

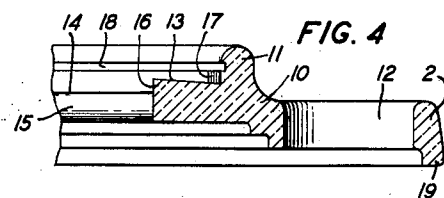
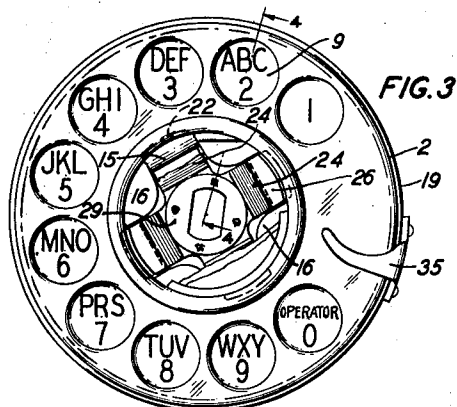
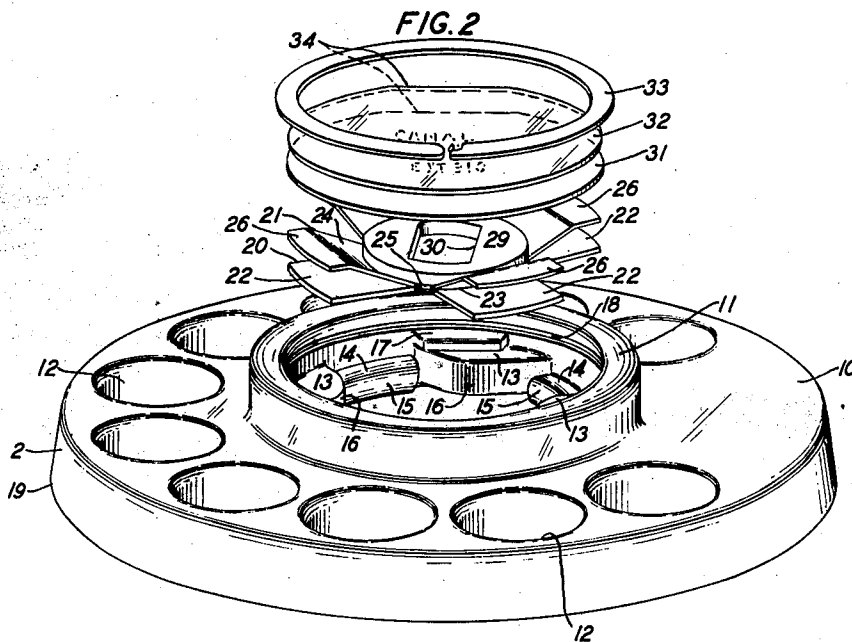
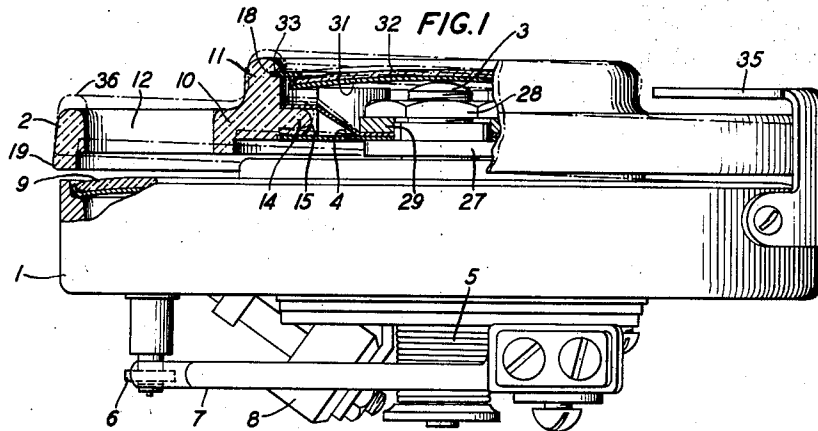
March 19, 1940.

