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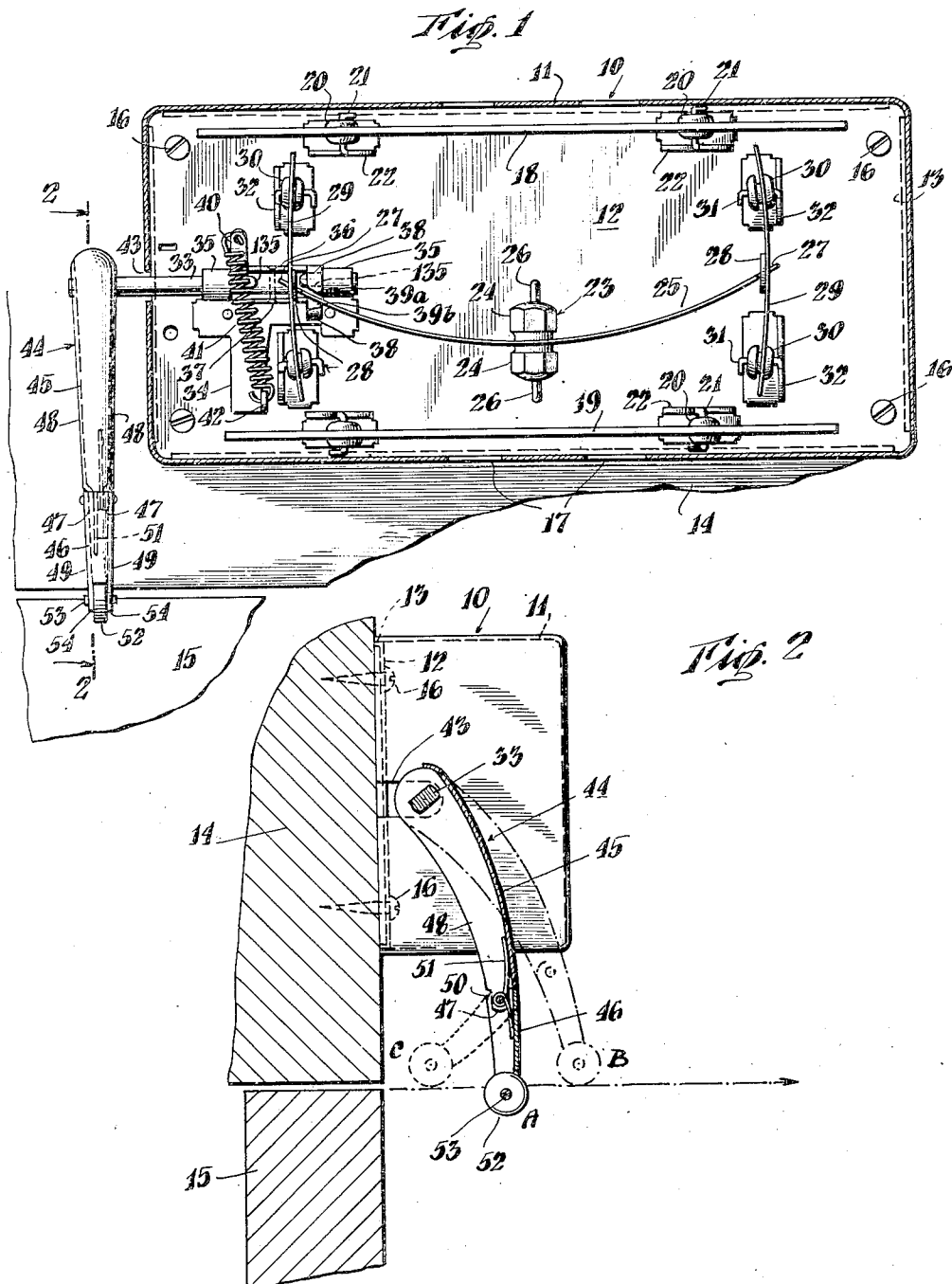
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2,463,832

