Nov. 11, 1941. T. N. SAATY 2,262,557

MECHANICAL MOVEMENT

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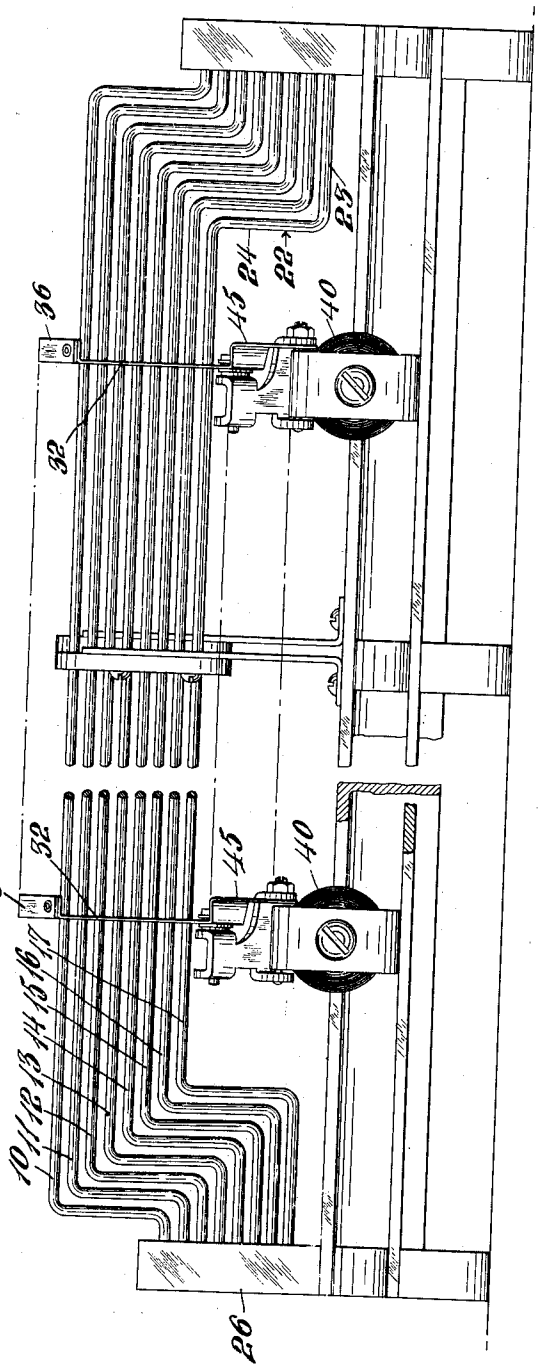

Fig. 1.

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Fig. 2.

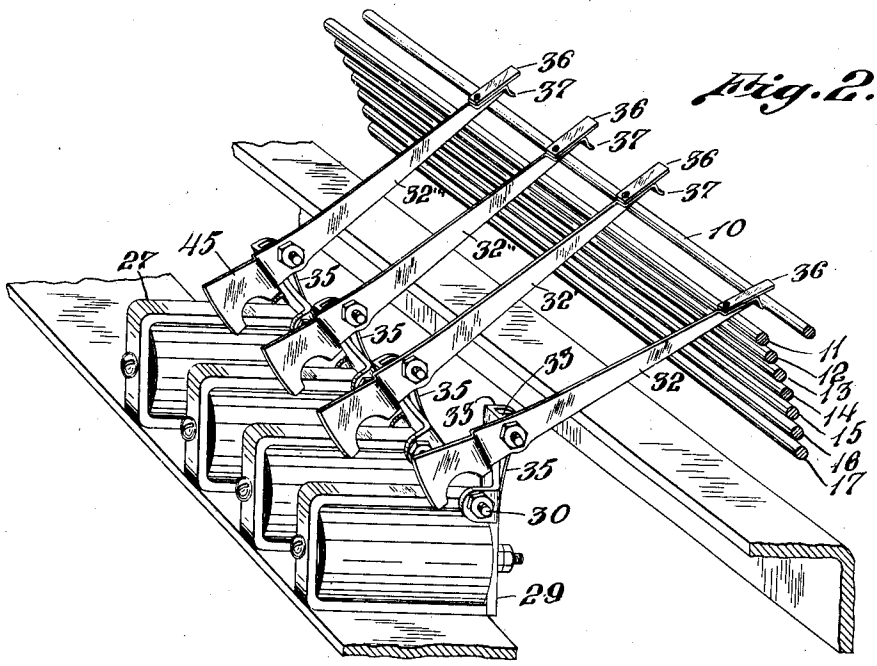
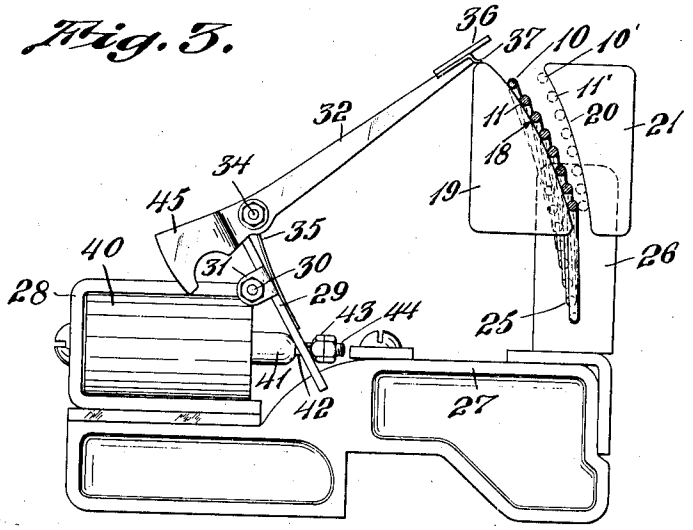


