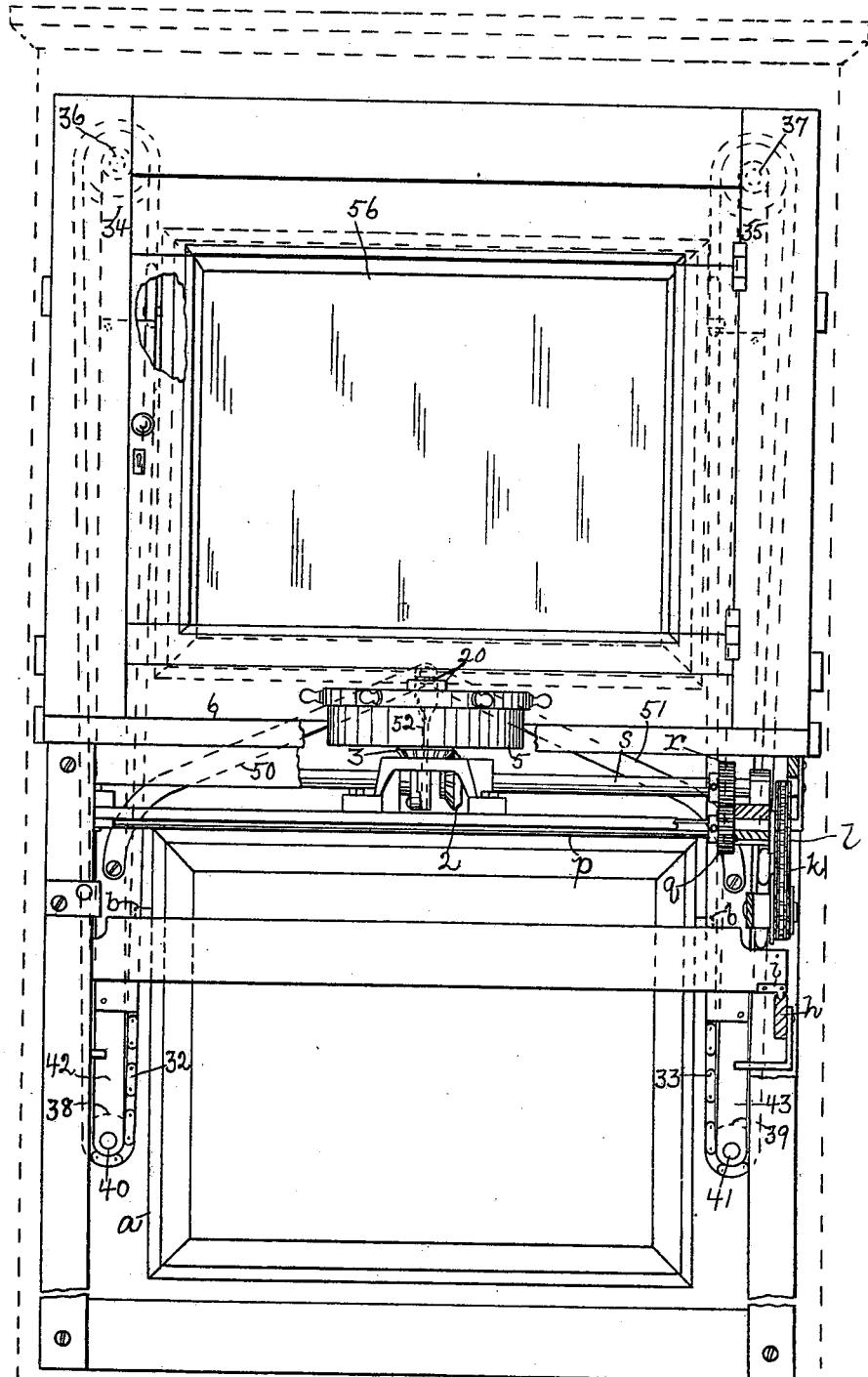


T. HANSEN.
DISPLAY APPARATUS.

(No Model.)

(Application filed May 11, 1899.)

3 Sheets—Sheet 1



WITNESSES.