DOOR SIGNAL DEVICE

Filed Sept. 17, 1947

2 Sheets-Sheet 1



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Fig. 3

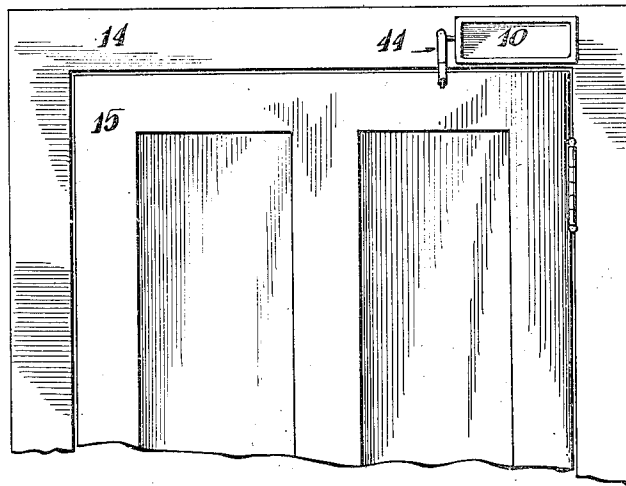


Fig. 4

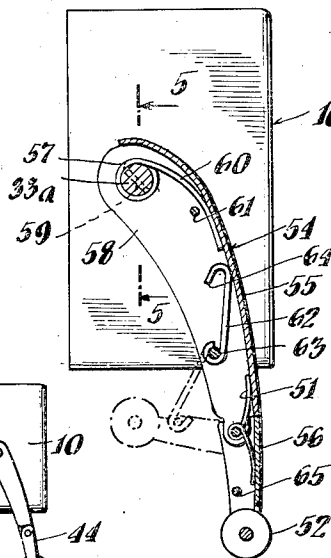


Fig. 5

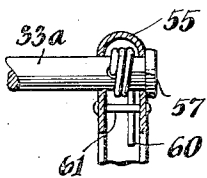


Fig. 6

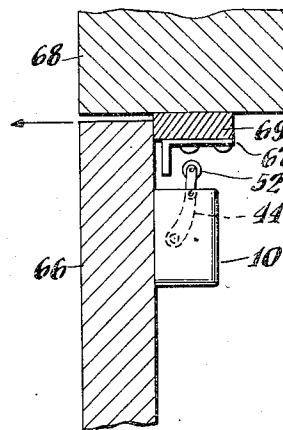
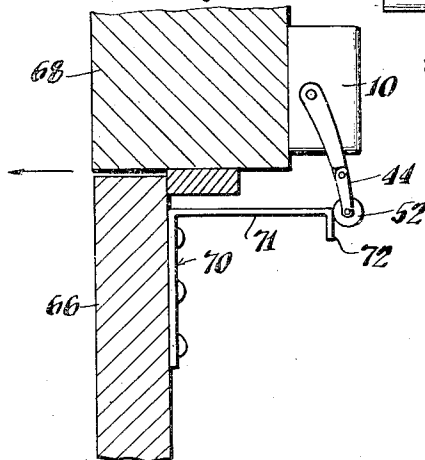


Fig. 7



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DOOR SIGNAL DEVICE

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5 Claims. (Cl. 116—95)

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This invention relates to audible signalling devices and more particularly to signalling devices for actuation by the opening of a door or by engagement with some other movable element.

The object of the invention is to improve audible signalling devices.

Another object is to improve door actuated signalling devices such as door-operated mechanical chimes and the like.

A further object is to improve the actuating mechanism for such devices, including the actuating member or arm to be engaged by the door or other movable operating element.

Other objects of the invention will be apparent from the following description and accompanying drawings taken in connection with the appended claims.

The invention accordingly consists in the features of construction, combination of elements, and arrangements of parts as will be exemplified in the structures to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings in which are shown by way of illustration several possible embodiments of my invention:

Figure 1 is a face view of a door chime embodying features of the present invention, the cover being shown in section to reveal internal construction of the device;

Figure 2 is a section on the line 2—2 of Figure 1;

Figure 3 is a face view of the upper portion of a door and door frame with the door chime mounted thereon for actuation by the door as it is opened;

Figure 4 is a section similar to the section on Figure 2 of a modified door chime embodying further features of the present invention;

Figure 5 is a section on the line 5—5 of Figure 4;