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2,194,306

TELEPHONE CALLING DIAL

Filed May 20, 1938



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TELEPHONE CALLING DIAL

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Application May 20, 1938, Serial No. 209,023

6 Claims. (Cl. 179-90)

This invention relates to telephone calling dials and more particularly to finger wheels for telephone calling dials.

The object of the invention is to prevent fracturing of a frangible finger wheel.

A feature of the invention resides in a flexible support for the finger wheel.

In the drawing:

Fig. 1 is a side elevational view partly in section of a telephone calling dial embodying the invention;

Fig. 2 is an exploded view in perspective of the finger wheel and certain other parts directly associated with the finger wheel;

Fig. 3 is a top plan view of the calling dial shown in Fig. 1 and drawn to a reduced scale relative to Fig. 1; and

Fig. 4 is a side elevational view partly in section of a portion of the finger wheel taken on the line 4-4 in Fig. 3. Fig. 4 is drawn to the same scale as Figs. 1 and 2.

In a common and well-known type of telephone calling dial a manually rotatable finger wheel is provided to control the sending of signals to a central station to set up a desired call connection. The finger wheel is a disc having therein a plurality of finger holes and is supported on an operating shaft of the telephone calling dial. The finger wheel is usually made of metal and is relatively strong and durable. It is rather expensive to manufacture however, due to the finishing operations required in its production.

Efforts have been made to reduce the cost of the finger wheel by making the finger wheel of molded insulation material since such material is relatively inexpensive and requires very little, if any, finishing operation beyond the molding operation. Synthetic resins and other easily molded substances and even glass have been tried for the finger wheel material. Such materials, however, have been found to be too frangible for the conditions met in service when the finger wheel is directly connected to the operating shaft of the calling dial.

In this invention a flexible support is provided between the finger wheel and the operating shaft of the calling dial.

The telephone calling dial as shown in Fig. 1 comprises a casing 1 and a finger wheel 2, the finger wheel 2 being supported above the casing 1. The finger wheel 2 is mounted on an operating shaft 3 by means of a flexible mounting 4, the structure of which will be subsequently described. The operating shaft 3 extends down-

ward through the casing 1 and may be manually operated by means of the finger wheel 2 to wind up a spring 5. The spring 5 serves as a motor to return the finger wheel to normal position and as a driving means for a contact controlling device 6 which operates on spring contacts 7 to control the sending of impulses over a line system to set up a desired call connection. A system of gears, not shown, but enclosed within the casing 1 is provided to transmit the driving force of the spring 5 to the contact controlling device 6. A centrifugal governor 8 is included in the device to slow down the unwinding movement of the spring 5 and the return of the finger wheel 2 to required normal position. A ring shaped dial 9 bearing groups of letters and numerals on its upper face is supported in the top portion of the casing 1, the groups being arranged in positions to be observed through finger holes in the finger wheel 2, all of which is well known and understood in the art.

The finger wheel 2 is made of material which may be readily molded to required form in suitable molds. Some of the synthetic resin compositions and phenol condensation materials have been found suitable for finger wheel construction. The particular material employed in the finger wheel construction is a matter of choice. For the purpose of illustration of the invention, however, and not limiting the invention to any particular material, it will be assumed that the finger wheel 2 is made of synthetic resin since such material may be readily molded to required form and material of this type is rather frangible. The finger wheel 2 comprises a disc portion 10 and a hub portion 11, the hub portion 11 extending upward from the upper surface of the disc portion 10. The disc portion 10 is apertured to provide a series of finger holes 12 to facilitate manual rotation of the finger wheel 2. The internal diameter of the hub portion 11 of the finger wheel 2 is much larger than the diameter of the operating shaft 3. Projecting inwardly from the inner wall surface of the hub portion 11 are four spaced shoulders 13 the upper surfaces of which are inclined downwardly toward the hub portion 11. In a plane below the level of the upper surfaces of the shoulders 13 and alternated with the shoulders 13 are four spaced lugs 14. The lugs 14 project inwardly from the inner wall surface of the hub portion 11 and are rounded on their inner ends as shown at 15. The curvature of the inner ends of the lugs 15 is downward toward the lower part of the hub portion 11. The inner ends of the shoulders 13 are rounded

