

May 28, 1946.

J. M. TALBOT

2,401,199

CHIME

Filed Dec. 12, 1944

3 Sheets-Sheet 1

Fig. 1.

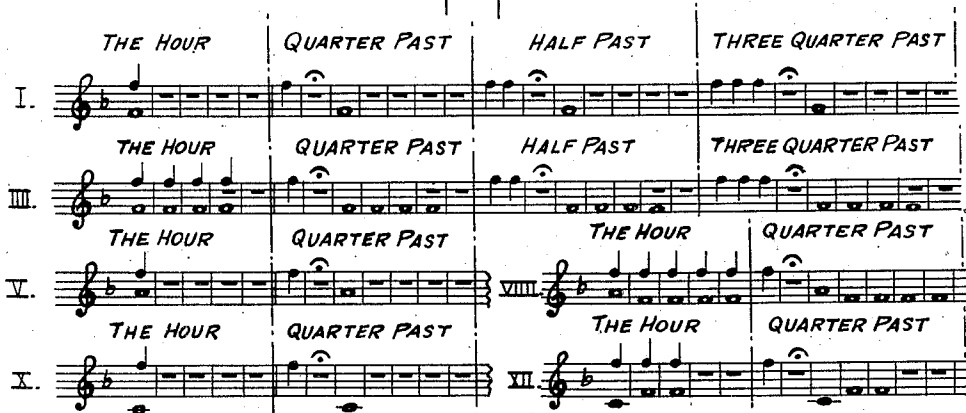
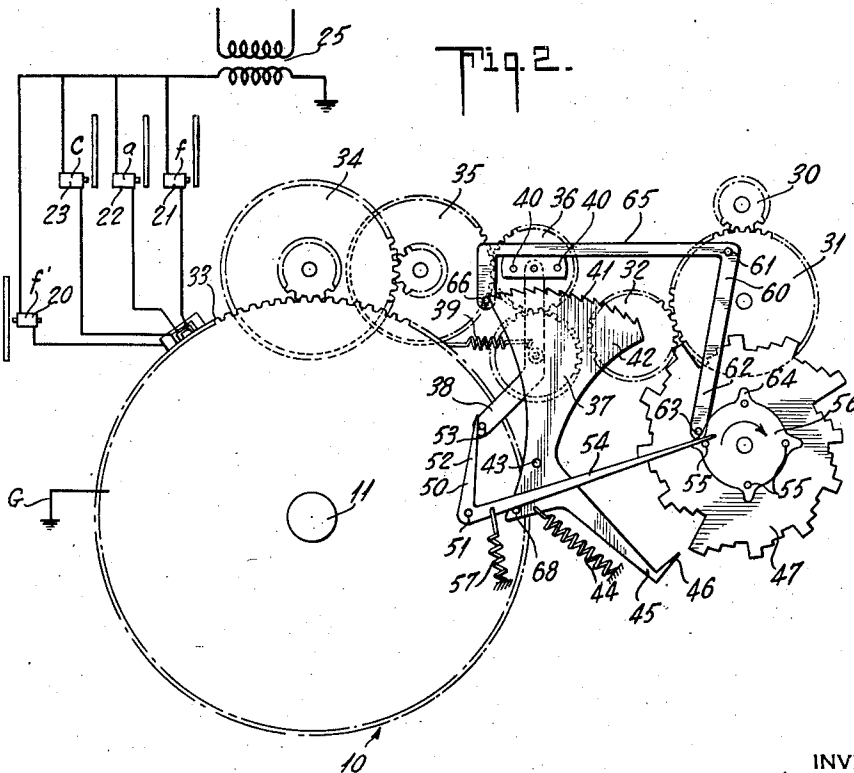


Fig. 2.