Fig. 3.



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MECHANICAL MOVEMENT

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Fig. 4.

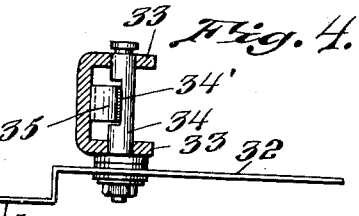


Fig. 5.

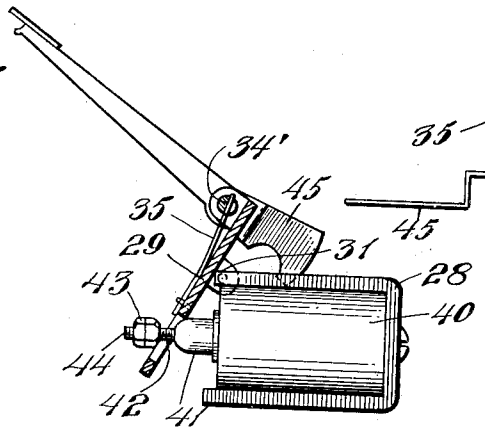


Fig. 6.

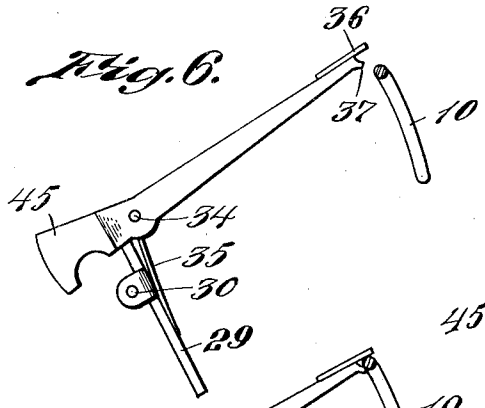


Fig. 9.

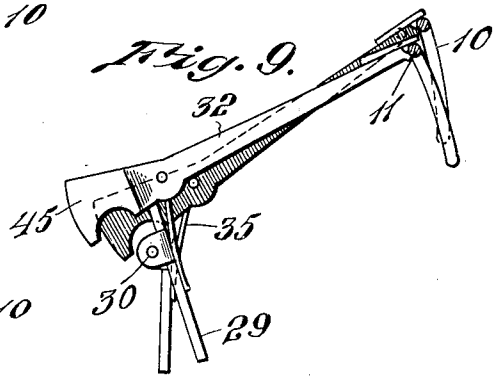


Fig. 7.

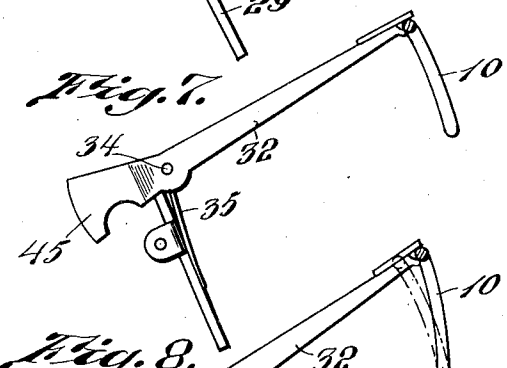
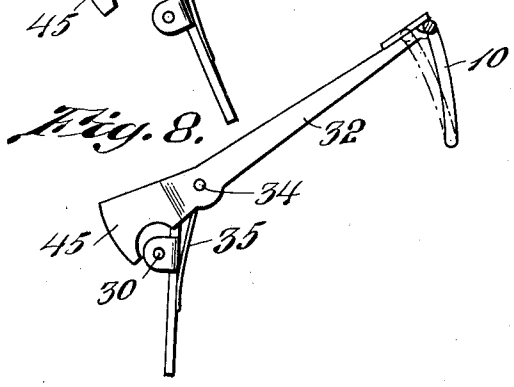


