

March 9, 1937.

A. WIRTH

2,073,087

SELECTOR FOR TELEPHONE INSTALLATIONS

Filed Aug. 13, 1935

2 Sheets-Sheet 1

Fig. 2

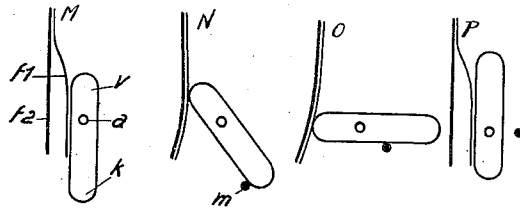


Fig. 3

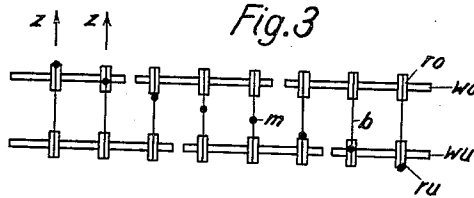


Fig. 1

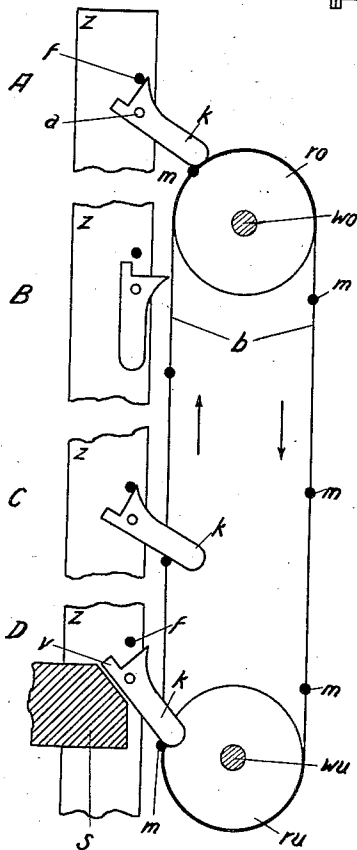


Fig. 4

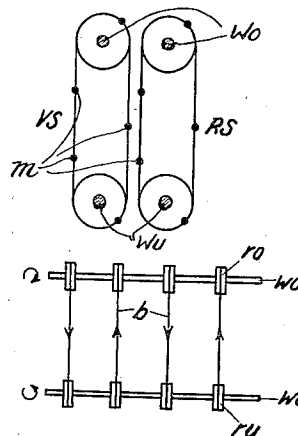
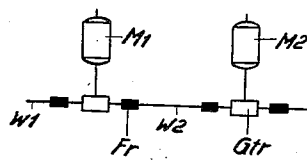


Fig. 5

Fig. 6



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2 Sheets-Sheet 2

Fig. 7

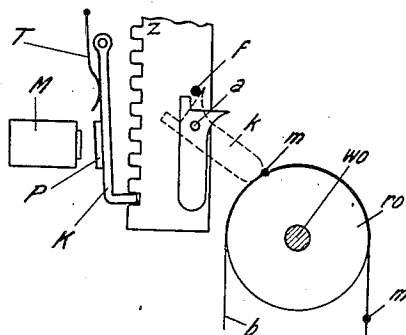


Fig. 5a

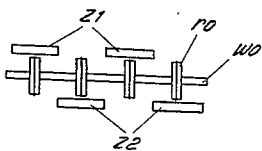
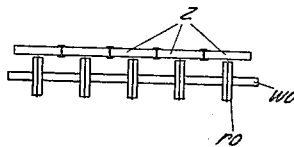


Fig. 8



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UNITED STATES PATENT OFFICE

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SELECTOR FOR TELEPHONE
INSTALLATIONSAlexander Wirth, Frankfort-on-the-Main,
GermanyApplication August 13, 1935, Serial No. 36,005
In Germany January 23, 1934

11 Claims. (Cl. 179—27.53)

This invention relates to selectors for telephone systems and more particularly to means for moving or lifting selector switch members back into normal inoperative position for refunct-

raising by the carrier means, as is frequently necessary in the case of the switch members of multiple brush selectors.