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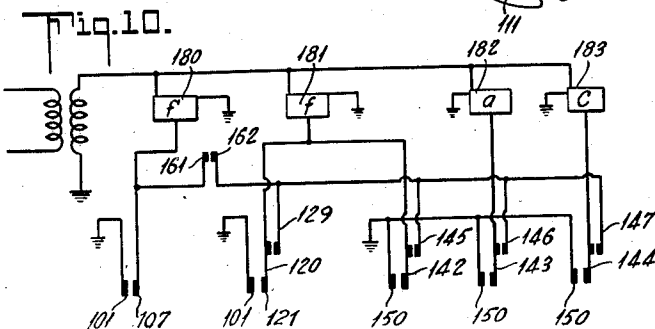
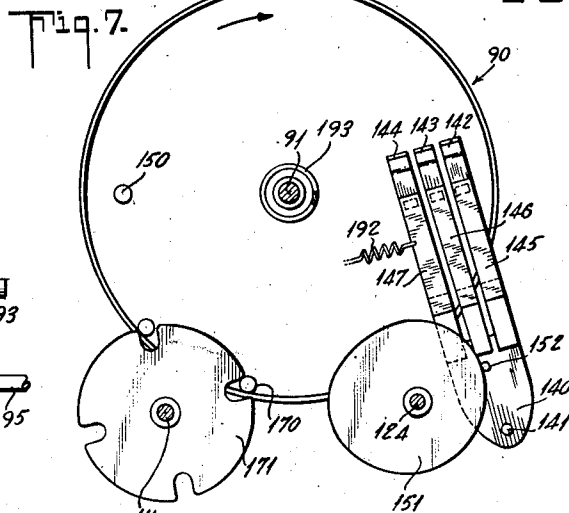
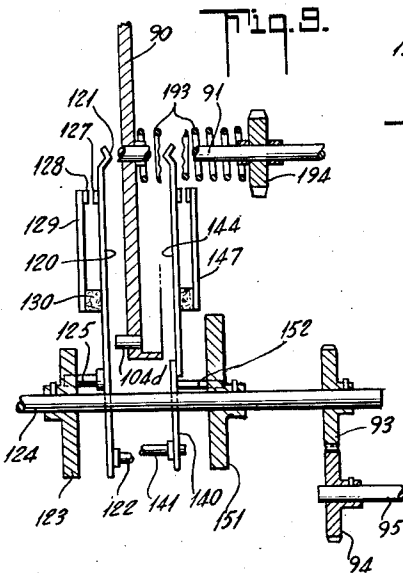
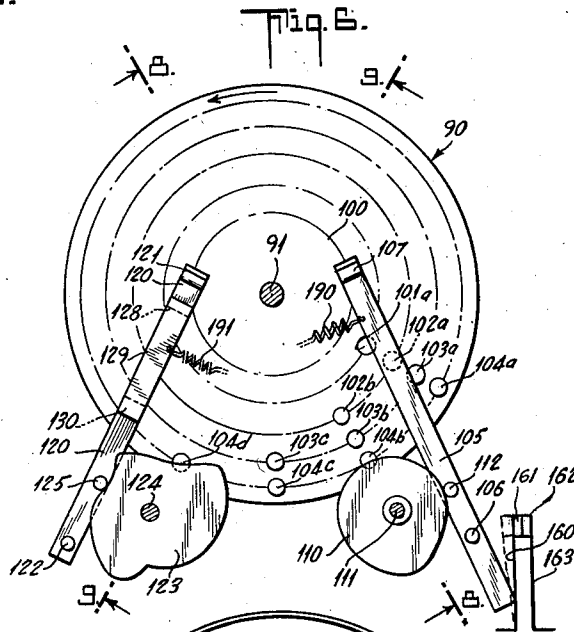
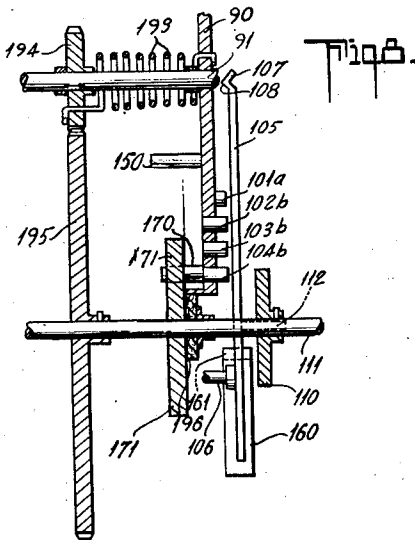
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2,401,199

CHIME

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3 Sheets-Sheet 3



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2,401,199

CHIME

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13 Claims. (Cl. 58—13)

This invention relates to chimes for a clock, and more particularly to chimes which will tell the hour and the fractional hour each fractional hour throughout the day, without making an unduly protracted signal.

The customary chime clock strikes the quarter, the half hour and the three quarter in each hour, without any designation of the hour, striking the hour only at the even hour. Thus the benefit of the quarter hour strike is completely lost, at any time, such for example as the middle of the night, when the listener does not know the hour. Even with such a system, however, the striking of the hour, for example at twelve o'clock, becomes unduly protracted and, to be significant, requires that the listener count the strokes up to twelve. This is tedious and confusing, particularly as the hour strokes are customarily all upon the same note. With such a system, it is very easy to miscount.

In accordance with this invention, the significant hours are sounded by combinations of notes of different tones in sequence. Thus because there are many possible combinations, the actual number of notes which it is necessary to strike is greatly reduced. Thus the number of times the same note must be repeated in sequence can be reduced to a minimum. Moreover, because it is possible to indicate the hour without unduly protracting the signal, that hour signal may be combined with a signal indicating the quarter hour, without the signal being as prolonged as the present striking of the noon hour. Moreover, by properly choosing the tones employed, every signal may be made varied and harmonious.