Fig. 8.



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MECHANICAL MOVEMENT

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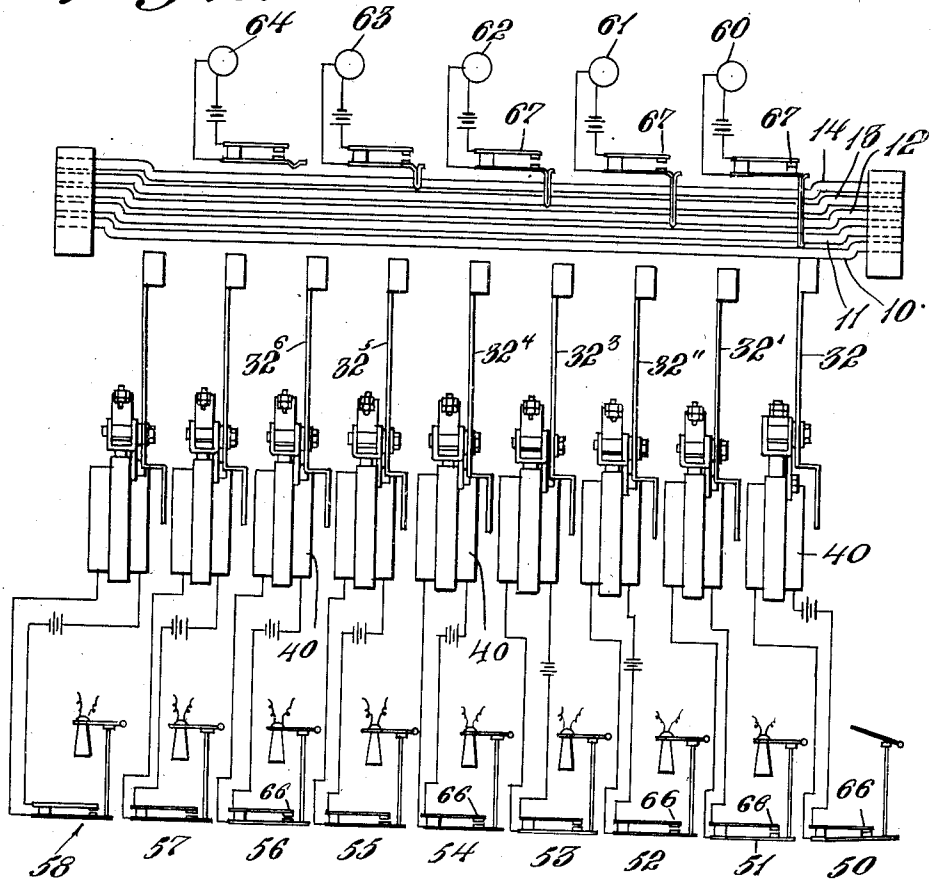
Fig. 10.



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Patented Nov. 11, 1941 2,262,557

UNITED STATES PATENT OFFICE

2,262,557

MECHANICAL MOVEMENT

Theodore N. Saaty, Providence, R. I., assignor to Screw Machine Products Company, Inc., a corporation of Rhode Island

Application January 27, 1940, Serial No. 316,009

11 Claims. (Cl. 179—27.5)

This invention relates to a mechanical movement which may be utilized to perform different desired results, one of which is illustrated in this application as functioning as an electrical switch of the type which may be used in a selecting telephone circuit, although it may have various and other distinct usages. An object of the invention is to provide an arrangement for mechanically selecting a member not in operative use from a group of other similar members some of which may be in use at the time of such selection.

Another object of the invention is to select one of several members and to then move such selected member out of its inoperative position.

A more specific object of the invention is to provide a mechanical selector switch for one of a plurality of electrical circuits which is at the time of selection inoperative and isolating the selected circuit from interference by other selecting mechanism.