The conveyor in the example illustrated in Figure 1 consists of an endless band *b*, which is provided with driving members *m* for moving the switch members, and is driven in the direction indicated by the arrows by the wheels *ro* and *ru* mounted on the shafts *wo*, *wu*. The selector switch member *z*, to be moved, has a pawl *k* which is shown in Figure 1 in four different positions A, B, C, D which it assumes during one lifting cycle. This pawl is mounted to turn about a pivot *a*, and is held by gravity or by means of a spring (not illustrated) in the normal position B.

During the setting of the selector and while it remains set, the pawl *k* remains in the normal position. When the selector becomes free, the switch member *z* moves downward until the pawl *k* abuts against the fixed stop *s* and is thus brought into the position D. This brings the pawl *k* into the path of movement of the driving members *m*, so that the pawl *k* and, therefore, the switch member *z* move together with that member *m* which makes contact with the pawl *k*.

In order to avoid the shock which might occur should the selector connected to the member *z* be suddenly set in movement, the pawl *k* is first raised by the member *m* without causing the switch member *z* to rise with it at the full speed of the band *b*. For this purpose, the pawl *k* has a tail or lug *v* which abuts against the stop *s*, so that the switch member *z* will be slowly moved as the point of abutment of the tail *v* against the stop *s* and of the member *m* on the pawl *k* changes, and it is only when the pawl *k* has reached the stop *f* in position C that the switch member *z* is moved at the full speed of the band *b*.

During this first part of the driving cycle, the distance of the point of abutment of the pawl *k* on the member *m* from the pivot *a* is gradually reduced so that the speed at which the switch member *z* rises gradually increases correspondingly. The upper wheel *ro* of the conveyor is disposed so that the member *m* loses contact with the pawl *k* when the selector has reached its highest or normal position A, in which the switch member *z* is held by a pawl *k* (see Fig. 7). The return movement of the selector is thereupon completed, and the pawl *k* which was in contact with the driving member *m*, being then released, falls back again into its normal position B. During the last part of the return movement of the selector switch member *z*, the speed at which

Selectors are known in which energy for effecting the movement of the switch members onto a particular contact is stored up and released. When the selector is no longer in use, these switch members must be returned again to their normal position. The energy required for setting the switch member may be stored during this return movement. This may be effected by tensioning a spring. If the switch member moves into its contact-making position under the influence of gravity, it has to be raised into the starting position in *a*, or during the, return movement. This return movement can be controlled by various means, for example by an electromagnetic stepping switch, or by pneumatic or mechanical means.

According to the invention, the switch member is returned raised into the normal position by rotary carrier means which are provided at intervals with means for moving the switch member.

In order that the invention may be thoroughly understood and be more readily carried into effect, some forms of construction in accordance therewith will now be described with reference to the accompanying drawings, wherein:—

Figure 1 is a diagrammatic illustration of a form of conveyor in accordance with the invention applied to the lower end of a switch member also shown diagrammatically;

Figure 2 illustrates the operation of a modified form of a detail shown in Figure 1;

Figures 3 to 6 show various modified forms of construction of the conveyor; Figure 5a being a plan view of main Fig. 5;

Figure 7 illustrates the selector, in somewhat fuller detail, in the inoperative position; and

Figure 8 is a plan view of an arrangement according to Figure 1.