I prefer to use combinations of the tones *f*, *a*, *C* and *f'* of the musical scale, as these notes are easily distinguishable when used in sequence or in combination, and the combinations are all harmonious. Within the broad scope of this invention any combinations of these notes may be employed. I prefer, however, to combine the three lower notes in accordance with the principles of the Roman numerals, since that system is simple and is well known. As a consequence, such a system is easy for the average person to learn and easy to interpret in use.

The invention accordingly comprises a device possessing the features, properties and the relation of elements which will be exemplified in the article hereinafter described and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had

to the following detailed description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a notation illustrating the series and combination of notes I prefer to employ in the new chimes.

Fig. 2 is a diagrammatic view showing a mechanism embodying the invention.

Fig. 3 is a top plan view of the contact drum of Fig. 2.

Fig. 4 is a section on the line 4—4 of Fig. 3.

Fig. 5 is a development of the surface thereof.

Fig. 6 is a front elevation of a modified form of apparatus.

Fig. 7 is a rear elevation of the same.

Fig. 8 is a section on the line 8—8 of Fig. 6.

Fig. 9 is a section on the line 9—9 of Fig. 6.

Fig. 10 is a wiring diagram of the construction of Figs. 6 to 9.

The system of notes I prefer to use gives a preliminary signal of the quarter hour comprising one stroke of *f'* for the quarter past, two strokes of *f'* for the half past, and three strokes of the same note for the three quarters past the hour.

This quarter hour signal is followed after a pause by the characteristic signal of the hour which has just passed. The characteristic hour signal, which would follow the quarter hour signal, would be, for the hour I, a single stroke of the note *f*, an octave below *f'*. For II o'clock, it would be two strokes of this same *f*. For III o'clock, it would be four strokes. For V o'clock, however, the characteristic signal to follow the quarter hour signal would be a single stroke of the note *a*. At VI o'clock, the hour signal would be *a* and *f*. At VII o'clock, one stroke of *a* and two strokes of *f*. At VIII o'clock, one stroke of *a* and four strokes of *f*. Similarly, the characteristic signal for X o'clock would be one stroke of *C*. XII o'clock would be one stroke of *C*, followed by two strokes of *f*.

On the even hour there is no stroke to indicate the quarter hour, but as a substitute therefor, in order to make the hour signal significant in itself, the same lower notes are struck to signify each hour, as has been previously described, but with each of these notes there is simultaneously struck to *f'*, so that on the hour, the hour I would be represented by the simultaneous striking of *f* and *f'* once. At III o'clock this same combination would be struck four times in sequence. At V o'clock the signal would constitute a simultaneous striking of *a* and *f'*. At VIII o'clock *a* and *f'* would be struck simultaneously once, and then *f* and *f'* would be struck simultaneously four

times in succession. At XII o'clock, *f'* and C would be struck once, followed by *f* and *f'* struck simultaneously twice in succession.

A mechanism for accomplishing this result is indicated in Figs. 2-4. The numeral 10 represents a drum rotated about a shaft 11 by a mechanism to be later described. This drum has a plurality of stations around its periphery corresponding to the total number of strokes and pauses, during a twelve hour period, or a total of 232, and the driving mechanism is constructed to drive this drum at the end of each quarter hour precisely enough stations to give the required number of signal strokes.

Around the periphery of the drum are placed gong-operating means so disposed as to strike the several gongs in proper sequence. Where the clock is to be mechanically driven, or where it is otherwise convenient, this striking mechanism may be purely mechanical. Such striking mechanisms are in themselves well known in the art. In this embodiment, however, I have chosen to employ electrical contacts, as such device is simple and makes it possible to locate the gongs at a point remote from the clock itself.

I have shown these contact mechanisms in the simplest manner to avoid undue complexity, but it will be clear that any contacting device may be employed.

As herein shown, the drum 10 is connected to ground, as shown at G, and opposite its periphery four contact members 15, 16, 17 and 18 are arranged side by side, connected respectively to the operating coils 20, 21, 22 and 23 of gongs sounding the notes *f'*, *f*, *a* and C respectively.

The opposite side of the operating coils is connected to the low voltage secondary of a small transformer 25.

The periphery of the drum is divided into 232 stations which are successively presented to the contact members as the drum is revolved.

In alignment with each contact member is a set of pins upon the drum, numbered 26, 27, 28 and 29. These pins are situated at the proper stations to sound the respective gongs in the following order.

