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[56]

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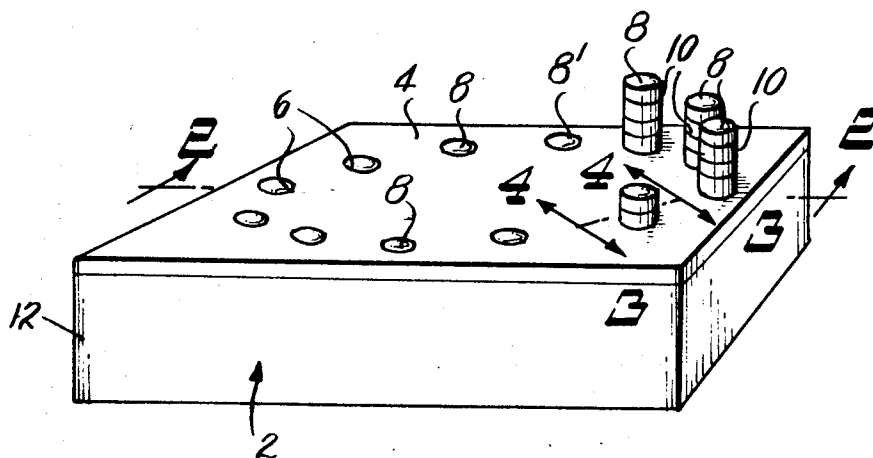
[54] **PEG CLOCK**
13 Claims, 10 Drawing Figs.

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58/127

[51] Int. Cl. G04b 45/00

[50] Field of Search 58/1, 2,
127, 23, 153

ABSTRACT: A hollow wood block houses a clock motor which drives a drum cam one turn in 12 hours. The drum cam sequentially lifts the pegs of a circular array of 12 pegs, representing the hours of the day, to project them upwardly from the upper surface of the block, each peg rising for 1 hour and being held in its upper position. When all 12 pegs have been lifted they are all dropped back into the block and the cycle is repeated.



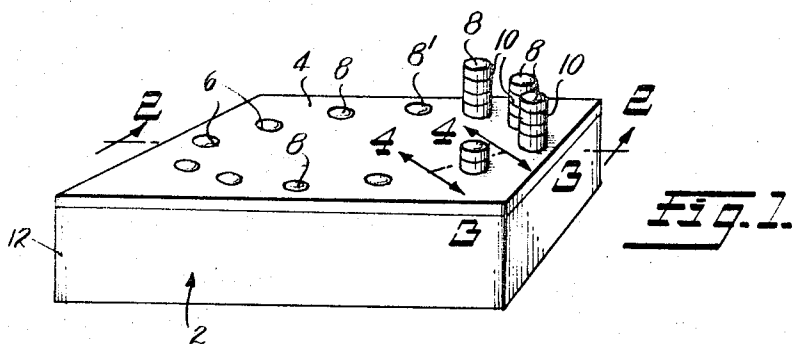
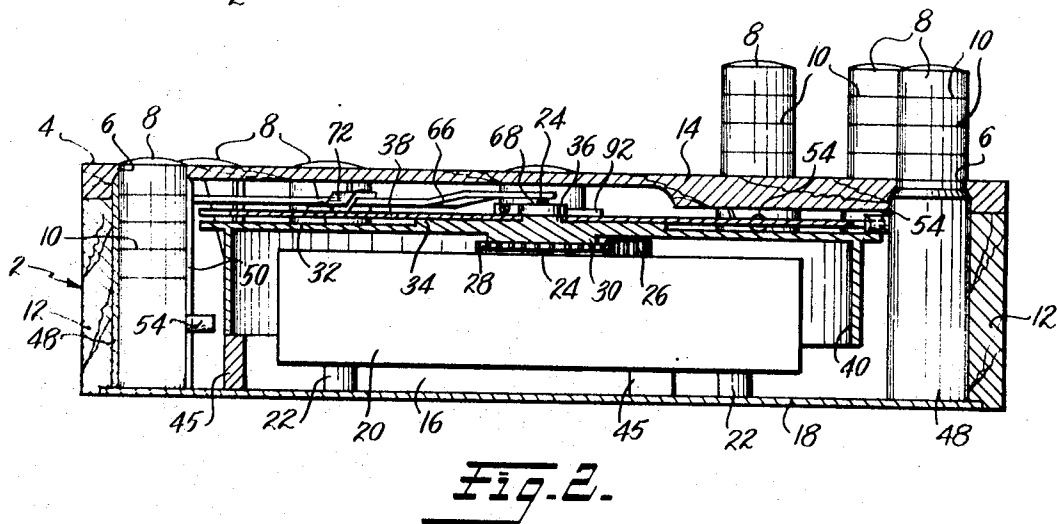
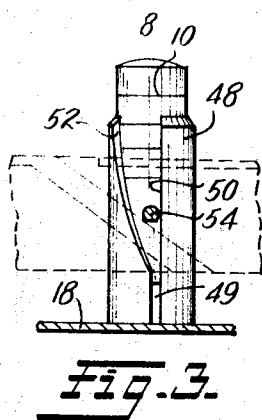
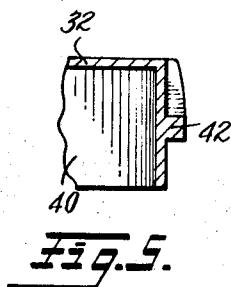
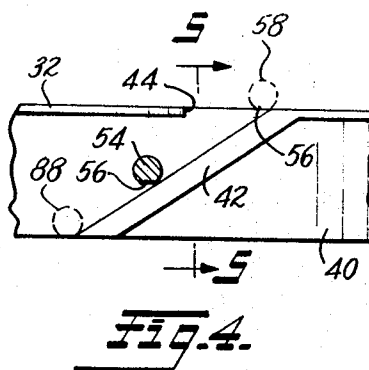
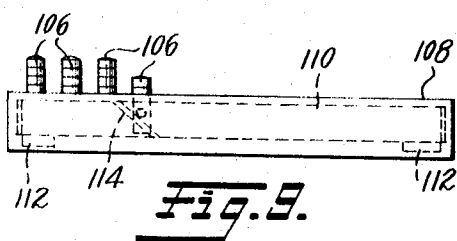