Matthew M. Blunt,
J. Murphy.

Fig. 1.

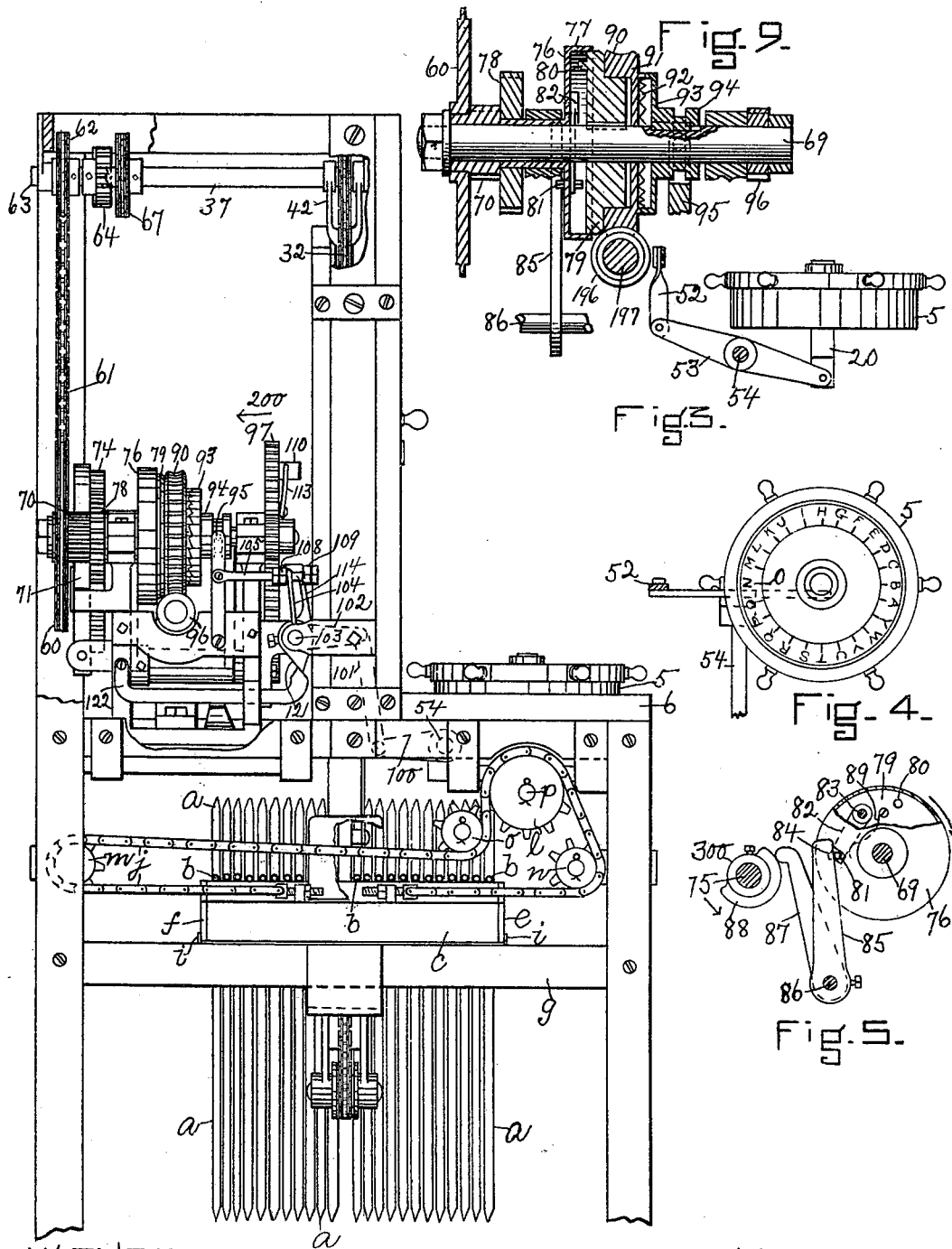
INVENTOR.
Thorvald Hansen
by Jas. H. Leitchill
ATTY

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3 Sheets—Sheet 2.