The selectors and the switch members contemplated herein are of the general form and character shown and described for example in the U. S. patent to Merk, No. 1,849,986 dated March 15, 1932, but are not here illustrated in detail because it is not material or essential to full understanding, and only those parts of the switch members which are or are intended to be, in engagement with the carrier means are shown since that is sufficient for the instant purpose. It is assumed that the switch members are to be

said member is lifted is reduced because the driving member *m* follows the periphery of the wheel *ro*, and the speed of course approaches zero as said driving member *m* nears the point vertically above the shaft *wo*. Thus the pawl *k* can securely engage a notch of the selector switch member *z*, as already indicated, and hold said member in its normal position, while the load on the conveyor is gradually and slowly removed as the pawl *k* releases from said driving member *m*. The stop *f* is preferably resiliently mounted so that varieties in the load, such as may occur for example when the contacts are actuated, are equalized by the spring or other resilient arrangement.

Owing to some mechanical defect, the selector might be damaged if a positive drive of the switch member were always maintained during the return movement. Fig. 2 shows an arrangement which will guard against this possibility and effect disconnection of a selector upon the occurrence of an overload. This is contrived by means of a special construction of the stop *f*. In this instance, said stop *f* consists of two leaf springs, a weak spring *f1* and a stronger spring *f2*. The spring *f1* holds the pawl *k* in its normal position here represented by *M*. During the return movement of the selector, the tail *v* of the pawl *k* presses against the springs *f1* and *f2*. The strength of the spring *f2* is such that when the load is normal, the pawl *k* assumes the position *N*. If the load on the switch member is greater than normal however, the pawl *k* escapes from the member *m* and after passing through a dead-centre position *O*, is brought by the springs *f1* and *f2* into the position *P* when the member *m* loses contact with the pawl *k*. An electrical disconnection of the selector may also be effected simultaneously with this mechanical disconnection. The normal or inoperative position of the switch member, or selector, and the means for holding it in this position, ready for operation, is illustrated in Fig. 7. In this view, the switch member *z* is shown in somewhat fuller detail, having notches formed therein, at one side, something like a rack. Engaging in these notches of the member is a pawl *k* which is subject to the action of the spring *t*. The pawl *k* carries the armature *p* of a magnet *m*. When the magnet *m* is excited momentarily, the pawl *k* is drawn out of the rack momentarily so as to release the switch member *z* for operative action by gravity, and of course reengages said member *z* when it is again lifted to the normal starting position.

The conveyor and switch members described with reference to Fig. 1 (also 2 and 7) comprise one of a plurality or series of the same used in a full selector system. They are of course in number or grouping depending upon the number and arrangement of selectors in the system. Fig. 8 is a plan view representation of a grouping arrangement of such members longitudinally in a system of individually adjacent selectors.

A single band *b* may be provided for a group of selectors or a separate narrow band may be provided for each selector. The driving members *m* which are provided for each selector are staggered in each set relatively to another as illustrated diagrammatically in Figure 3, so as to avoid having to accelerate several selectors simultaneously. A number of driving members *m* are advantageously fitted on each band *b* in order that the time required for the return movement of the selector may be as short as possible.

In order that the shafts carrying the conveyor bands *b* may be of small diameter and in order that the cost of the arrangement may be reduced, the shafts *wo* and *wu* are made discontinuous or in sections as shown in Figure 3, the breaks in the shafts being staggered relatively to each other. Each line of shafting thus comprises a number of coaxial shaft parts or sections, the power being transmitted from a section in one line of shafting to its neighbour through a section in the other line of shafting. The bands *b* themselves thus serve as couplings and no special couplings have to be provided.

If the selectors are fitted on both the front and back of selector frames and two resetting conveyors are used as represented in Fig. 4, the upper shafts *wo* or the lower shafts *wu* of the two conveyors can be coupled together at several places by toothed wheels (not shown) so that if one overlapping band on one side of the frame is out of action, the following groups will be driven through the agency of these toothed wheels on the opposite side.