Hour	On hour		15 min. after		30 min. after		45 min. after	
	Station No.	Contacts	Station No.	Contacts	Station No.	Contacts	Station No.	Contacts
1					5	<i>f'</i>	9	<i>f'</i>
			2	<i>f'</i>	6	<i>f'</i>	10	<i>f'</i>
			3	Pause	7	Pause	11	<i>f'</i>
	1	<i>f' f</i>	4	<i>f</i>	8	<i>f</i>	12	Pause
2					20	<i>f'</i>	26	<i>f'</i>
			16	<i>f'</i>	21	<i>f'</i>	27	<i>f'</i>
			17	Pause	22	Pause	28	Pause
	14	<i>f' f</i>	18	<i>f</i>	23	<i>f</i>	29	<i>f</i>
3					39	<i>f'</i>	45	<i>f'</i>
			34	<i>f'</i>	40	<i>f'</i>	46	<i>f'</i>
			35	Pause	41	Pause	47	<i>f'</i>
	31	<i>f' f</i>	36	<i>f</i>	42	<i>f</i>	48	Pause
4					62	<i>f'</i>	70	<i>f'</i>
			56	<i>f'</i>	63	<i>f'</i>	71	<i>f'</i>
			57	Pause	64	Pause	72	Pause
	52	<i>f' f</i>	58	<i>f</i>	65	<i>f</i>	73	<i>f</i>
5					81	<i>f'</i>	85	<i>f'</i>
			78	<i>f'</i>	82	<i>f'</i>	86	<i>f'</i>
			79	Pause	83	Pause	87	<i>f'</i>
	77	<i>f' a</i>	80	<i>a</i>	84	<i>a</i>	88	Pause

Hour	On hour		15 min. after		30 min. after		45 min. after	
	Station No.	Contacts	Station No.	Contacts	Station No.	Contacts	Station No.	Contacts
6					96	<i>f'</i>	101	<i>f'</i>
			92	<i>f'</i>	97	<i>f'</i>	102	<i>f'</i>
			93	Pause	98	Pause	103	<i>f'</i>
	90	<i>f' a</i>	94	<i>a</i>	99	<i>a</i>	104	Pause
7					115	<i>f'</i>	121	<i>f'</i>
			110	<i>f'</i>	116	<i>f'</i>	122	<i>f'</i>
			111	Pause	117	Pause	123	<i>f'</i>
	107	<i>f' a</i>	112	<i>a</i>	118	<i>a</i>	124	Pause
8					133	<i>f'</i>	143	<i>f'</i>
			128	<i>f'</i>	134	<i>f'</i>	144	<i>f'</i>
			129	<i>f'</i>	135	<i>f'</i>	145	<i>f'</i>
	130	<i>f' f</i>	136	<i>f</i>	142	<i>f</i>	146	Pause
9					158	<i>f'</i>	165	<i>f'</i>
			131	<i>f'</i>	137	<i>f'</i>	166	<i>f'</i>
			132	Pause	138	Pause	167	<i>f'</i>
	123	<i>f' a</i>	133	<i>a</i>	139	<i>a</i>	168	<i>a</i>
10					165	<i>f'</i>	173	<i>f'</i>
			153	<i>f'</i>	160	<i>f'</i>	174	<i>f'</i>
			154	<i>f'</i>	161	<i>f'</i>	175	<i>f'</i>
	155	<i>f' f</i>	162	<i>f</i>	169	<i>f</i>	176	Pause
11					186	<i>f'</i>	191	<i>f'</i>
			156	<i>f'</i>	163	<i>f'</i>	177	<i>a</i>
			157	<i>f'</i>	164	<i>f'</i>	178	<i>f</i>
	158	<i>f' f</i>	165	<i>f</i>	170	<i>f</i>	179	<i>f</i>
12					186	<i>f'</i>	191	<i>f'</i>
			182	<i>f' c</i>	183	<i>f'</i>	192	<i>f'</i>
			184	Pause	185	Pause	193	Pause
	182	<i>f' c</i>	185	<i>c</i>	189	<i>c</i>	194	<i>c</i>
13					201	<i>f'</i>	206	<i>f'</i>
					197	<i>f'</i>	202	<i>f'</i>
					198	<i>f'</i>	203	<i>f'</i>
	195	<i>f' c</i>	199	<i>c</i>	204	<i>c</i>	207	<i>f'</i>
14					215	<i>f'</i>	220	<i>f'</i>
			196	<i>f' c</i>	200	<i>f</i>	205	<i>f</i>
					216	<i>f'</i>	221	<i>f'</i>
	212	<i>f' c</i>	217	<i>c</i>	222	<i>c</i>	226	<i>f'</i>
15					222	<i>f'</i>	227	<i>f'</i>
			213	<i>f' f</i>	218	<i>f</i>	223	<i>f</i>
			214	<i>f' f</i>	219	<i>f</i>	224	<i>f</i>
	214	<i>f' f</i>	219	<i>f</i>	225	<i>f</i>	228	Pause

The drum is arranged to be moved at the close of each quarter hour, the number of stations required to give the necessary signal. For example, since the signal at 6:15 occupies stations 92 to 95 inclusive, the drum will be moved from a neutral position between stations 91 and 92, past stations 92, 93, 94 and 95, to rest again between stations 95 and 96. Hence the operating mechanism is arranged to move it an angle equal to four stations. Similarly at 9:45, nine stations' movement will be needed, but at 10:00 only one will be required.