Fig. 8.

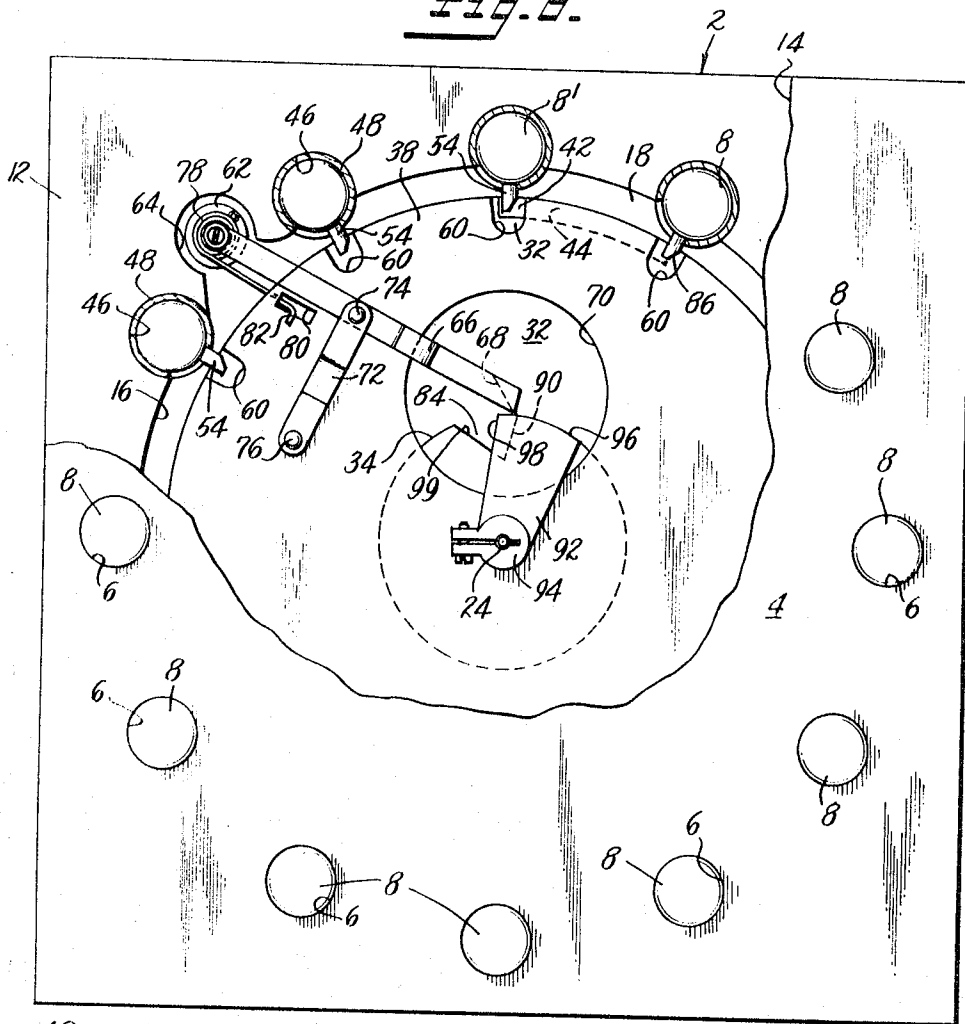
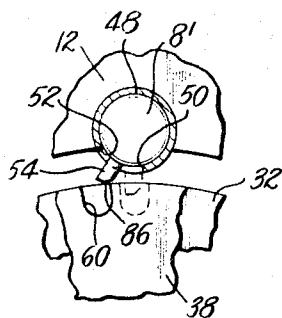