Figure 6 is a vertical section through a door and door frame showing the door chime mounted on the door for actuation upon opening of the door; and

Figure 7 is a vertical section through a door and door frame showing another means for mounting the door chime for actuation by the door upon opening thereof.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring to Figures 1, 2 and 3 the door chime 10 comprises a substantially rectangular base plate 12 having its outer edge 13 turned down

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to provide rectangular mounting face adapted to rest against the surface of a door frame such as door frame 14 for door 15. The edge 13 is smoothly cut off to lie in a plane which can rest against the door frame. Plate 12 is provided with suitable mounting holes in which are inserted screws 16 or other fastening elements to securely mount the door chime on the frame.

A cover 11 for the chime comprises a generally rectangular or boxed-shaped housing provided with openings 17 to permit the tone emitted from the chime to issue from the housing. The housing enclosure provided by the cover and base plate thereby comprises a resonating chamber for the chime elements as well as a protective housing. Cover 11 is of such dimensions as to fit snugly over the edge of base plate 12 and may be provided with interlocking bumps or tongues for engagement with suitable recesses or slots in the edge of the base plate or may be attached to the base plate by screws or other fastening elements. For convenience of mounting it is preferable that cover 11 be readily attachable and detachable from base plate 12 to permit the user to insert screws 16 in the base plate for mounting purposes and subsequently attach the cover to complete the installation.

The chime mechanism comprises a sound emitting element, preferably in the form of a chime bar 18 formed of a straight flat piece of resilient metal tuned to vibrate at a frequency which will yield a pleasing tone when struck. In the preferred embodiment illustrated a second chime bar 19 tuned to vibrate at a different frequency from bar 18 is also mounted within the housing. Thus, bar 18 is supported by a pair of rubber grommets 20 inserted through spaced holes in bar 18, the grommets being fitted over the bar by small ears 21 on the upper ends of lugs 22 punched out and turned up from base plate 12 near one edge. Chime bar 19 is similarly mounted along the opposite edge of the base plate so that bars 18 and 19 are resiliently mounted in spaced face to face relation.

It is obvious that one of the chime bars such as bar 19 may be omitted from the assembly if a single note chime is desired.

The sounding element or striker for energizing the chime bars to cause them to emit musical tones may preferably comprise a member 23 supported between chime bars to be actuated in one direction to strike bar 18 and in the opposite direction to strike bar 19. In the device illustrated striker 23 comprises a pair of nut-like parts 24 which are screwed together on a short threaded

stem with a normally-straight flexible spring 25 interposed between them. Each of parts 24 carries a striking pin 26 preferably formed of non-metallic material such as plastic, wood or the like press-fitted into recesses in the outer face of the part. The striker pin is formed of such material as to yield a pleasingly soft tone when it strikes the chime bar.

Flexible spring 25 which supports the striker may comprise a thin normally flat strip of spring steel having a small aperture at its mid-point through which the striker parts are joined and a pair of narrow tongues 27 at its two ends. These tongues extend through washers 28 and apertures in the mid portions of another pair of flexible leaf springs 29 which in turn are supported near their ends on rubber grommets 30 which are threaded over mounting ears 31 on lugs 32 punched up from the base plate 12 in aligned positions; the two lugs 32 for supporting one of the springs 29 being aligned in a direction across the base plate near one end of the chime bars, and the other two lugs 32 near the other end of the chime bars.

The spacing between leaf springs 29 is less than the length of striker support spring 25 so that spring 25 will be bowed by support springs 29 into an arcuate shape. Support springs 29 will also bow slightly outward. Striker 23 is thus held normally adjacent to but spaced slightly from one of the chime bars, such as bar 19.