The driving mechanism for the drum is shown in Fig. 2. In that figure the numeral 30 represents the clock driving motor, driving gears 31 and 32 of the clock train.

The drum 10 is driven by gears 33, 34, 35 and 36, journaled to the frame. A gear 37 is pivoted on a lever 38 which in turn is pivoted concentric with gear 36, so that gears 37 and 36 are at all times in mesh. The gear 37, however, is movable into and out of mesh with motor driven gear 32 by lever 38 acting against a spring 39.

The gear 36 has a plurality of pins 40 in position, as they rotate, to engage the teeth 41 of a ratchet segment 42 pivoted at 43, to move the segment 42 clockwise one tooth at a time, against the action of a spring 44.

The segment 42 has a projecting arm 45 having a point 46 in position to engage a cam 47 driven by gear 31 of the clock mechanism, one revolution in twelve hours. The contour of this cam is divided into 48 sections, and each section has a diameter such that the segment 42 may fall counter-clockwise through an angle correspond-

ing to the number of teeth equal to the number of signal stations of the drum 33 required for the particular quarter hour to which it corresponds. Lever arm 38 is urged against spring 39 by a V-shape lever 50 pivoted at 51, having one arm 52 in position to engage a pin 53 on lever 38. The other arm 54 of lever 50 extends into the path of pins 55 on a disc 56 driven by the clock mechanism at one revolution per hour. There are four pins on disc 56 so that the arm 54 is raised once each quarter hour. A spring 57 is connected to urge lever 50 clockwise to move gear 37 into mesh with gear 32 against the action of spring 39.

A hook lever 60 pivoted at 61 has one arm 62 carrying a pin 63 in position to engage the periphery of disc 56. This disc has four peripheral projections 64 in position to engage pin 63 immediately before the end of each quarter hour to swing lever 60 clockwise. The other arm 65 of lever 60 has a pin 66 in position to engage the teeth 41 of segment 42, or to pass down beyond the last tooth, as shown in Fig. 2. The proportions are such that when pin 63 is engaged by projection 64, the pin 66 will rise above the level of the teeth 41. The lever arm 65 may be arranged to be raised by pins 40 as gear 36 revolves.

With this construction the operation will be clear. Normally the strike mechanism will be quiescent in the position shown in Fig. 2.

As soon, however, as projection 64 raises lever 60 to release ratchet 42, the latter will fall counter-clockwise in response to spring 44, until point 46 engages the surface of cam 47. When the pin 63 has passed beyond the point 64, lever 60 drops and pin 66 falls in between the teeth 41, leaving a number of teeth to the left equal to the number of stations on the drum, which must be rotated for that particular time of day. As soon thereafter as pin 55 passes up beyond the end of lever 54, it permits lever arm 53, urged by spring 57, to force lever 38 counter-clockwise to bring gears 37 and 32 into mesh, and start the drum 10 rotating.

The gears are so proportioned that the drum 10 moves $\frac{1}{232}$ of a revolution for each half revolution of the gear 36, and hence for each tooth of the segment 42. With this proportion, with each half revolution of the gear 36, a new station will be brought into contact position, and as a result a new note or pair of notes will be sounded, or a pause will result, dependent upon the location of the pins upon the drum.

As soon as the segment 42 is brought back by pins 40 to the position shown in the drawings, a pin 68 mounted upon the segment engages the underside of the arm 54 and raises the arm to release lever 38, so that spring 39 may draw the gear 37 out of mesh with gear 32 to stop the rotation of the drum. The drum then remains stationary until, at the end of the next quarter hour, a new projection 64 again raises the lever 60 and a new pin 55 again operates the arm 54.

In accordance with the invention disclosed in Figs. 6 to 8 inclusive, a disc 90 is mounted for rotation about a shaft 91, carrying upon its face four concentric rows of pins and one row devoid of pins positioned as will be hereinafter described. A contact arm 105 is pivoted at 106 adjacent to the disc, and has a head 107 with inclined faces 108, comprising a contact point, whereby as the disc 90 rotates, contact will be made between the face 108 of the contact arm 105 and the pins.