WITNESSES.

Matthew M. Blunt,
J. Murphy.

INVENTOR.
Thorwald Hansen
by
Jas. H. Churchill
ATT'Y.

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3 Sheets—Sheet 3

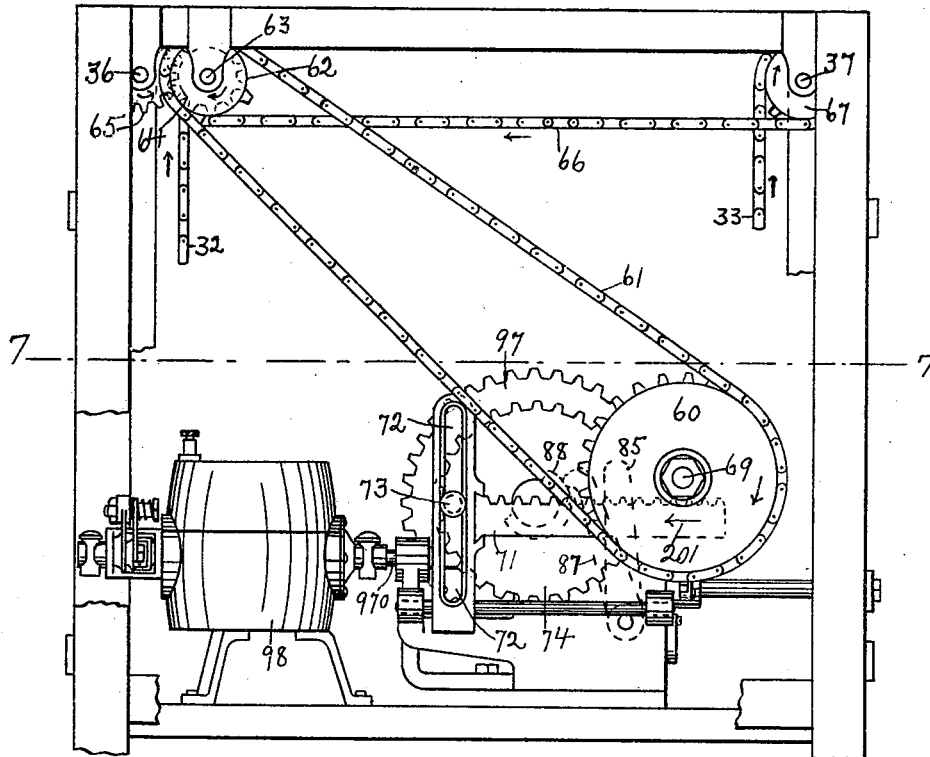


Fig. 6.

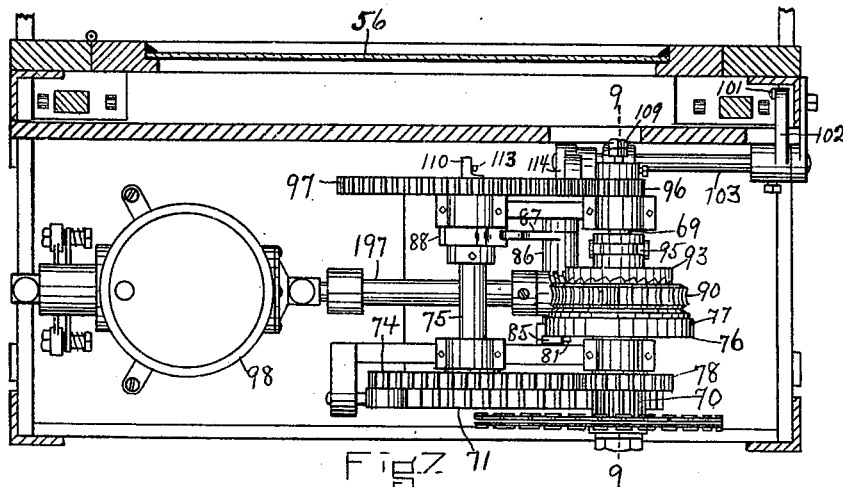


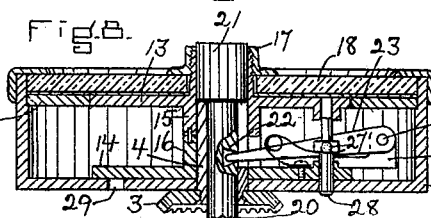
Fig. 7.