The actuating mechanism for the striker comprises a rotatable shaft 33 supported for rotation in a sheet metal bracket 34 riveted, welded or clinched to base plate 12 near one end of the unit between chime bars. The bracket is provided with a pair of aligned bearings 35 formed by bending a pair of lugs formed of one edge of bracket 34 into tubular shape to receive shaft 33. A sheet metal channel 36 is fitted over shaft 33 between bearings 35 and secured to the shaft by pin 37 or by welding or brazing and carries a pair of spaced arms 38 comprising extensions of the channel walls at one end of the channel member in parallel relation to positions on opposite sides of spring 25 a short distance inside its point of support on the adjacent leaf spring 29. The spaced ends of arms 38 are turned inward towards spring 25 and are cut in such a manner as to be tapered to points 39a and 39b for alternately engaging opposite faces on striker supporting spring 25. Channel 36 has an integral arm 40 at its other end extending upwardly and provided with a hole at its end to receive the hooked end of coil spring 41. The other end of spring 41 is hooked into the small lug 42 turned up from a portion of sheet metal bracket 34 which is spaced away from bearings 35. Coil spring 41 is of such length as to be held in tension and thereby tend to rotate shaft 33 in such a direction as to press upper point 39a against leaf spring 25.

The tension of coil spring 41 is sufficiently great so that if striker 23 is in upper position near chime bar 19 spring 41 will flex leaf spring 25 downward through mid-position to the lower position shown in Figure 1. As spring 25 passes through mid-position its supporting springs 29 are bowed outwardly thereby increasing their pressure against ends of spring 25 so that, as soon as it passes mid-position, springs 29 aid spring 41 in urging the striker downward. It will be apparent that springs 29 cooperate with spring 25 to provide a toggle-action assembly and that coil spring 41 biases the assembly in the rest position shown in Figure 1. During the downward move-

ment the inertia of striker 23, due to the rapid motion after spring 25 passes mid-position, will carry the striker beyond the rest position shown to impinge the lower striker pin 26 against chime bar 19 with a single clean stroke after which the striker will rebound and come to a stop in the rest position shown. The tubular bearing portions 35 have integral lugs 135 extending between the walls of channel 36 to limit the rotation of the channel and shaft in both directions to a distance of travel sufficient to permit operation of the striker without interference but insufficient to allow the control arm to be displaced excessively from its normal range of travel.

Shaft 33 extends laterally out of the left hand end of the housing through a slot 43 in one end of cover 11 and carries at its outer end an actuating arm 44 formed of an inner section 45 and outer section 46 hingedly connected together.

Inner section 45 comprises a die casting or piece of sheet metal formed into a channel of substantially U-shaped cross-section and into an arched-shape from end to end. The two side walls 48 at the inner end of section 45 are provided with aligned substantially rectangular slots and the outer end of shaft 33 is machined or cut away to provide a flattened portion which extends through aligned slots, the end of the shaft being peened over to lock the arm to the shaft. In case of a sheet metal arm a short metal sleeve may be placed over the shaft between side walls 48 to prevent bending of the walls when the shaft is peened over. Section 45 of the arm extends parallel to the end face of cover 11 and makes an angle of a few degrees with the plane defined by the free edge 13 of the base plate, that is with the mounting plane of the door chime unit. While the angle which arm 44 makes with the mounting plane may be varied over a substantial range it is preferably rather small and in any event it is desirable that the arm make a substantial angle with a perpendicular to the mounting plane.

The two side walls of inner section 45 of the arm are provided at their outer ends with a pair of extending ears 47, which are offset slightly from side walls 48 of section 45 to lie in parallel planes slightly within the inside faces of walls 48. Outer section 46 of the arm also comprises a sheet metal channel whose side walls 49 are aligned with side walls 48 of the inner section so that sections 45 and 46 together present a continuous smooth outer surface of pleasing appearance. By virtue of their offset relation with respect to walls 48 the two ears 47 can enter between side walls 49 of outer section 46. The ears 47 and side walls 49 are provided with aligned apertures and a pivot pin 50 is inserted through these apertures to hingedly connect sections 45 and 46 of the arm, the ends of the pin being enlarged after insertion to prevent subsequent removal of the pin. The inner edges of side walls 49 at their hinged ends are rounded inward on a radius about pin 50 to permit arm section 46 to swing in a clockwise direction (as shown in Figure 2) to substantially right angles with section 45. However, the rounded crown portion of U-shaped arm 46 is not similarly cut away so that the adjoining ends of arms sections 45 and 46 form cooperating abutments to prevent the rotation of section 46 beyond a position in which it is in substantial alignment with section 45.