A more specific object of the invention is an arrangement of a plurality of selectors for an automatic telephone having a plurality of stations and members selected with each member selected representing one idle line of a group of lines fewer in number than the selectors so that there will be a movement of the member selected out of the path of movement of the next selector whereby each line may be individually picked up progressively as the selectors are operated.

Another object of the invention is to provide an arrangement so that each selector arm may return to position across the selected members without completing an electrical circuit.

With these and other objects in view the invention consists of certain novel features of construction as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Fig. 1 is an elevation illustrating the mounting of a plurality of members and illustrating a plurality of selector arms for operating upon these members;

Fig. 2 is a perspective view of a plurality of selector arms and members with one of the arms in operating position;

Fig. 3 is an end elevation showing one of the arms in inoperative position;

Fig. 4 is a lateral sectional view through the mount for the selector arm;

Fig. 5 is a longitudinal sectional view through the mount of the selector arm;

Figs. 6, 7 and 8 show different relative positions of the selector arm and mount and contact member;

Fig. 9 is a view showing two positions of two different selector arms and contact members; and

Fig. 10 is a diagrammatic view illustrating an operative circuit in which the mechanism herein shown may be operable.

Under some conditions, in the operation of an automatic telephone with a plurality of stations it may be less expensive to provide a mechanical arrangement for utilizing movement of an arm for selecting one of a group of a lesser number of unused lines for transmission to a central operating unit; and accordingly, I have provided a plurality of bar members for a larger number of selector arms with such an arrangement as to mounting that an arm may be moved into contact with the first bar member which is in inoperative position and to then move that bar member into an operating position out of an aligned position with other members when inoperative, leaving the next unused bar member in the inoperative position free for engagement by the next selector arm, the arrangement being mechanical; although for actuating purposes it is convenient to use some electrical energization; and the following is a more detailed description of the present embodiment of this invention, illustrating the preferred means by which these advantageous results may be accomplished:

With reference to the drawings, I have provided a plurality of bar members **10**, **11**, **12**, **13**, **14**, **15**, **16** and **17** which are located in inoperative position, as shown in Fig. 3 along the arc **18** of a guide member **19**, these members being so guided as to be movable out of this aligned arcuate arrangement into a working position, this movement consisting essentially of a movement laterally of the alignment and against the arcuate guide **20** of the member **21**. Any convenient means may be utilized for the guiding of the movement of the bar members **10** to **17** inclusive laterally out of this arcuate alignment. One convenient way of accomplishing this is to shape each of these bar members with L-shaped ends designated **22** forming a bell crank with a portion **23** parallel and a portion **24** at right angles to the main portion of the bar member, the portion **23** being pivoted in a suitable bearing **25** in the upright **26**. This pivot is so located with respect to the guide **20** that the member will normally fall away from the guide **20** against the guide **18**. Thus pressure upon each of the members **10** to **17** will swing it from the guide **18** to the guide **20** positioning it out of the alignment such as is shown in full lines in Fig. 3 to the dotted line position shown in Fig. 3.

The upright **26** is suitably supported on a frame **27** and a bracket **28** provides a bearing for the rockable mount **29** pivoted as at **30** through ears **31** folded from the mount **29**. Upon this mount I pivotally support an arm **32**. The mount is provided with spaced ears **33** each having a bear-

ing therein for rotatably supporting a shaft 34 which is fixedly secured to the arm 32. This shaft 34 has a flattened surface 34' between the ears 33 against which a leaf spring 35 rests to hold this arm in one desired relative position.

The pivotal relation and position of this mount 29 and arm 32 is such that when the mount 29 is swung about the pivot 30 the insulation 36 fixed at the end of arm 32 above the arcuate lip 37 will engage the first bar member 10 by moving along an arc substantially coincident with the arc 18 (note Figs. 6 and 7). Upon engagement with the bar member 10, as the bar member cannot move along this arc, further movement causes the arm 32 to swing around its pivot 34 against the action of the spring 35, and this provides for a thrust to move the bar member 10 (see Figs. 8 and 9) out of the alignment, shown in Fig. 3 along the arc 18, to the dotted line position 10' as shown in Fig. 3. This removes the bar member 10 from the inoperative position and thus should another arm 32' or 32'' or 32''' be actuated, it would then engage the next in line bar member 11, move it to the dotted line position 11' and so on until the selectors had utilized all of the inoperative lines represented by one of the bar members located against the arcuate guide 18. It is never necessary in a telephone system to have more than one half the stations served represented by bar members or lines, and far fewer than half the number are found to serve the purpose.