WITNESSES.

Matthew M. Blunt.

J. Murphy.

FIG. 8.



INVENTOR
Thorvald Hansen

by
Jas. H. Churchill

ATTY.

UNITED STATES PATENT OFFICE.

THORVALD HANSEN, OF EVERETT, MASSACHUSETTS, ASSIGNOR TO THE
ADVERTISING MACHINE COMPANY, OF PORTLAND, MAINE.

DISPLAY APPARATUS.

SPECIFICATION forming part of Letters Patent No. 646,168, dated March 27, 1900.

Application filed May 11, 1899. Serial No. 716,400. (No model.)

To all whom it may concern:

Be it known that I, THORVALD HANSEN, a citizen of the United States, residing in Everett, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Display Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates to a display apparatus particularly well adapted, among other uses, to be employed as a station-indicator. In the embodiment of the invention preferred by me a plurality of card-supporting frames are carried by a reciprocating carriage movable relatively to a lifting mechanism, which is adapted to elevate and lower a selected frame in the same vertical plane, the lifting mechanism being automatically stopped for a given time when the supporting-frame has reached its elevated position, as will be described. These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is a front elevation, with parts broken out, of an apparatus embodying this invention; Fig. 2, a side elevation, with parts broken out, of the apparatus shown in Fig. 1 looking toward the right; Figs. 3, 4, and 5, details to be referred to; Fig. 6, a rear elevation of the upper portion of the apparatus shown in Fig. 1; Fig. 7, a section on the line 7 7, Fig. 6, looking down; Fig. 8, a sectional detail, on an enlarged scale, to be referred to; and Fig. 9, a sectional detail to be referred to, taken on the line 9 9, Fig. 7.

The display apparatus herein shown as embodying this invention is especially adapted for use as a station-indicator, and to facilitate description it will be hereinafter referred to as such.

The apparatus is provided with a plurality of frames *a*, each designed to carry a card having thereon the names of a number of stations. The frames *a* are preferably made of tin or other metal and have extended from their opposite sides pins or projections *b*, adapted to rest upon the upper edges of the side bars *c* of a support or carriage, having front and rear side bars *e f* extended beyond

the side bars *c* and resting on suitable supports or bars *g h*, (see Figs. 1 and 2,) forming part of the framework of the apparatus.

The bars *g h* may be grooved on their upper edge to form a track and receive suitable projections or runners *i* (see Fig. 1) on the under side of the carriage.

The carriage is designed to be moved back and forth on the track or side bars *g h*, and this may be accomplished, as herein shown, by link chains *j k* at opposite sides of the machine and having their ends fastened to the sides of the carriage and passed about sprocket-wheels *l m n o* at opposite sides of the apparatus. The sprocket-wheels *l* are mounted on the ends of a shaft *p*, (see Fig. 1,) provided with a gear or pinion *q*, which meshes with a pinion *r* on a shaft *s*, extended from one side of the apparatus to near the center of the same, where it is provided with a bevel-gear 2, in mesh with a bevel-gear 3, (see Figs. 1 and 8,) which is fast on a sleeve 4, attached to a circular casing 5, inserted in a circular hole in a table or platform 6, forming part of the framework. The casing 5 is provided with a series of knobs or handles by which it may be turned to rotate the bevel-gear 3 and thereby rotate the shaft *s*, so as to cause travel of the link chains *j k* and thereby move the frame-supporting carriage back and forth to bring a selected card-frame into position to be elevated, as will be described.

The circular casing 5 is provided with an inwardly-extended annular flange 10, forming a dial and having graduations or marks, (shown in Fig. 4 as letters,) which correspond to the card-frames, and the said casing contains a stationary frame consisting of two disks 13 14, having hubs 15 16 joined together, the hub 15 being extended up through the casing 5 and provided with a nut 17, which serves to retain a glass 18 on the stationary frame.