Fig. 7.

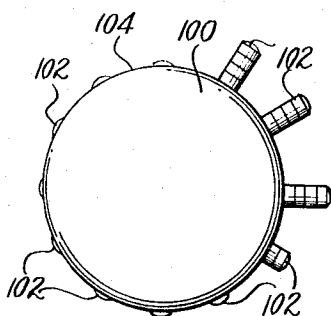


Fig. 9.

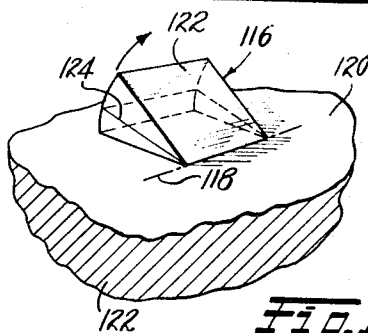


Fig. 10.

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PEG CLOCK

BACKGROUND OF THE INVENTION

This invention relates to time-controlled indicators and particularly clocks for indicating the time of day.

Clocks heretofore have been of two general types, those employing at least two movable hands or pointers cooperating with fixed numerals or equivalent indicia and those in which a numerical display is periodically changed to indicate the time of day, commonly referred to as digital clocks. Such clocks require the recognition of numerical or equivalent symbols and usually require that the user be positioned directly in front thereof to be able to read the time correctly.

SUMMARY OF THE INVENTION

The present invention comprises a clock device for indicating the time by only a visible change in external volume, the extent of which can be observed and quite accurately read from a multitude of different and opposed directions.

In the preferred embodiments the change in volume is produced by projecting one or more pegs or the like outwardly from a reference surface of a base body. The pegs are sequentially moved by a suitable clock motor at a uniform rate so that the extent of projection indicates a corresponding fraction of the time required for full projection of each and the number of pegs fully extended indicates the hour of the day.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a preferred embodiment;
FIG. 2 is an enlarged vertical sectional view taken on the line 2-2 of FIG. 1;

FIG. 3 is an enlarged fragmentary sectional view taken on the line 3-3 of FIG. 1;

FIG. 4 is an enlarged fragmentary sectional view taken on the line 4-4 of FIG. 1, in the same plane as FIG. 3 but looking in the opposite direction;

FIG. 5 is a fragmentary sectional view taken on the line 5-5 of FIG. 4;

FIG. 6 is a plan view of the clock of FIG. 1 on an enlarged scale and with a portion of the cover broken away and certain parts shown in section;

FIG. 7 is a view similar to a portion of FIG. 6 but showing certain parts in different positions; and

