of said operative position, first control means operable for moving said one unit into said operative position, second control means operable for moving said one unit out of said operative position, and means rendering said second control means inoperative in response to the respective coupling means being connected to a predetermined one of said remaining units.

9. A storage device comprising a plurality of juxtapositioned separable container units and normally arranged in a closed condition, electric and reversible drive means including control circuits therefor, driven means operatively connected to said drive means and extending adjacent said units, means attaching one of said units with said driven means, coupling means for each of said remaining units and each including normally closed switch means connected to said control circuits, each coupling means being engageable with said driven means and operating the respective switch means to open the latter, and spaced apart limit switch means arranged in the path of movement of said driven means and connected to said control circuits for defining the extent of reversible movement of said driven means, the distance between said limit switch means determining the spacing between adjacent separable units upon engagement of the coupling means of one of said remaining units with said driven means and movement of the latter relative to the other of said remaining units and from one to the other of said limit switch means, whereas upon disengagement of the coupling means of said one of said remaining units from said driven means and closing of the respective switch means, said drive means effects the movement of said driven means from said other limit switch means to said one limit switch means to thereby return said remaining

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units into said closed condition with said one of said units.

10. A storage device comprising a plurality of separable container units movable relative to each other, reversible drive means, driven means operatively connected to at least one of said units for moving the latter away from and toward the remaining units in response to the respective movements of said reversible drive means in one direction and in a direction opposite thereto, respective coupling means associated with each of said remaining units and operable for connecting one of said remaining units to said driven means for movement with said one unit, first electric control means connectable to said reversible drive means for rotating the latter in said one direction, second electric control means connectable to said reversible drive means

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for rotating the latter in said opposite direction, and means rendering said second control means inoperative in response to the operation of one of said coupling means when establishing connection of said one of said remaining units with said driven means.

HANS INGOLD.

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