The hubs 15 16 receive the sleeve 4, and the latter has extended through it a spindle 20, provided with a head 21, which shoulders on the sleeve 4 when depressed. The spindle 20 has a slot or opening 22, into which projects the end of a lever 23, pivoted at 25 to an arm 26, attached to the disk 14, the said lever having a stud or pin 27, (indicated by

dotted lines, Fig. 8,) which enters a socket in a rod or bolt 28, movable vertically through the disk 14 and adapted to enter one of a series of holes or openings 29 in the bottom 30 of the circular casing 5, there being a hole 29 for each indication on the dial, so that when the frame-carrying carriage has been moved into its proper or selected position it will be locked in said position until released by the withdrawal of the pin or bolt 28 from the hole in the casing, as will be described.

From the above description it will be seen that rotation of the selecting device, which in the present instance is the casing 5, brings the selected card-frame into position to be elevated, and this may be effected as will now be described.

The elevating and lowering mechanism herein shown consists of two endless link chains 32 33, passed about sprocket-wheels 34 35 on shafts 36 37, having bearings at the top of the framework of the apparatus, and also passed about pulleys or wheels 38 39, mounted on shafts 40 41, having bearings in the forked lower end of levers or arms 42 43, having their upper ends forked and hung upon the shafts 36 37. The levers or swinging arms 42 43 are hung so that normally the endless chains fall or come outside of the pins or projections *b* on the card-frames to thus permit movement of the frame-carriage back and forth on its track. The levers 42 43 may be moved toward the carriage to thus engage the chains 32 33 with the pins or projections *b* on the card-frame *a* in line with said chains by toggle-levers 50 51, pivoted at their outer end to the chain-carrying levers and at their inner end to a link 52, (see Figs. 1, 3, and 4,) connected to one end of a lever 53, fast on a rock-shaft 54, and having its other end pivotally connected to the lower end of the spindle 20, so that when the said spindle is depressed the rock-shaft 54 is turned and the link 52 elevated, which lifts the toggle-levers 50 51 and draws in the lower ends of the chain-carrying levers 42 43 until the pins *b* on the selected card-frame extend into a link of the said chains, and when the chains are in the position just described they are set in motion, so as to elevate the selected card-frame into position to be displayed, which, as shown in Fig. 1, is behind a glass door 56 at the upper portion of the apparatus.

The card raising and lowering chains 32 33 are intermittently actuated, as will be described, by a sprocket-wheel 60, (see Figs. 2 and 6,) about which is passed a link chain 61, connecting said sprocket-wheel with a smaller sprocket-wheel 62 on a shaft 63, suitably supported in the framework, at the upper end thereof, and having mounted on it a gear 64, (see Fig. 2,) in mesh with a gear 65 on the shaft 36, the shaft 63 being connected with the shaft 37, as shown in Fig. 6, by a link chain 66, passed about a sprocket-wheel on the shaft 63 and not herein shown and about a sprocket-wheel 67 on the shaft 37.