It will be apparent that it is immaterial which of the arms 32, 32', 32'', etc., is first actuated. The actuated arm will select the first inoperative bar member which may represent the telephone line for causing desired connection by a switching means; and thus it will be unimportant that the arms operate in any particular sequence.

The means of actuation of an arm may be any one of a variety of means. One convenient means of actuation is an electro-magnet 40 provided with a core 41 and an adjustable connection by means of rod 42 and nuts 43 on the threaded portion 44 of the rod 42 for extending through a slot in the mount 29 so that upon energization of the electro-magnet, the mount will be pulled and consequently the arm, to cause the bar members to move as above indicated. The mount with its arm is so balanced, such for instance as by the large end 45, that the mount and arm will swing about its pivot to position the arm in raised position as shown in Fig. 3 or 6; or any convenient means may be provided for this purpose, upon release of the actuating means.

In the use of this device for telephonic operation, the contact can usually be made through the arm 32 and bar member 10, suitable wires being connected through flexible or slip devices for completing the circuit through the arm and bar member. If it should so happen that the bar members 10 to 17 inclusive were all in use at the same time, and the bar members 10 to 16 were released prior to the release of the bar member 17, these released bar members would of course move back against the guide 18 into their at-rest, inoperative position. Should, after such occurrence, the connection of the bar member 17 and one of the arms thereafter be released, this arm released from the bar member 17 could then move back to its elevated position as illustrated in Fig. 3 by reason of the insulating pad 36 contacting the bar members 16, 15, 14, 13, 12, 11, and 10 successively to either cause a movement of the arm downwardly against the spring 35 by rotation of rod 34 or a movement of the bar member laterally to permit the arm to pass without making any electrical connection. Thus in each instance, an arm will return to its elevated position upon release, even though there be some bar member above it by reason of a relative movement of the contacting parts for the accomplishment of this result.

With reference to Fig. 10 it might be assumed that there are a plurality of individual telephone units 50, 51, 52, 53, 54, 55, 56, 57 and 58 and that there are a plurality, in this case five, lines to a central selector mechanism which will be represented as 60, 61, 62, 63 and 64. From experience, we may assume that five lines to the central station will be sufficient to service the nine telephones represented by the numerals for each unit 50 to 58 inclusive. Each of the arms 32, 32', 32'', etc., operated by the solenoids 40 may swing into engagement with any of the five bars 10 to 14 inclusive for connection to one of the lines indicated by 60 to 64 inclusive. For instance, if the receiver of the calling unit 50 is lifted, the contacts 66 will be closed to energize the relay 40 and swing the arm 32 into engagement with the bar 10 and cause that bar 10 to close the contacts 67 to place into operation the line 60 to the central station. If, while this line is in operation, one of the other eight telephones 51 to 58 inclusive is desired to be used, say for instance, unit 52, its contacts 66 of unit 52 will be closed causing the arm 32'' to pick up the next bar, which will be 11, to close the contact 67 of the line 61 to cause connection to the central unit. If, while these two are in use, another line is desired, say by telephone unit 54, the contacts 66 of this unit 54 will energize the armature 40 and cause the arm 32^4 to be energized to move the bar 12 to close contact 67 of the line 62.

If we assume now that line 50 ceases to be used while the other two lines are in use and the telephone at 56 is desired to be operated, when this receiver is lifted, upon energizing of the armature 40, the arm 32^6 will be swung into engagement with the first bar, which in this case will be 10 because the unit 50 has released 10, and in this case the contacts 67 of the line 60 will be closed to again use this first line for connection to the central selector mechanism. Thus, it will be apparent that if line 60 is available at any time, this line will be used first, and if this line is not available, then the next line which is unused will be picked up.

While I have indicated this for use in selecting an unused line in a telephone circuit, this same arrangement might be used in other ways such, for instance, as for calling employees in a factory. The contacts 66 of the units 50 to 58 might represent call buttons from various executives. The line 60 might represent a light or bell calling a messenger boy, the line 61 calling for a filing clerk, and the line 62, a stenographer; the scheme in mind being that a messenger boy would run errands for the executives if he were available. If he were not available, the filing clerk would run the errand; and if the filing clerk were not available, the stenographer. It would be most desirable that the messenger boy always be called first if he were available, and so forth, in the order above mentioned. Accordingly, the messenger boy's line would always be operated first, and if he were not available, then the call would be transferred automatically by my selector mechanism to the next line, and so forth. Thus, it will be apparent that the use of this selector

mechanism is not confined to a telephone circuit, although this is one use in which it has very desirable usages.