as shown at 16, the curvature being in a direction transverse to that of the curved inner ends 15 of the lugs 14. The shoulders 13 and the lugs 14 form, in a sense, an irregular ring of projections extending inwardly from the inner surface of the hub portion 11. As clearly shown in Fig. 2 it will be seen that the shoulders 13 extend a greater distance inwardly from the hub portion 11 than the lugs 14 and that the upper surfaces of the shoulders 13 are above the upper surfaces of the lugs 14. A raised ledge 17 is provided on the top of one of the shoulders 13, the ledge 17 extending over a portion of the inclined upper surface of the shoulder 13. An annular groove 18 is formed in the inner wall surface of the upper portion of the hub portion 11 of the finger wheel 2, the groove 18 extending directly above the upper surface of the ledge 17. The outer edge of the finger wheel 2 is extended downward to provide a skirt portion 19.

The finger wheel 2 is not directly attached to the operating shaft 3 of the calling dial but is mounted thereon by means of the flexible mounting 4. The flexible mounting 4 comprises cross-shaped members 20 and 21 of flexible material having sufficient stiffness to support the finger wheel 2. The members 20 and 21 are made in the form of a Greek cross and are laid together in laminated form with the finger portions of one extending over corresponding finger portions of the other. The member 20 is made flat so that the finger portions 22 and the central portion 23 all lie in the same plane. The member 21 has finger portions 24 slanting upward from the central portion 25 and terminating at the free ends in flat portions 26 which lie in spaced parallel relation with the associated finger portions 22 of the member 20. The central portions 23 and 25 of the respective members 20 and 21 are fastened together and are apertured to accommodate the upper end portion of the operating shaft 3. The central portions of the members 20 and 21 rest on a flange 27 on the shaft 3 and are held against removal therefrom by a nut 28 screwed to the upper end of the shaft 3. A washer 29 is interposed between the nut 28 and the central portion of member 21 to insure against separation of the central portions of the members 20 and 21. The aperture in the washer is formed to accommodate flat side portions on the upper portion of the shaft 3 and the apertures in the central portions of the members 20 and 21 are likewise formed to prevent relative rotation of the parts. The finger portions of the members 20 and 21 frictionally engage the lugs 14 in the hub portion of the finger wheel 2 and extend across the space between the lugs 14 and the flange 27 of the shaft 3 and serve as flexible supports between these parts. The finger portions 22 of the member 20 bear against the under surfaces of the lugs 14. The flat portions 26 of the fingers 24 of the member 21 bear against the upper surfaces of the lugs 14 and are positioned between the upper portions of the spaced shoulders 13. The width of the finger portions of the members 20 and 21 is made substantially the same as the width of the lug 14 and the shoulders 13 are made higher than the lug 14 to prevent lost motion between the finger wheel 2 and the flexible support 4 in a rotational direction.

When the flexible support 4 is being assembled with the finger wheel 2, the member 20 is placed with its finger portions bearing against the under surfaces of the lugs 14. The member 21 is then placed within the hub portion 11 with the flat

portions 25 of the fingers 24 resting on the upper surfaces of the lugs 14. Pressure is then applied to the central portions of the members 20 and 21 until the central portions come together. The central portions are then fastened together by any suitable means. For instance, if the members 20 and 21 are made of sheet metal, the central portions may be welded together. In the assembling operation of these parts, spring pressure is developed in the finger portions of the members 20 and 21 so that there is a clamping action of the finger portions against the lugs 14. The washer 29 may be welded or otherwise fastened to the upper surface of the central portion of the member 21 at the same time as the members 20 and 21 are secured together.

A station identification card 31 comprising a flat disc rests on the top of the shaft 3 and on the inclined upper surfaces of the shoulders 13. The card 31 is covered by a transparent disc 32. A split ring 33 having an outside diameter only slightly less than the diameter of the groove 18 and adapted to be sprung into the groove 18 bears against the upper portion of the transparent disc 32 and holds the card 31 and the disc 32 in place. The station identification card 31 and the transparent disc 32 are cut away at one point as indicated at 34 to accommodate the ledge 17 which bears against the cut-away portion 34 to prevent rotation of the parts 31 and 32 relative to the finger wheel 2. The upper surfaces of the shoulders 13 are inclined and the operating shaft 3 extends above the plane of the upper surfaces of the shoulders 13 to give the station identification card 31 and the disc 32 an upwardly bowed formation when the card 31 and disc 32 are clamped in position by the ring 33.