The arrangement of Figure 4 can be simplified for example in the manner indicated in Figure 5, in which only two shafts *wo* and *wu* altogether are provided, these, however, being rotatable in opposite directions as indicated by the arrows. In this case, the upper wheels *ro* of the bands serving the front of the selectors are rigidly connected to the upper shaft *wo*, while the corresponding lower wheels *ru* are mounted freely on the shaft *wu*. Correspondingly, the wheels *ru* serving the back of the selectors are rigidly connected to the shaft *wu* and the wheels *ro* are loose on the upper shaft *wo*. Figure 5a represents a plan view of this arrangement. In the latter, *z1* designates the switch members of two selectors disposed at one side of the selector frame, and *z2* designates the switch members of two selectors disposed on the other side of said frame.

The resetting device is driven by a motor, and one motor can be provided for each frame or for a group of frames (see Figure 6). Each motor *M1*, *M2* is provided with a transmission *Gtr*, set for the desired speed of rotation and connected to the driven shafts (*w1*, *w2*) through free wheel devices *Fr*. This arrangement enables a number of driving units each provided with a motor to be coupled directly, the result being that, on failure of one of the motors, the corresponding driving group can be driven from the motor of the second group.

The driving motor can at the same time be used for controlling purposes and for the direct or indirect production of the necessary signal current, charging current and so forth, or for other purposes.

I claim:

1. A selector for telephone installations, comprising a switch member adapted to be set under the influence of a stored force, and rotary conveying means adapted to act upon and move said switch member back into its normal position when the selector is no longer busy, the said rotary conveying means being provided with a series of driving elements each engageable with means carried by the switch member, and said switch member having thereon the means engaged by said driving elements movable into position for such engagement only when said member is in a predetermined position for the return movement and releasing from the engagement

when said member has been moved to normal position.

2. A selector for telephone installations, comprising a switch member for each selector adapted to be set under the influence of a stored force, and a constantly operating driving member common to a plurality of sets of resetting members for resetting the switch member of the respective selectors, each of said sets of resetting members corresponding to a selector and each resetting member of a set of such members being adapted to reset the switch member of its corresponding selector into the normal position thereof when said selector is moved in a predetermined position for the return movement.

3. A selector for telephone installations, comprising a switch member adapted to be set under the influence of a stored force, a coupling member fixed to said switch member, a stop adapted to deflect said coupling member in a predetermined movement limit position of said switch member, and rotary conveying means, said rotary conveying means being provided with driving members adapted to engage with said coupling member when deflected and thereby to return said switch member from said predetermined limit position into its normal position.

4. A selector for telephone installations, comprising a switch member adapted to be set under the influence of a stored force, a coupling member fixed to said switch member, said coupling member being formed as a two-armed lever with unequal arms, a stop arranged in the path of movement of the longer lever arm of said coupling member and adapted to deflect said coupling member when said switch member has reached a predetermined position for starting the return movement, and rotary conveying means provided with driving members, said driving members being adapted to engage with said deflected coupling member and to return said switch member to its normal position.

5. A selector for telephone installations, comprising a switch member adapted to be set under the influence of a stored force, a coupling member fixed to said switch member, said coupling member being formed as a two-armed lever with unequal arms, a stop arranged in the path of movement of the longer lever arm of said coupling member and adapted to deflect said coupling member when said switch member has reached a predetermined position for starting the return movement, and rotary conveying means provided with driving means, said driving means being adapted to engage with said deflected coupling member and to return said switch member to its normal position, and means for disconnecting said coupling member from said driving members on the occurrence of an overload resisting the return movement of said switch member into the normal position.

6. A selector for telephone installations, comprising a switch member adapted to be set under the influence of a stored force, a movable coupling member arranged on said switch member, said coupling member being formed as a two-armed lever with unequal arms, an oblique stop arranged in a fixed position in the path of movement of the longer arm of said coupling member and adapted to deflect said coupling member and thereby arrest the switch member in a predetermined lower position, a further stop for said coupling member connected to said switch member, two rollers, a conveyor band running round said rollers, said conveyor band be-

ing provided with driving members adapted to come into engagement with the longer lever arm of said deflected coupling member and to return said switch member into its normal position when said member has reached said predetermined position.