The foregoing description is directed solely towards the construction illustrated, but I desire it to be understood that I reserve the privilege of resorting to all the mechanical changes to which the device is susceptible.

I claim:

1. In combination, a movable mounted engaged member, means to guide the movement of said member, a rockable mount, an arm pivoted on said mount, said mount and arm being so positioned that rocking said mount will move the arm in one direction into engagement with said member, said member being so guided that, when engaged by the arm, further movement of the mount will cause swinging of the arm on its pivot and movement of the arm and member engaged in a different direction.

2. In combination, a plurality of arms mounted for movement in two curved paths, a series of movably mounted members positioned in alignment and in the path of travel of said arms, means to guide each of said members for movement out of said alignment, and means for moving each arm toward said members and upon engagement with a member move the member out of the said alignment of the members.

3. In combination, a plurality of arms mounted for movement in two curved paths, a series of movably mounted members positioned in alignment and in the path of travel of said arms, means to guide each of said members for movement out of said alignment, and means for moving each arm toward said members and upon engagement with a member move the member out of the said alignment of the members and out of the path of swing of a subsequently operated arm.

4. A switch for closing a circuit comprising a movably mounted contact member, means to guide the movement of said member, a contact arm, a rockable mount for pivotally supporting said arm, actuating means to move said mount to cause said arm to swing and engage said member and then by relative movement of the mount and arm move said member with the arm in a different direction.

5. A switch for closing a plurality of different circuits comprising a plurality of rockable mounts each having a contact arm movably secured thereto, a lesser number of contact members, each movably mounted and said members being in alignment when disengaged, means for individually rocking said mounts to swing the arm thereon toward said members in a direction for engaging a disengaged member and move it from said alignment by movement in a direction different from the swing of said arm.

6. In combination, an arm mounted for swinging movement in two curved paths, a movably mounted member engageable by said arm, and means for actuating said arm to move the same in one of said curved paths towards and into engagement with said member to move the same and the arm upon engagement in the other of said curved paths.

7. In combination, a plurality of arms movable in two directions, an arcuate guide surface, a plurality of movably mounted members engageable by said arms and normally positioned in nested relation and having portions thereof resting on said guide surface to position the engageable part of said member in the initial path of travel of said arms, and means for actuating individual arms to move the same towards and into engagement with the first disengaged member and move the same from said guide surface and out of the path of travel of a subsequently operated arm.

8. In combination, a plurality of rockable supports, each having an arm movably mounted thereon, a plurality of movably mounted aligned members engageable by said arms, and means for individually rocking said supports to swing the arm thereon toward and into engagement with the first disengaged member and move the same out of the path of travel of a subsequently operated arm.

9. A selector switch mechanism comprising an arcuate guide surface, a plurality of pivotally mounted contact members each having a portion resting on said guide surface to position said members normally in predetermined, generally nested relation for the completion of an electrical circuit, a plurality of contact arms, means to mount each of said arms for a movement initially into engagement with the first unused member and then move the member out of aligned position to be free from engagement when the next operated arm is operated, and actuating means for each arm for moving the arm, and means to return each arm to its inoperative position upon said actuating means terminating operation.

10. A selector mechanism comprising a plurality of contact members in predetermined, generally aligned relation for the completion of an electrical circuit, means to guide each of said members, a plurality of stationary supports each having an arm pivotally supported thereon for movement in two directions, electrically operable means for moving individual arms initially into engagement with the first unused contact member and then move the engaged member out of aligned position to be out of the path of movement of a subsequently operated arm, and means to return each arm to its inoperative position upon said actuating means terminating operation, and means to prevent electrical connection of the released arm with any of the contact members.

11. A selector switch mechanism comprising an arcuate guide surface, a plurality of pivotally mounted contact members each having a portion resting on said guide surface to position said members normally in predetermined, generally aligned relation for the completion of an electrical circuit, a plurality of stationary supports each having an arm thereon for movement in two directions, electrically operable means for moving individual arms initially into engagement with the first unused contact member and then move the engaged member out of aligned position to be out of the path of movement of a subsequently operated arm, and means to return each arm to its inoperative position upon said actuating means terminating operation, each of said arms having an electrical insulating portion thereon engageable with and to move any contact member out of the return path of travel of said arm to inoperative position to prevent electrical connection therewith and said contact member.

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