The flexible mounting 4 flexibly supports the finger wheel 2 on the operating shaft 3 of the calling dial and will bend when stresses are applied to the finger wheel 2. The finger wheel 2 may be tilted from its normal plane as shown in the dotted line of Fig. 1 without danger of fracturing the finger wheel since movement to such a position is permitted by the flexible mounting 4. In the case where a telephone instrument bearing the calling dial described is dropped to a floor surface, the frangible finger wheel is protected from the effects of the resulting jar by the flexible mounting 4. The flexible mounting 4 has only frictional engagement with the finger wheel 2 and may be made of material having a different temperature coefficient of expansion than that of the finger wheel. For instance, the finger wheel 2 may be made of synthetic resin and the flexible mounting 4 may be made of metal and because of the frictional connection between the parts, the materials of the flexible mounting 4 and finger wheel 2 may expand or contract in different degrees under changes in temperature without causing the application of fracturing pressures or stresses to the finger wheel.

It has been found that considerable downward pressure is sometimes applied to a finger wheel when a subscriber is manually rotating the finger wheel 2 around to the stop arm 35. In this event the flexible mounting 4 permits tilting of the finger wheel 2 to compensate for the pressure applied. The finger wheel 2, for instance, in this event may be moved to the dotted line position 36. In this position the skirt portion 19 of the finger wheel immediately under the point of pressure will engage the upper portion of the casing 1 to limit the extent of the down-

ward movement. As shown in the dotted line position the finger wheel 2 is raised on one side and on the opposite side is in engagement with the upper portion of the casing 1. No fracturing strain, however, has been applied to the finger wheel 2 during its movement to the position shown since most of the pressure applied is taken up by the finger portions of the flexible mounting 4.

The finger wheel 2 may, therefore, be made of synthetic resin or other frangible molding material and still stand the conditions met in service by instruments of this kind.

It is obvious that the washer 23 may be dispensed with and the members 20 and 21 need not be attached to each other, but that the members 20 and 21 may be simply clamped between the nut 28 and the flange 27 and that other changes may be made in the structure without departing from the spirit of the invention.

What is claimed is:

1. In a telephone calling dial, in combination, a rotatable shaft, a finger wheel and a flexible support in frictional engagement with said finger wheel and mounted on said shaft.

2. In a telephone calling dial, in combination, a rotatable shaft, a finger wheel, a central hub portion on said finger wheel, and a fingered support of flexible material frictionally engaging said hub portion and mounted on said shaft.

3. In a telephone calling dial, in combination, a rotatable shaft, a finger wheel, a hub portion on said finger wheel, spaced lugs extending inwardly from said hub portion, and a fingered

support of flexible material in frictional engagement with said lugs and mounted on said shaft.

4. In a telephone calling dial, in combination, a rotatable shaft, a finger wheel, a hub portion on said finger wheel, spaced projections extending inwardly from said hub portion, a laminated support of flexible material mounted on said shaft, and spaced fingers arranged in pairs on said support and in frictional engagement with said projections.

5. In a telephone calling dial, in combination, a rotatable shaft, a finger wheel of frangible material, a hub portion on said finger wheel, a series of spaced shoulders extending inwardly from said hub portion, a series of spaced lugs alternated with said shoulders and projecting inwardly from said hub portion, a support of flexible material mounted on said shaft and divided finger portions on said support in frictional engagement with said lugs and extending between said shoulders.

6. In a telephone calling dial, in combination, a rotatable shaft, a finger wheel of frangible material, a hub portion on said finger wheel, a series of spaced shoulders projecting inwardly from said hub portion, a series of spaced lugs alternated with said shoulders and projecting inwardly from said hub portion, a laminated support of flexible material mounted on said shaft, and pairs of upper and lower finger portions on said support passing between said shoulders and in frictional engagement with said lugs.

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