A cam 110 is mounted adjacent to the periphery of the disc 90, and driven by a shaft 111,

which in turn is driven by the clock mechanism at the rate of one revolution per hour. This cam has a periphery designed to engage a pin 112 upon the contact arm 105, so as to swing the contact point 108 into alignment with the row containing no pins or with any one of the inside three of the four concentric groups of pins, that is, with pinless circle 100 or with groups bearing subscripts 101, 102 or 103.

Where the device is intended to produce the particular chimes which have been heretofore described, I place the contact pins in sets around the periphery, the sets being 30 degrees apart; in the first set there being four pins 101a, 102a, 103a and 104a; in the second set three, 102b, 103b and 104b; in the third set two, 103c and 104c; and in the fourth set one, 104d. These pins are also arranged in concentric groups, there being four pins, 104a, 104b, 104c and 104d, in the outer circle; three, 103a, 103b and 103c, in the next inner group; two, 102a and 102b, in the group next to the center; and one, 101a, in the center group. There is a third concentric circle 100 on the cam which is devoid of any pins whatsoever. Thus it will be seen that the 100 row has no contacts; the 101 has one; the 102 has two; the 103 has three; and the 104 has four.

The cam 110 is so designed that the head 108 will be in alignment with the 100 row at each even hour, and in alignment with the 101 row at each one-quarter hour, at the 102 row at each half hour, and at the 103 row at each three-quarter hour. Thus as the drum rotates, it will make contact zero, one, two or three times during the first third revolution of the disc 90.

Mounted adjacent to the disc on the other side is a contact arm 120 having a head 121 and pivoted at 122, similar to the arm 105, except that instead of moving over rows 100, 101, 102 and 103, it is adapted to move the head over rows 100, 101, 102, 103 and 104.

A cam 123 is mounted upon a shaft 124 driven by the clock mechanism with a step by step motion one-twelfth revolution just before the end of each hour. Such drives are well known and are here represented by Geneva gears 93 and 94, connecting shaft 124 to a shaft 95 of the clock train. This cam 123 engages a pin 125 on contact arm 120 and is so designed as to bring the head 121 of arm 120 into alignment with the 100 row at the positions corresponding to 1:00, 5:00 and 10:00 o'clock upon the cam; and to move it over to the 101 row at positions corresponding to 2:00, 6:00 and 11:00 o'clock upon the cam; to move it to the 102 row at 3:00, 7:00 and 12:00 o'clock; to the 103 row at 4:00 and 8:00 o'clock; and to the 104 row at 9:00 o'clock.

The position of the heads 108 and 121 about the disc is preferably such that any point will come into angular alignment with the head 121, 150 degrees of rotation after it has been in alignment with the head 108.

The contact arm 120 has upon its rear face a contact point 127, in position to engage a contact point 128 on a spring arm 129 which is carried by an insulating member 130 upon the arm 120 previously described. These contacts 127 and 128 are apart except where head 121 engages a pin 101 to 104.

Refer now to Fig. 7 which shows the reverse side of the disc. Adjacent to the disc upon this side there is mounted an arm 140, pivoted at 141 and carrying three sets of contact arms 142, 143 and 144. Each of these contact arms is individually identical with the contact arm 120, and

each has mounted upon its back an auxiliary contact arm 145, 146 and 147, similar to the arm 129. The arms 142, 143 and 144 are rigidly attached together but insulated from each other and they are spaced apart in such a manner that any one of them may be brought into alignment with a contact pin 150 which is carried upon this side of the disc 90.

A cam 151 mounted upon shaft 124 engages a pin 152 upon arm 140, and the peripheral contour of this cam is such that between the hours of 1:00 and 4:45 o'clock inclusive, the arm 142 will be in alignment with the pin 150, and during the hours of 5:00 to 9:45 o'clock inclusive, the arm 143 will be in alignment with the pin 150, and during the hours of 10:00 to 12:45 o'clock inclusive, the arm 144 will be in alignment with the pin 150.

A contact arm 160 is mounted upon the base and carries a contact 161 in position to be brought in contact with a contact 162 upon the bracket 163 also carried by the base, these parts being so positioned that arm 105 will engage arm 160 to cause the contacts 161 and 162 to be brought into engagement with each other whenever the arm 105 is in alignment with the 100 line of pins.

A pin 170 is carried by the disc 90 upon its periphery adapted to engage a four-tooth releasing dog 171 carried by the quarter hour shaft 111, this dog being so arranged that as a pin 170 slips off one tooth of the dog, it permits almost one revolution of the disc 90 until the pin engages the next tooth thereof. Thus the disc starts rotating whenever the dog releases the pin 170 and rotates for about $\frac{1}{2}$ of a revolution, during which time the signaling takes place. Then during the next fifteen minutes, while the shaft 111 is rotating, the pin 170, and with it the disc 90, travels about $\frac{1}{2}$ the revolution, until it is again in position to be released for the next quarter hour.