FIGS. 8, 9 and 10 are schematic illustrations of modified forms of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a clock embodying the present invention as it appears externally and comprises essentially a block 2, preferably of wood, although it may be made of any suitable material. The block or body 2 is hollow, as will be described, and its upper surface 4 is provided with a circular array of 12 openings 6 in which pegs 8 are vertically slidable from a lower position wherein the upper ends of the pegs are flush with the surface 4 to upper positions wherein the pegs project upwardly from that surface. A mechanism to be described sequentially lifts the pegs 8 from their lower position to their upwardly projected position, taking 1 hour to raise each peg. The positions of the pegs are indicative of the hours of the day. For example, the peg 8' is at the normal 12:00 o'clock position and the other pegs are indicative of the hours of the day as though they were conventional numerals. As shown in FIG. 1, the 1:00, 2:00 and 3:00 o'clock pegs have been lifted to their full extent indicating that the time is after 3:00 o'clock. The peg in the 4:00 o'clock position has been lifted only part way, the extent of its projection being indicative of the fraction of the hour between 3:00 and 4:00 o'clock. Preferably, each peg is provided with suitable indicia, such as the circular rings or grooves 10, cooperable with the surface 4 at the periphery of the opening 6. As shown, each peg is provided with four such rings, each representing 15 minutes of the hour. Thus, as

shown in FIG. 1, the indicated time is approximately 3:30. As stated, the pegs are sequentially raised at a uniform rate and when the peg 8' in the 12 o'clock position (which is preferably the last one lifted) reaches its full height, a mechanism to be described operates to cause all 12 pegs to drop back into the body 2 and the cycle is repeated.

It is to be noted that this embodiment of the invention is intended to be placed on a horizontal surface, such as a desk or table, and the time indicated thereby can be observed and determined from any position around the clock, from any side of the table or desk. Thus, it is not necessary to position one's self directly in front of the clock to read the time. Since the indicia rings 10 extend completely around each peg, they can be read from any direction.

Referring now to FIGS. 2 to 5, the body or block 2 is shown as comprising a lower block portion 12 and an upper or covering plate 14 suitably secured to the block 12, after assembly of the mechanism. The block 12 is provided with a large central opening defining a chamber 16 closed by a bottom plate 18 on which a clock motor 20 is mounted, as by suitable spacers 22. The clock motor 20 may be either a spring motor or a conventional electric clock motor and is provided with an output shaft 24, which rotates at the rate of 1 revolution per hour. Such shafts conventionally drive the minute hand of a clock. Also driven by the motor 20 is a pinion 26 engageable with and driving a gear 28 journaled freely on the shaft 24. The gear ratios are such that the gear 28 makes one complete revolution in 12 hours and is customarily employed to drive the hour hand of a conventional clock. It is contemplated that the motor 20 be provided with a conventional manually operable means (not shown) to enable the clock to be set to the correct time. The gear 28 is secured to the lower hub portion 30 of a cam disc 32 extending outwardly over the clock motor 20. Fixed to the disc 32 is a cam 34, to be described in greater detail later, and an upper hub 36 on which a reset disc 38 is journaled.

Adjacent its outer periphery the disc 32 is provided with a depending cylindrical skirt or flange 40 spaced inwardly from the outer periphery of the disc 32. On the outer cylindrical surface of the skirt 40 there is fixed a helical cam 42 (see FIGS. 4 and 5) extending angularly through 30° or one-twelfth of the circumference of the skirt 40. As shown in FIG. 4, the helical cam extends from the lower edge of the skirt 40 and its upper surface provides a cam surface extending through a notch 44 provided in the outer peripheral portion of the disc 32. The upper end of the cam surface terminates at the upper surface of the disc 32. Spaced bronze or other antifriction blocks 45 (preferably 3) are mounted on plate 18 and support the cam means 32, 34, 40, 42 for rotation without tilting about the axis of shaft 24. Obviously, rollers could be substituted for the blocks 45.

Referring now also to FIG. 6, the chamber 16 in the block 12 is of generally circular configuration as shown and larger than but concentric to the cam disc 32. A circular array of 12 cylindrical openings 46 are formed in the block 12, each of the openings 46 extending into the circular chamber 16. In each opening 46 is positioned a guide tube 48 for guiding the pegs 8 for vertical sliding movement. FIGS. 2 and 3 more clearly illustrate the guide tubes 48 and FIG. 3 shows each guide tube provided with a vertical split 49 on its radially inner side defining a vertical guide surface 50 and an angular cam surface portion 52 tapering downwardly from the upper periphery. The guide tubes 48 are fixedly secured in the block 12 by any suitable adhesive or the like and each extends above block portion 12 into a counterbore in cover 14, concentric with the associated opening 6. This assures proper alignment of the tubes 48 with the openings 6.