A section of spring wire 51 is wrapped around pin 50 and has its ends extending along the bottoms of the aligned channels provided by arm sections 45 and 46. This spring 51 biases outer

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section 46 of the arm to a position in alignment with inner section 45, in which position the rounded crown portions of arms sections 45 and 46 are in abutment. The springs being relatively weak, however, the outer section of the arm can readily be rotated in clockwise direction (as seen in Figure 2) by a relatively light force against the outer end of the arm without causing any rotation of shaft 33.

The two side walls 49 of outer section 46 extend beyond the crown portion at the free end of the arm to provide a pair of parallel arms 54 between which is pivoted a small roller or wheel 52 which is preferably molded or formed from a single piece of durable plastic such as phenol formaldehyde resin or suitable plastic. If desired a metal roller can be used and provided with a smoothly rounded rim in order to provide the roller, which will travel over a surface, such as the edge of a door, with a minimum of abrasion to the surface. Roller 52 is pivoted between the extended arms 54 of arm section 46 by a small pin or axle 53.

The preferred mounting arrangement for the device is shown in Figures 1, 2 and 3 wherein the chime box is mounted against the face of door frame 14 inside a room by placing base plate 12 against the door frame and attaching it by screws 16 after which the cover 11 is replaced. The device is mounted with shaft 33 in horizontal position and the end of arm 44 extending downward into the path of travel of door 15 which is mounted in the frame for opening into the room. The best mounting position is one in which the device is mounted above the door near the hinged side of the door as this results in somewhat slower operation and a more pleasing tone. The roller 52 preferably has its pivot axis slightly below the path of the upper edge of the door as seen most clearly in Figure 2. Upon the door being opened into the room as indicated by the arrow in Figure 2 the upper edge of the door engages roller 52 thereby rotating the entire arm 44 in a counter-clockwise direction (as seen in Figure 2), thus rotating shaft 33 to bring actuating end 39b on lower arm 38 against the under side of spring 25 to snap the spring upward and impinge upper striker 26 against chime bar 18 to emit a musical chime signal thereby advising the occupant of the room that someone is entering. As arm 44 rotates it carries roller 52 in a circular path from its lowermost position A (Figure 2) to a higher position B in which the roller just clears the path of the top of the door. It reaches position B shortly after the chime has been actuated and as the door continues to swing open the roller travels across the top edge of the door and drops down on the other side. As soon as the door has opened widely enough to release the end of the arm it swings back to the arm rest position with roller 52 again in position A. In so doing spring 41 actuates striker 23 downward to impinge lower striker pin 28 against chime bar 19, if one is provided, to give a second chime signal or musical tone of a different tone from the first tone produced. This serves as a second signal in case the first one has been overlooked.

When the door swings closed it will again engage roller 52, this time from the opposite edge, so that it will rotate arm section 46 in clockwise direction to bring the roller to position C without disturbing the rest of the arm. This permits the roller to ride back over the top surface of the door until it can drop off and return to position A under the influence of spring 51, thereby pre-

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paring the chime for operation upon the next opening of the door.

Figures 4 and 5 illustrate a modified arm construction which can be substituted for arm 44 in the chime illustrated in Figures 1 to 3. Modified arm 54 has an inner and outer section 55 and 56 respectively, similar in construction to sections 45 and 46 and arm section 56 carries roller 52. Inner arm section 55 is pivoted on shaft 33a but in this arrangement the pivot apertures in section 55 are circular and the end of shaft 33a is also of circular cross section so that arm 54 is not directly keyed to the shaft. A section of coil spring 57 is wrapped around shaft 33a between side walls 58 of the arm and has a short section 59 extended diametrically through a slot or transverse hole in shaft 33a to key the spring to the shaft. The other end 60 of spring 57 extends down inside arm section 55 generally parallel to the crown portion of the arm and in contact with it and a pin 61 extends through the arm just inside spring end 60 so that the arm is constrained by the spring in both directions. Spring 57 is relatively stiff so that rotation of arm 54 in a counter-clockwise direction will bring pin 61 into engagement with the projecting end of the spring and will rotate shaft 33a through the spring to operate the chime.