The numerals 180, 181, 182 and 183 represent respectively the operating mechanisms for sounding the *f'* gong, the *f* gong, the *a* gong and the C gong. The *f'* gong 180 is connected directly to the contact 108 on arm 105 and to contact 161; the *f* gong 181 is connected to the contact arm 142 and 120; the *a* gong 182 is connected to the contact arm 143; and the C gong 183 is connected to the contact arm 144. The contacts 145, 146, 147 and 129 are connected in parallel through the contacts 161 and 162 to the *f* gong 180.

A source of power, as for example a small 24 volt transformer, has one side connected to each of the gongs, and the other side connected to ground.

Springs 190, 191 and 192 hold the arms 105, 120 and 140 against their respective cams. The disc driving mechanism is as follows: The disc 90 is connected by a coil 193 to a pinion 194, loose upon the shaft 91. This pinion is driven by a gear 195 upon the shaft 111, the ratio being one to four. This serves to drive the disc 90 around once for each quarter revolution of the cam 110, and yet to permit the disc to take its movement all at one time when the pin 170 is released by the dog 171, and substantially to rest during the remaining period. A suitable dampening device 196 is employed to control the rate of revolution of the disc when it is released by the dog.

The parts are so positioned and the points 101 to 104 and 150 are so placed upon the disc that the sequence of notes referred to heretofore will be performed as the disc rotates. For example, at a quarter after eight, that is, 8:15 o'clock, being one quarter of an hour after 8:00, the cam

110 will have rotated to bring the arm 105 into registry with the 101 row, that is, in position to engage point 101*a*. Similarly, the cam 151 will have rotated the arm 140 to bring the contact arm 143 into alignment with pin 150, and cam 123 will have brought arm 120 into alignment with the 103 row of points. Thus as the drum is released in the position shown, when the disc has rotated 45 degrees, the first point 101*a*, coming into contact with the arm 105 successively, will strike the *f'* once while the disc moves 90°. For the next 30 degrees of rotation no sound will be made, in order to leave a space between the quarter hour strike and the hour strike. Thereafter the point 150 will come in contact with the arm 143 and sound the *a*, and on 30 degrees further revolution the arm 120 will strike the point 104*a*, 104*b*, 104*c* and 104*d*, and sound the note *f* four times in succession.

When the next even hour is reached, or 9:00 o'clock, the cam 110 will have moved far enough to let the contact arm 105 fall over into the zero row, and arm 120 will have moved to the 104 row. Contact will also have been made between points 161 and 162 by arm 105. Now when the pin 170 is released by dog 171, and the disc starts to rotate, no signal will be sounded until the pin 150 comes into engagement with the head on the arm 143, thereby sounding the note *a*. At the same time, however, contact is made between the arm 143 and the arm 146, and this sounds the note *f'* simultaneously with the note *a*, because the contacts 161 and 162 are closed. On further rotation, the points 104*a*, 104*b* and 104*c* will come in contact with head 121, each of which will sound the *f* four times in succession and simultaneously make contact with the arm 129 and thereby sound the *f'*, because contacts 161 and 162 are still closed.

The actual sounding of the signal requires therefore but $\frac{1}{2}$ of the revolution, and the remaining $\frac{1}{2}$ is thus available for stopping and releasing the disc.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A signal system for a clock comprising in combination three signals of different pitch chosen to represent the letters I, V, X of the Roman system of numerals, and means adapted to be operated by the clock for sounding said signals, each hour in a sequence corresponding to the Roman numeral for that hour, including means for repeating said hour signal at the close of each fraction of an hour after the full hour, and another signal for designating the fractional hour.

2. A signal system for a clock comprising a signal for designating fractional hours and a plurality of signals of different pitch for designating different hours of the day according to a selected system, and means adapted to be operated by the clock for sounding said fractional hour signal

successively a number of times corresponding to the number of elapsed fractional hours after the full hour, and means also operated by said clock for operating said hour signal in a sequence corresponding to the hour after the fractional hour signals.

3. A signal system for a clock comprising a signal for designating fractional hours and a plurality of signals of different pitch for designating different hours of the day according to a selected system, and means adapted to be operated by the clock for sounding said fractional hour signal successively a number of times corresponding to the number of elapsed fractional hours after the full hour, and means also operated by said clock for operating said hour signal in a sequence corresponding to the hour after the fractional hour signals, and means for operating said fractional hour signal simultaneously with each stroke of the hour signal at the full hour.