The sprocket-wheel 60 has fast to it a pinion 70, which meshes with a rack-bar 71, provided with an elongated slot 72, engaged by an eccentrically-located pin or stud 73 on a gear 74, fast on a cam-shaft 75. The sprocket-wheel 60 and pinion 70 are loose on the shaft 69, having loose on it a disk 76, provided with a rim 77 and a hub, to which is secured a pinion 78, which drives the gear 74. The shaft 69 is supported in suitable bearings in the framework and has fast on it a disk 79, forming one member of a clutch mechanism, which will be hereinafter referred to as the "auxiliary" clutch mechanism, the disk 79 having projecting from its face adjacent to the disk 76 a stud or pin 80, which is adapted to engage the inner end of a cross-bar 81 on the end of a lever 82, pivoted at 83 to the inner side of the disk 76, the said cross-bar extending through a slot 84 in the disk 76 to the outer side thereof, where it is adapted to be engaged by a crank or arm 85, fast on a rock-shaft 86, provided with a second crank or arm 87, cooperating with a cam 88 on the cam-shaft 75. The lever 82 is acted upon by a spring 89 to normally force the cross-bar 81 toward the periphery of the disk 76 and into the path of movement of the stud or pin 80 on the disk 79. The disk 79 is loosely encircled by a worm-gear or ring 90, attached to a disk 91, which is loose on the shaft 69 (see Fig. 9) and which is provided, as shown, with teeth 92, which cooperate with like teeth on a disk 93, keyed to slide on the shaft 69 and forming the movable member of a main clutch. The disk 93 is provided with a grooved hub 94, which is engaged by a forked lever 95. The shaft 69 has fast on it a pinion 96, which meshes with a gear 97, fast on the cam-shaft 75. The full periphery of the cam 88 acts on the clutch 87 to turn the rock-shaft 86 in such direction as will move the crank 85 toward the center of the disk 76, and thereby carry the cross-bar 81 out of the path of movement of the stud or pin 80 on the disk 79, thereby rendering the disk 76 and the parts driven by it stationary until the reduced portion of the cam 88 permits the crank or arm 85 to be moved away from the center of the disk 76, to thereby place the cross-bar 81 into the path of movement of the stud or pin 80. The worm-gear 90 and its disk 91 are designed to be continuously rotated, which may be effected, as herein shown, by means of a worm 196 on a shaft 197, attached to or forming part of the armature-shaft of an electric motor 98, suitably supported by the framework and which may be of any usual or suitable construction.

In the normal condition of the apparatus—that is, with the card-frames lowered and at rest—the lever 87 engages the reduced portion of the cam 88 about its center or near the point 300, Fig. 5, and the clutch-disk 93 is disengaged from the worm-gear 90 and its disk 91, which are thus free to be continu-

ously rotated by the worm-shaft 197 without effecting movement of the shaft 69, the disk 76, and the parts actuated by them. The clutch member or disk 93 is adapted to be moved longitudinally on the shaft 69, so as to engage the said clutch with the worm-gear 90 by the spindle 20, and for this purpose the rock-shaft 54 at one end or side of the machine has fast on it a crank 100, (see dotted lines, Fig. 2,) joined by a link 101 to a crank 102, fast on a rock-shaft 103, having bearings in the framework of the machine and provided with an upright arm 104, which is forked to engage a rod 105, pivotally connected to the clutch-lever 95. The arm 104 is movable between the front and back stops 108 109 on the rod 105.

From the above description it will be seen that when the spindle 20 is depressed into the position shown in Figs. 3 and 8 the rock-shaft 54, through the crank 100, link 101, and crank 102, will rock the shaft 103 so as to move the arm 104 forward or in the direction indicated by arrow 200, Fig. 2, thereby moving the clutch member 93 into engagement with the normally-loose worm-gear 90 and setting the shaft 69 in motion, and the said shaft through the secondary or auxiliary clutch mechanism previously described and consisting of the pin 80 and cross-arm 81 will effect rotation of the gear 74, and the movement of the gear 74 for one-half its rotation will produce longitudinal movement of the rack-bar 71 in the direction indicated by arrow 201, Fig. 6, so as to rotate the sprocket-wheel 60 in the direction indicated by the arrow thereon, and thereby cause the chains 32 33 to move in such direction as to elevate the selected frame from its normal or lowered position into the position shown in Fig. 1.

During the rotation of the cam-shaft 75 in the direction indicated by the arrow, Fig. 5, the stud or pin 80 is in engagement with the cross-bar 81, while the portion of the cam 88 from the point 300 to the full periphery is moving under the crank 87, and when the full periphery of the cam is brought under the said crank the latter is moved so as to carry the crank 85 toward the center of the disk 76 into substantially the position shown in Fig. 5, so that when the cross-bar 81 in the rotation of the disk 76 is brought into engagement with the crank 85 the said cross-bar will be disengaged from the pin 80, thus rendering stationary the disk 76 and the parts driven by it, while the disk 79, being fast to the shaft 69, continues to rotate with said shaft. The elevated card-frame is thus held in its lifted position until in the rotation of the cam-shaft 75 the full periphery of the cam has passed from under the crank 87 and the reduced portion of the cam is brought into engagement with the said crank, which reduced portion permits the cranks 87 85 to move away from the center of the disk 76, and thus permit the spring 89 to move the lever 82 and place the cross-bar 81 into the