Each of the pegs 8 is provided, between its ends, with an inwardly extending pin 54, extending inwardly through the slot defined by the edges 50 and 52, with their inner ends closely adjacent but slightly spaced from the outer surface of the skirt 40, and extending into the path of movement of the upper cam surface of helical cam 42. The angular extent of the helical

cam 42 is exactly equal to the angular spacing between the pins 54, as seen in FIG. 6. It will thus be apparent that as the disc 32 and cam 42 rotate (clockwise as seen in FIG. 6), the cam will sequentially engage the pins 54 and cause the respective peg 8 to slide upwardly, with pin 54 sliding along edge 50, to project the pegs successively vertically upwardly to their upper positions. When each pin 54 reaches the top of the cam surface of cam 42, it is then at the level of the upper surface of disc 32 and continued rotation of that disc causes the outwardly projecting edge of the disc to remain in supporting relation to the lifted pins 54 and hold the raised pegs 8 in their uppermost positions, as seen in FIG. 2.

Referring to FIG. 4, each of the pins 54 is provided with a flat lower surface 56 so formed that the cam 42 is tangent to the cylindrical surface of the pin 54 at one edge of the flat bottom surface 56. Since the cam 42 is of uniform slope and rotates at a uniform speed, the rates at which the pegs 8 are lifted is also uniform and remains so until a pin 54 reaches the upper position shown by dotted line at 58 in FIG. 4. When the pin 54 reaches that upper position its lower surface 56 is coplanar with the upper surface of the disc 32 and no further rising takes place as the disc continues to rotate. Thus, each peg is lifted at an exactly uniform rate throughout its entire range of movement.

When the helical cam 42 lifts a pin 54 to its upper position, that pin moves upwardly into a corresponding notch 60 in the periphery of the reset disc 38 previously referred to. The disc 38, while journaled on the hub 36, is held stationary and does not rotate with the disc 32. Thus, all of the notches 60 are in position to receive the pins 54 as they rise and to thus confine the pins on the disc 32. With the parts in the position shown in FIG. 6, the cam 42 has lifted the 12:00 o'clock peg 8' almost to its upper position and at this time all the other pegs 8 have been lifted and the time indicated is nearly 12:00 o'clock. All of the other pins 54 are slidably resting on the upper surface of the outer edge of disc 32 within their corresponding notches 60 of reset disc 38.

A post 62 is fixed to the baseplate 18 and extends upwardly through an opening 64 in block 12. A reset control lever 66 is freely pivoted to the upper end of the post 62 and extends inwardly over the reset disc 38. The inner end of the reset control lever 66 is provided with a downwardly extending cam follower 68 which extends downwardly through an opening 70 in the stationary disc 38 to a position adjacent the upper surface of disc 32. A link 72 is pivotally connected at 74 to the lever 66 and at 76 to the disc 38. A torsion spring 78 is anchored at one end to the post 62 and its other end extends between the discs 32 and 38, then upwardly through an opening 80 in disc 38, with a hook 82 on its inner end engaging an edge of the opening 80. Thus, the spring 78 applies a constant bias or torque to the reset disc 38, tending to rotate that disc in a counterclockwise direction, as seen in FIG. 6. However, due to the presence of link 72, the spring 78 can rotate disc 38 counterclockwise only until the cam follower 68 on lever 66 engages the periphery of the cam 34 fixed to disc 32. As shown, the outer periphery of the cam 34 is circular throughout substantially its entire periphery but is provided with a notch 84. When the follower 68 engages the circular periphery of cam 34, the disc 38 is held in the stationary position shown in FIG. 6 wherein each of its notches 60 embraces a corresponding pin 54 of a lifted peg 8. The cam notch 84 is so positioned that the follower 68 on lever 66 would drop into that notch when the 12:00 o'clock pin 8' reaches its upper position. This would permit the lever 66 to swing clockwise and thus release the disc 38 to the spring 78 so that the disc is rotated counterclockwise until the follower 68 engages the bottom of the notch 84. FIG. 7 illustrates what happens when this occurs. Just prior to 12:00 o'clock, the pins 54 and notches 60 are in the dotted line positions shown in FIG. 7 but when the cam follower on lever 66 drops into notch 84, the disc 38 is caused to rotate slightly counterclockwise to the full line positions shown in FIG. 7. In rotating counterclockwise, the trailing edge of each notch 60 engages its corresponding