4. A signal system for a clock comprising in combination a signal for designating fractional hours and a plurality of signals of different pitch for designating the hour according to a selected system, means actuated by the clock for operating the hour signals according to said selected system, at the end of each hour and fractional hour of the day, and means for operating the fractional hour signal simultaneously with the hour signal at the end of each hour, and means to operate the fractional hour system before the hour signal at each other fractional hour of the day.

5. A signal system for a clock comprising in combination three signals of different pitch selected to represent I, V, and X of the Roman system of numerals, means operated by the clock for operating said signals I, V, and X to correspond to the Roman numeral for the hour, at the end of each hour, and fractional hour of the day, a fractional hour signal, and means for operating said signal with each stroke of the hour signal on the full hour, and means to operate the fractional hour signal once for each fractional hour of elapsed time after the full hour, before the actuation of the hour signal at each other fractional hour of the day.

6. A signal system for a clock comprising in combination a plurality of signals of different pitch, a drum having pins thereon, means for driving said drum through a predetermined angle at the end of each fractional hour of the day, means actuated by said pins for operating certain of said signals in selected sequence to represent the hour at the end of each fractional hour of the day, and a second means actuated by the pins for operating another of said signals at the end of each fractional hour a number of times corresponding to the number of fractional hours after the last full hour, and means for releasing said drum for movement and for driving said drum at the close of each fractional hour.

7. A signal system for a clock comprising a plurality of signals of different pitch, a drum having pins therein, means for driving said drum through a fixed angle at the end of each hour, means actuated by said pins during movement of the drum for operating the said signals in a predetermined sequence to indicate the hour.

8. A signal system for a clock comprising three signals of different pitch chosen to represent the letters I, V, and X of the Roman system of numerals, a drum having pins therein, means for driving said drum through a predetermined angle at the end of each hour, a means actuated

by said pins during movement of the drum, for operating said signals in a sequence corresponding to the Roman system of numerals to represent the hour.

9. A signal system for a clock comprising a drum, three signals of different pitch representing the letters I, V, and X of the Roman system of numerals and a fourth signal of markedly different pitch for indicating the fractional hours, a drum having pins thereon, means for driving said drum through a predetermined angle at the close of each fractional hour, means actuated by said pins during movement of said drum for sounding said signals I, V, and X, at the close of each fractional hour in a sequence corresponding to the Roman numerals designation of the hour, and means operated by said pins for operating said fractional hour signal simultaneously with each stroke of the signal at the full hour, and for operating it after each fractional hour once for each elapsed fractional hour after the full hour, before sounding the hour signal.

10. A signal system for a clock comprising a plurality of signals, a drum having pins thereon arranged in sets, each set constructed to operate one signal, and the pins of the different sets being constructed and arranged to operate the signals in a predetermined sequence, a movement of the drum through a predetermined angle to indicate the hour of the day, and means operated by the clock mechanism for driving the drum at the close of each hour, and for limiting the movement to the angle required for sounding the signal for the hour in accordance with the selected system.

11. A signal system for a clock comprising a drum having pins thereon arranged in sets, a plurality of signals, one signal being constructed to be operated by each set, on movement of the drum through a predetermined angle, means for moving said drum at the close of each fractional hour including means to limit the drum to the predetermined angle required to indicate the hour and fractional hour in accordance with the preselected system, and means for releasing said drum and for moving same through a fixed angle of revolution at the close of each fractional hour.

12. A signal system for a clock comprising a fractional hour signal and a plurality of signals for indicating the hour by a sequence of notes of different pitch in accordance with the selected system, a drum having a plurality of pins thereon, a signal actuating device for registry with said pins to actuate the fractional hour signal including means to vary the number of pins with which said signal actuating mechanism engages in accordance with the fractional hours, the second signal actuating device position to engage said pins subsequent to the engagement of said pins by said first signal actuating device, said second signal actuating device being constructed and arranged to actuate said hour signals in accordance with the preselected system to indicate the hour, and means for releasing said drum and for moving same through a fixed angle of revolution at the close of each fractional hour.

13. A signal actuating mechanism comprising a disc, means for rotating said disc through a fixed angle at the close of each fractional hour, a plurality of pins arranged in concentric paths upon said disc, the pins in said concentric paths being differently arranged, a pair of signal operating mechanisms, each of which is arranged

to engage the pins of any of said concentric paths, means operated by the clock mechanism to move said signal actuating devices from one path to another at different hours and fractional hours of the day to vary the number of signal actuations in accordance with the hours of the day, a plurality of signals, one of which is actuated by one of said signal actuating devices for indicating

the fractional hours of the day and one of which is actuated by the other of said signal actuating devices to indicate the hour of the day, and means for actuating other signals in coordination with said hour indicating devices for indicating the hour in accordance with the selected system.

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