path of movement of the pin 80, which latter in the rotation of the disk 79 engages said cross-bar and again clutches the disk 76 to the shaft 69, thereby moving the gear 74 a half-revolution and causing the rack-bar 71 to move in the direction opposite to that indicated by arrow 201, so as to rotate the sprocket-wheel 60 in the direction opposite to that indicated by the arrow thereon, and thus lower the elevated frame into its normal position on its carriage.

The card-frame reaches its lowered position at or about the time the point 300 of the reduced portion of the cam 88 engages the crank 87, and at or about this time the main clutch 93 is disengaged from the worm-gear 90 and its disk 91. The main clutch may be automatically disengaged by a releasing device, shown in the present instance as a lug 110 pivoted in a recess in the face of the gear 97 and acted upon by a spring 113.

The lug 110 coöperates with a crank or arm 114, fast on the rock-shaft 103, the crank 114 having its upper end curved on its under side and projected into the path of movement of the pivoted lug 110, which latter in the revolution of the disk 97 engages the crank or arm 114 and forces the latter backward or in the direction opposite to that indicated by arrow 200, which movement rocks the shaft 103 and through the arm 104 engaging the stop 109 moves the rod 105 and the clutch 93 backward into their inoperative position, with the clutch 93 disengaged from the worm-gear 90. The lug 110 is made movable and spring-actuated, so as to insure the disengagement of said lug from the crank or arm 114, and thus avoid the machine stopping until the clutch 93 has been positively disengaged from the worm-gear 90. The shaft 69 is thus rendered stationary, but the worm-gear loose thereon continues to be driven by the motor.

The rock-shaft 103 may and preferably will be yieldingly held in its operative and inoperative positions, and for this purpose the rock-shaft is provided with a V-shaped lug or projection 121, engaged by a correspondingly-shaped end of the spring arm or bar 122. (See Fig. 2.)

The operation of the machine may be briefly summed up as follows: Assuming all the card-frames in their lowered position, the operator first moves the selecting device or casing 5, so as to bring the indication on the dial corresponding to the card to be selected to the zero-point. (Shown in Fig. 4.) The rotation of the selecting-casing, as above described, moves the carriage carrying the card-supporting frame, so as to place the selected frame into line with the lifting devices or chains, and the operator then depresses the spindle 20, which effects three distinct operations, as herein shown—namely, it locks the selecting device by means of the lever 23 and bolt 28, (see Fig. 8,) it operates the toggle mechanism so as to engage the

elevating-chains with the pins or projections on the selected card, and it also rocks the shaft 54, so as to engage the main clutch 93 with the worm-gear 90. As a result the shaft 69 is rotated, which through the pinion 96 and gear 97 operates the cam-shaft 75, and the cam 88 permits the disk 76 to be clutched to the disk 79, and this engagement of the auxiliary clutch rotates the disk 76, pinion 78, and gear 74, thereby producing movement of the rack-bar 71 and proper movement of the elevating-chains, which carry the selected card from its lowered position up into its elevated position, (represented in Fig. 1 as behind the glass door 56.) While the frame is being elevated, the reduced portion of the cam 88 is in engagement with the crank-arm 87, as above described, and when the selected card-frame has been elevated the full periphery of the cam engages the crank-arm 87 and disengages the cross-bar 81 from the pin 80, thereby disengaging the auxiliary clutch and rendering stationary the disk 76 and the pinion 78, while the worm-gear 90 and the shafts 69 and 75 continue to revolve. The selected card is thus displayed to view and remains exposed while the full periphery of the cam 88 is in engagement with the crank or arm 87, and when the reduced portion of the cam again engages the arm 87, as above described, the disk 76 is again clutched to the shaft 69, and the pinion 78 is rotated to lower the card-frame into its normal position, and at or about the time the card-frame is lowered the clutch-releasing device 110 engages the arm 114 and rocks the shaft 103, so as to disengage the clutch 93 from the worm-gear 90, thereby rendering the said worm-gear loose on the shaft 69 and permitting it to be rotated without producing movement of the shaft 69. At the same time the spindle 20 is restored to its normal position by movement of the clutch-lever 95 in the direction opposite to that indicated by arrow 200, Fig. 2. The operator may then by depression of the spindle display the same card a second time or more, if he desires, or he can by rotation of the selecting device select a new card to be displayed.