pin 54 and slides the same rearwardly along the upper surfaces of disc 32 until the corresponding peg 8 has rotated sufficiently to permit the pins 54 to drop off the peripheral edge of the disc 32. Preferably, each pin 54 is bevelled somewhat at its inner end, as shown at 86, to limit the extent of rotation necessary to impart to the pegs 8 to drop the pins 54 off the disc 32. It is to be noted that the described rotation of the pegs 8 is permitted by the large space between the edges 50 and 52 (FIG. 3). The pegs 8 are freely slidable in their guide tubes 48 so that when pins 54 drop off disc 32, the entire peg drops downwardly and its pin 54 engages cam surface 52 to rotate each peg 8 back to its normal position wherein its pin 54 again engages vertical guide surface 50 of its guide tube.

When the pegs are dropped, as described, their lower ends engage and rest on bottom plate 18 to position their pins 54 at the proper elevation for the next cycle. Thus, when all 12 pegs are dropped (at 12:00 o'clock) as described, the peg in the 1:00 o'clock position has its pin 54 just in engagement with the lower end of the helical cam 42 as shown by dotted line 88 in FIG. 4 and since the disc 32 is rotating at a uniform but slow rate a new 12 hour cycle commences immediately.

Again referring to FIG. 6, the drop-off edge 90 of cam notch 84 would have to be very accurately positioned for the pegs to drop at exactly 12:00 o'clock and after continued use wear on the follower 68 and the upper terminus of edge 90 would introduce errors. In addition, it would be difficult to initially position the edge 90 in exactly the right position of disc 32. To overcome these difficulties a further cam member 92 is provided. The cam member 92 has a split hub 94 by which it can be adjustably oriented on the minute hand shaft 24 previously described. This hub, being larger than hub portion 36 of disc 32, also serves to hold disc 38 on the hub 36. The cam 92 is provided with an outer cam surface 96 substantially coincident with the outer circular periphery of the cam 34, although preferably of slightly less radius. The edge 90 of cam notch 84 is positioned slightly in advance of the 12:00 o'clock position so that the follower 68 would normally drop into the notch 84 a minute or two before 12:00 o'clock. However, the cam 92 can be accurately adjusted on shaft 24 so that the follower 68 drops on its periphery 96 and will not drop off the trailing edge 98 until the parts have exactly reached the 12:00 o'clock position. As is evident, this cam 92 can be very accurately and easily adjusted for this purpose. As cam 34 then continues to rotate with disc 32, the trailing edge 99 of notch 84 cams follower 68 and lever 66 outwardly and link 72 causes disc 38 to rotate clockwise back to the position of FIG. 6. The angular extent of notch 84 is such that disc 38 reaches the FIG. 6 position in time for the pin 54 of the 1:00 o'clock peg to enter its notch 60.

While the description thus far relates to a specific form of the invention, it is obvious that other embodiments and configurations may be employed. For example, FIG. 8 illustrates a modification wherein the body of the clock would be a circular block 100 adapted to be hung on a wall or otherwise placed in a vertical position. The hour-indicating pegs 102 would be mounted to be projected radially outwardly from the peripheral surface 104 of the body 100. Clearly, mechanism comparable to that already described could be readily adapted by those skilled in the art to effect operation of this modification. It is, however, necessary that biasing means be provided to return the pegs to their inner position at 12:00 o'clock since they cannot be returned by gravity, particularly those extending from the lower half of the body 100.