7. A selector for telephone installations, comprising a switch member adapted to be set under the influence of a stored force, a movable coupling member arranged on said switch member, said coupling member being formed as a two-armed lever with unequal arms, an oblique stop arranged in a fixed position in the path of movement of the longer arm of said coupling member and adapted to deflect said coupling member in a predetermined lower limit position of the switch member, a spring fixed to said switch member and acting on said coupling member, two rollers, one of said rollers being arranged in the neighbourhood of said fixed stop, a conveyor band running over said rollers and provided with driving members adapted to come into engagement with the longer lever arm of said coupling member when deflected and to thereby return said switch member from the predetermined lower limit to its normal position by displacement of the bearing point on said lever arm as well as to swing said coupling member over by overcoming the tension of the spring on the occurrence of an overload resisting the return movement of said switch member into the normal position and thus to destroy the engagement with said coupling member.

8. A selector arrangement, comprising a plurality of selectors having switch members arranged side by side and adapted to be set under the influence of gravity, each of said switch members being provided with a coupling member, a plurality of oblique stops each corresponding to a selector and arranged in the path of movement of said selector and adapted to deflect the coupling member thereof when the switch member has reached its lowest position, two shafts arranged one above the other, a number of rollers corresponding to the number of selectors on each of said shafts, conveyor bands running each over one roller of said upper and lower shafts, said conveyor bands being provided with driving members adapted to come into engagement with said coupling members when deflected and to thereby lift said switch members of said selectors into the normal position, and said driving members of the various conveyor bands being staggered relatively to each other.

9. A selector arrangement, comprising a plurality of selectors with switch members arranged side by side adapted to be set under the influence of gravity, each of said switch members being provided with a coupling member, a plurality of oblique stops each corresponding to a selector and arranged in the path of movement of said selector and adapted to deflect the coupling member thereof when the switch member has reached its lowest position, two shafts arranged one above the other, a number of rollers corresponding to the number of selectors on each of said shafts, conveyor bands running each over one roller of said upper and lower shafts, said conveyor bands being provided with driving means adapted to come into engagement with said coupling members when deflected and to thereby lift said switch members of said selectors into the normal position, said driving members of the various conveyor bands being staggered relatively to each other, and each of said shafts being sub-divided into a number of sections and carrying a plurality of rollers, said sections

of the upper shaft being staggered relatively to the sections at the lower shaft, and each conveyor band running over one roller of one section of the lower shaft and one roller of another section of the upper shaft.

- 5 10. A selector arrangement, comprising several selectors having switch members adapted to be set under the influence of gravity, each of said switch members being provided with a coupling member, a plurality of oblique stops each corresponding to a selector and arranged in the path of movement of said selector and adapted to deflect the coupling member thereof when the switch member has reached its lowest position, a plurality
- 10 of groups of driving means, each of said groups containing an upper and a lower shaft with rollers, conveyor bands running round said rollers, said conveyor bands being provided with driving means adapted to come into engagement with said
- 15 coupling members when deflected by said stops, a driving motor and free-wheel couplings for connecting the shafts of the individual groups of driving means.

- 20 11. A selector arrangement, comprising a plu-

rality of selectors with switch members arranged side by side adapted to be set under the influence of gravity, each of said switch members being provided with a coupling member, a plurality of oblique stops each corresponding to a selector and arranged in the path of movement of said selector and adapted to deflect the coupling member thereof when the switch member has reached its lowest position, two shafts arranged one above the other, a number of rollers corresponding to the number of selectors on each of said shafts, conveyor bands running each over one roller of said upper and lower shafts, said conveyor bands being provided with driving means adapted to come into engagement with said coupling members when the latter are deflected by said stops and by the said coupling members to lift said switch members of the selectors into the normal position, said driving means of the various conveyor bands being staggered relatively to each other, and a driving motor for said shafts connected to devices for the control and energization of signal currents.

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