Spring 57 provides a protection device which prevents damage to the chime in case of undue force applied to the arm 54 as a result of improper mounting, accident or other causes. In the normal operation of the device the spring acts substantially as a rigid member but it will yield sufficiently to prevent damage in case of excessive force applied to the arm in either direction tending to force the arm beyond its normal limits of travel.

Figure 4 also shows a latch member 62 comprising a small wire hook pivoted on a pin 63 extending through side walls 58 on arm section 55 near its outer end. Hook 62, when not in use may be turned up to the position shown in solid lines in Figure 4 so that its hooked portion 64 is retracted between the walls 58. The latch member is wrapped around pin 63 with a sufficiently tight fit to hold the latch in this position by friction. When it is desired to put the chime out of service outer arm section 56 is simply rotated in a clockwise direction (as seen in Figure 4) to a position substantially at right angles to section 55 as indicated by dotted lines in Figure 4 and a latch 62 is swung down and its hooked end 64 is hooked over a small pin 65 bridging the side walls of channel section 56 a short distance above roller 52. This latches the upper section of the arm out of the path of the door to take it out of service.

Since the usual practice in stores and the like is to provide the entrance door opening into the room the mounting illustrated in Figures 1 to 3 will be the one most generally useful. However, the device can also be applied to doors which open outwardly where it is desired to have the signal mounted within the room. Two means for mounting the chime device for such operation are illustrated in Figures 6 and 7. In Figure 6 the chime 10 is mounted on the door 66 itself, preferably on the frame portion enclosing the door panel near the upper edge of the door. The device is mounted with arm 44 extending upwardly and a small L-shaped metal bracket 67 is attached to the under face of the stationary door frame 68 or door jam 69 so that one arm of the L projects down into the path of travel of

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roller 52 as the door swings open. When the door is opened outwardly the arm 44 is first rotated away from the door by bracket 67 to give the first chime tone and then as roller 52 falls off the edge of bracket 67 the second chime tone is given. When the door closes bracket 67 rotates the outer section of arm 44 sufficiently to permit roller 52 to roll over the edge of the bracket and snap back into its normal position preparatory to operation when the door is opened again.

Figure 7 illustrates another method of mounting in which chime device 10 is mounted on the stationary door frame 63 in much the same location as shown in Figures 1 to 3. In this case a bracket 70 formed of a strip of sheet metal may be secured to the inner face of door 66. This bracket has an arm 71 projecting outwardly from the door at right angles to the mounting portion and a short depending end portion 72 bent down at right angles to the outer end of arm 71 in such a position that, when door 66 is closed, the outer face of portion 72 will engage roller 52 and rotate arm 44 sufficiently to operate the chime. As long as the door remains closed arm 44 will be held in this "operated" position. When the door is opened arm 44 will be released and allowed to return to its normal position during which operation the second chime note will be sounded. Upon the door again closing the arm will be engaged by bracket 70 to sound the first chime note and prepare the device for operation on subsequent opening of the door.

While the present invention, as to its objects and advantages, has been described herein as carried out in specific embodiments thereof, it is not desired to be limited thereby but it is intended to cover the invention broadly within the spirit and scope of the appended claims.

What is claimed is:

1. A door signal device comprising a sound emitting element, a sounding element therefor operable to energize said sound emitting element, a support having a mounting face adapted for mounting on a door frame or the like, an arm pivoted at one end to a rotatable shaft on said support and extending laterally therefrom, said sounding element being operatively coupled to said arm by a plurality of coupling elements including at least one resilient element for actuation thereby responsive to rotation of said arm toward a position approaching a perpendicular to said mounting face, said arm comprising an inner section at the end pivoted to said shaft and an outer section hingedly connected thereto, whereby said outer section is swingable about said inner section, said sections having cooperating abutments thereon to limit the swing of said outer section in a direction away from the plane of said mounting face to a limiting position substantially in alignment with said inner section, said outer section being swingable in the opposite direction to form a substantial angle with said inner section, whereby said inner and outer sections will function together as an actuating arm for said signal device responsive to engagement of the outer end of said arm by a door or the like to rotate said arm in a direction away from the plane of said mounting face and said outer section will swing independently of said inner section responsive to force applied to the outer end of said arm in the opposite direction, and a spring engaging said inner and outer sections for returning said outer section to said limiting position of substantial alignment with said inner section.