FIG. 9 illustrates a further embodiment. While FIGS. 1 and 8 suggest a circular array of time-indicating pegs, FIG. 9 illustrates an embodiment wherein the indicating pegs 106 are arranged in a rectilinear array in an elongated body 108. It is contemplated that this modification be actuated by an endless belt or band 110 passing over end rollers or drums 112. The band 110 would be provided with a pair of diametrically opposed flexible cams 114. When one of the cams 114 lifts the final or 12:00 o'clock peg to its upper position, the other cam is positioned to immediately start lifting the 1:00 o'clock peg,

at the other end of the array. Means corresponding to the notched disc 38 would comprise a linearly slidable notched bar (not shown).

In all of the embodiments described to here, the time-indicating elements comprise slidable pegs. However, the principles of the invention are not limited thereto and FIG. 10 illustrates a further embodiment. In this form of the invention time-indicating elements 116 are in the form of segments of cylinders or the like, each mounted for rotation about an axis 118 lying substantially in an outer surface 120 of a suitable body or block 122. Each of the bodies 116 would have a lower position wherein a flat surface 122 thereof would be flush with the surface 120 and upper positions wherein that surface 122 is rotated, as illustrated to any desired extent in the time period to be indicated thereby. Suitable fractional indicia 124 may also be provided to cooperate with the surface 120.

While a limited number of specific embodiments of the invention have been described, it is to be understood that they are merely illustrative and not limiting.

We claim:

1. A time indicator comprising:
a body having relatively movable exterior portions;
drive means for relatively moving said portions to increase the external volume of said body at a uniform rate whereby said external volume is proportional to time; and cooperating indicia on said portions to indicate said time.
2. A time indicator comprising:
a body having an outer surface;
an array of a plurality of indicator members carried by said body, each being movable thereon from a first position wherein an outer face portion thereof is generally flush with said outer surface to a second position wherein said member extends outwardly from said outer surface; and drive means in said body for sequentially moving said members of said array from said first position to said second position in predetermined periods of time and at such a rate that intermediate positions of said members are indicative of corresponding fractions of said predetermined periods of time.
3. A time indicator as defined in claim 2 wherein said drive means includes: means for holding each member in its second position while subsequent members of said array are being moved to their second positions and means for substantially simultaneously causing all said members to return to their first positions when the last member of said array reaches its second position.
4. A time indicator as defined in claim 2 wherein said drive means moves said members from their first to their second positions in equal periods of time and at a uniform rate.
5. A time indicator as defined in claim 4 wherein said outer surface is an upper surface of said body, said members being

movable generally vertically to their second positions whereby they may be returned by gravity to their first positions.

6. A time indicator as defined in claim 4 wherein said outer surface extends peripherally around said body, said members being movable generally radially of said body from said surface.

7. A time indicator as defined in claim 4 wherein said members are arranged in a generally rectilinear array along said outer surface.

8. A clock comprising:

a body having an outer surface;

a generally circular array of openings through said surface;

a plurality of pegs in said body, each having a first position

with an end in one of said openings and with its outer end

face substantially flush with said outer surface, each peg

being movable outwardly of said body through its corresponding opening to a second position;

drive means in said body for sequentially moving the pegs of

said array outwardly through their respective openings to

their second positions at the same uniform rate and in

equal periods of time; and

spaced indicia on each of said pegs, cooperable with said

body for indicating portions of said periods of time.

9. A clock as defined in claim 8 wherein there are 12

equally spaced openings and pegs in said array, said drive

means being arranged to move each of said pegs outwardly

from their first to their second positions in equal periods of

time of one hour each.

10. A clock as defined in claim 9 including means for hold-

ing the first and each subsequent peg in its second position

while subsequent pegs of said array are being moved out-

wardly, and reset means for causing all said pegs to return to

their first positions when the 12 peg of said array reaches its

second position.

11. A clock as defined in claim 10 wherein each peg is provided with a cam follower; said drive means comprising a first

rotary cam means having a first cam portion sequentially engageable with said cam followers for moving said pegs out-

wardly and a second noncamming portion for holding said

cam followers and their pegs in their outer positions, said reset

means comprising means for disengaging said cam followers

from said noncamming portion.

12. A clock as defined in claim 11 including a third cam

portion on said first cam means for controlling said reset

means.

13. A clock as defined in claim 12 wherein said first cam

means rotates at the rate of one revolution in 12 hours, a

second cam means rotatable at the rate of one revolution in 1

hour and having a fourth cam portion thereon, said reset

means having a control element engageable with both said

third and fourth cam portions.

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