I claim—

1. In an apparatus of the class described, the combination of the following instrumentalities, viz: a movable support or carriage, a plurality of frames supported thereby and movable therewith, lifting devices normally disengaged from said frames and removed from the path of movement of the same with said carriage, means to move said carriage freely with relation to said lifting devices to position a selected frame relative to the lifting devices while the latter remain inoperative, means to engage said lifting devices with said selected frame, and means to actuate said lifting devices, substantially as and for the purpose specified.

2. In an apparatus of the class described, the combination of the following instrumen-

talities, viz: a reciprocating support or carriage provided with side bars, a plurality of card-frames suspended between said side bars and supported thereon to move therewith, means to reciprocate said carriage and move the same freely, and means to lock said carriage in a selected position, substantially as described.

3. In an apparatus of the class described, the combination of the following instrumentalities, viz: a card-supporting frame, mechanism to elevate and lower said frame in the same vertical plane, a shaft rotatable in one direction, and intermediate mechanism actuated from said shaft to intermittently operate said lifting and lowering mechanism and elevate the card-frame, hold it in its elevated position and then lower it while the said shaft continues to rotate, substantially as and for the purpose specified.

4. In an apparatus of the class described, the combination of the following instrumentalities, viz: a card-supporting frame, mechanism to elevate and lower said frame in the same vertical plane, a shaft rotatable in one direction, and intermediate mechanism to actuate said elevating and lowering mechanism and comprising an oscillating gear connected with said elevating and lowering mechanism, a rack-bar meshing with said gear, a rotatable gear actuating said rack-bar, and means to rotate said gear, substantially as described.

5. In an apparatus of the class described, the combination of the following instrumentalities, viz: a card elevating and lowering mechanism, a continuously-rotatable shaft, a second shaft, a gear normally loose on said second shaft and driven from the first shaft, an oscillating gear or pinion connected with the card elevating and lowering mechanism, a clutch controlling the rotation of said second shaft, and an auxiliary clutch mechanism controlling the oscillation of the said gear or pinion and the operation of the elevating and lowering mechanism, and means to control said clutch mechanisms, substantially as described.

6. In an apparatus of the class described, the combination of the following instrumentalities, viz: a reciprocating support or carriage movable freely in opposite directions, a plurality of frames supported thereon and movable therewith, a rotatable selecting device, and mechanism to connect said selecting device with said carriage and means to engage said rotatable selecting device in predetermined position to lock the said carriage at predetermined points in its movement, substantially as described.

7. In an apparatus of the class described, the combination of the following instrumentalities, viz: a card-supporting frame, carriers to elevate and lower said frame in the same vertical plane, pivoted levers or supports for said carriers, mechanism to normally disengage said carriers from the card-

supporting frame, and means to actuate said mechanism and engage said carriers with said supporting-frame, substantially as described.

5 8. In an apparatus of the class described, the combination of the following instrumentalities, viz: a reciprocating carriage movable freely in a substantially-horizontal plane, a plurality of frames supported thereon, and
10 mechanism normally out of the path of movement of said carriage but movable toward the same to engage a selected frame and elevate it from said carriage, hold it elevated a predetermined time, and then lower it again

upon the said carriage, a motor mechanism to actuate said elevating and lowering mechanism, and means to control the action of the motor mechanism upon the elevating and lowering mechanism, substantially as described. 15

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses. 20

THORVALD HANSEN.

Witnesses:

JAS. H. CHURCHILL,
J. MURPHY.