2. A door signal device comprising two spaced

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chime elements, a support therefor having a mounting portion adapted for mounting on a door frame or the like, a striker on said support movable in a first direction to strike a first of said chime elements and in another direction to strike the second of said chime elements, an arm pivoted at one end to a rotatable shaft on said support and extending laterally therefrom, said striker being yieldably coupled to said arm by a plurality of coupling elements for actuation thereby to strike said first chime element responsive to rotation of said arm in a first direction and to strike said second chime element responsive to rotation of said arm in the opposite direction, said arm comprising an inner section at the end pivoted to said shaft and an outer section hingedly connected thereto, whereby said outer section is swingable about said inner section, said sections having co-operating abutments thereon to limit the swing of said outer section in the first direction to a limiting-position substantially in alignment with said inner section, said outer section being swingable in the opposite direction to form a substantial angle with said inner section, whereby said inner and outer sections will function together as an actuating arm for said signal device responsive to force applied to the outer end of said arm in said first direction and said outer section will swing independently of said inner section responsive to force thereon in the opposite direction and a spring holding said inner and outer sections in substantial alignment in the absence of external forces thereon.

3. A door signal device comprising two spaced chime elements, a support therefor having a mounting portion adapted for mounting on a door frame or the like, a striker on said support movable in a first direction to strike a first of said chime elements and in another direction to strike the second of said chime elements, an arm comprising two substantially U-shaped sections pivoted at one end to a rotatable shaft on said support and extending laterally therefrom, said striker being yieldably coupled to said arm by a plurality of coupling elements for actuation thereby to strike said first chime element responsive to rotation of said arm in a first direction and to strike said second chime element responsive to rotation of said arm in the opposite direction, said arm comprising an inner section at the end pivoted on said shaft and an outer section hingedly connected thereto, whereby said outer section is swingable about said inner section, said sections having co-operating abutments thereon to limit the swing of said outer section in the first direction to a limiting-position substantially in alignment with said inner section, said outer section being swingable in the opposite direction to form a substantial angle with said inner section, whereby said inner and outer sections will function together as an actuating arm for said signal device responsive to force applied to the outer end of said arm in said first direction and said outer section will swing independently of said inner section responsive to force thereon in the opposite direction and a spring disposed partially within the channel formed in said inner section and partially within the channel formed in said outer section holding said inner and outer sections in substantial alignment in the absence of external forces thereon.

4. A door signal device comprising a chime element, a housing therefor having a mounting face for mounting on a door frame or the like,

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a shaft rotatably mounted in said housing and projecting therefrom substantially parallel to said mounting face, a striker in said housing and operatively coupled to said shaft for actuation thereby to strike said chime element, and an arm having one end yieldably pivoted on said shaft by a spring external of said housing and forming a substantial angle with the perpendicular to said mounting face, said arm comprising an inner section at the end pivoted on said shaft and an outer section hingedly connected thereto, said sections having co-operating abutments thereon to limit the swing of said outer section in a direction toward said perpendicular to a limiting position substantially in alignment with said inner section, said outer section being swingable in the opposite direction to form a substantial angle with said inner section and a spring holding said inner and outer sections in substantial alignment in the absence of external forces thereon.

5. A door signal device comprising a chime element, a housing therefor having a mounting face for mounting on a door frame or the like, a shaft rotatably mounted in said housing and projecting therefrom substantially parallel to said mounting face, a striker in said housing and operatively coupled to said shaft for actuation

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thereby to strike said chime element, and an arm having one end yieldably pivoted on said shaft by a spring external of said housing and forming a substantial angle with the perpendicular to said mounting face, said arm comprising an inner section at the end pivoted on said shaft of substantially U-shaped cross section and an outer section of substantially U-shaped cross section hingedly connected thereto, said sections having co-operating abutments thereon to limit the swing of said outer section in a direction toward said perpendicular to a limiting position substantially in alignment with said inner section, said outer section being swingable in the opposite direction to form a substantial angle with said inner section and a spring holding said inner and outer sections in substantial alignment in the absence of external forces thereon.

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