United States Patent

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[33] **Germany**
[31] **68 07 494**

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[54] **CLOCKWORK MECHANISM, ESPECIALLY ALARM CLOCK MECHANISM**
6 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **58/22.5,** 16/121, 85/8.3, 58/85.5
[51] **Int. Cl.** **G04b 27/00**
[50] **Field of Search** 58/7, 16, 19, 53, 85.5, 22.5; 16/118, 121; 85/5, 8.1, 8.3

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ABSTRACT: A clockwork mechanism is provided having an axially shiftable and rotatable adjustment shaft. The shaft is provided at one end with two resilient axially extending projections which have wedge-shaped elements formed on the terminal ends thereof. A knob is provided and is formed with an axial bore having an internal shoulder disposed therein. When the shaft is inserted within the axial bore of the knob, the projections are wedged together until the wedge-shaped elements expand and engage within the wider portion of the bore defined by the internal shoulder thereof. To release the knob from the shaft, a pincer tool is inserted into the bore and the ends of the projections are forced together to disengage them from the internal shoulder. The other axial end of the shaft may be formed with an axial bore which slides and rotatingly about a pivot pin extending normally from a baseplate of the mechanism.

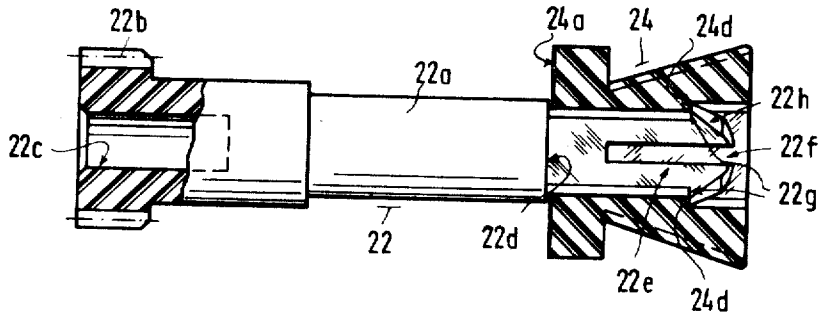


Fig.1

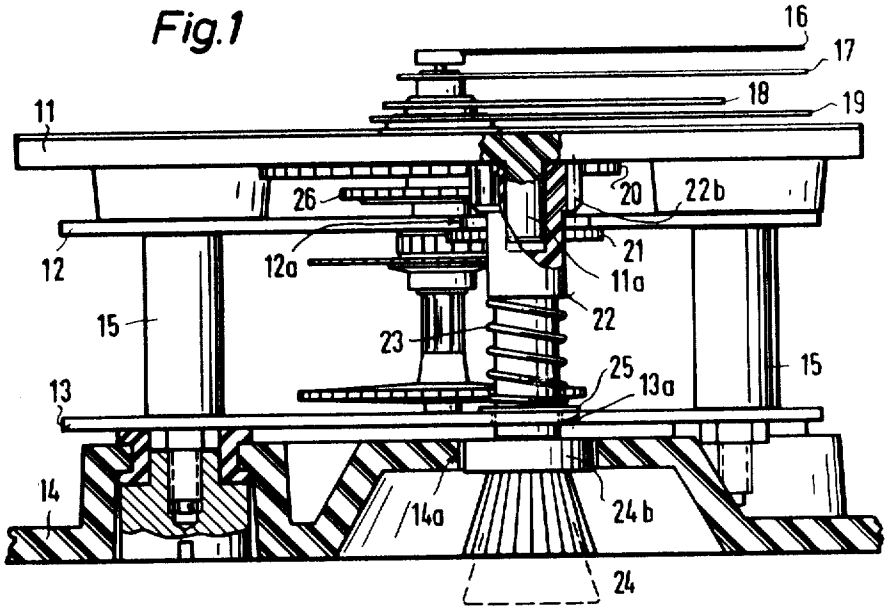
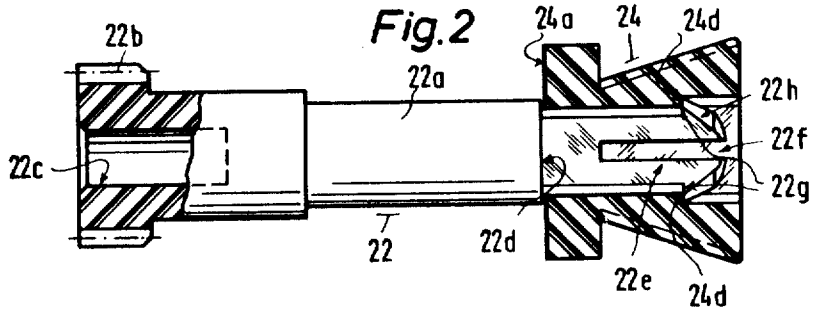


Fig.2



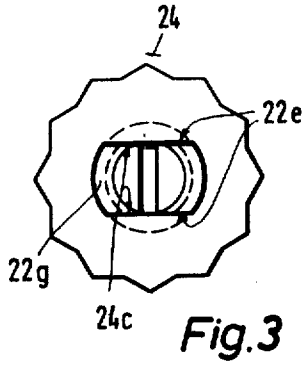
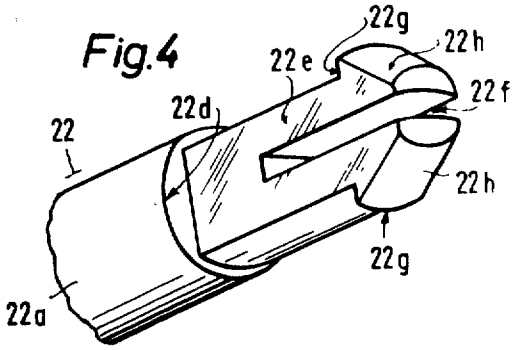


Fig.3

Fig.4



INVENTOR.

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CLOCKWORK MECHANISM, ESPECIALLY ALARM CLOCK MECHANISM

BACKGROUND OF THE INVENTION

The invention relates to clockwork mechanisms, especially alarm clock mechanisms and it concerns a mechanism of that known design whose hands can be adjusted by means of at least one adjusting shaft, onto which an adjusting knob with releasable coupling has been placed. It is the purpose of the invention to improve the coupling for the adjusting knob, but furthermore also to improve the mounting and development of the adjusting shaft itself. Customarily, the adjusting knob is screwed onto the adjusting shaft for the purpose of its coupling with it, and this results in the disadvantage that the coupling is effective only in one rotational direction, while the danger exists that the adjusting knob will disengage from the adjusting shaft. Another type of attachment in which a square end is squeezed onto the adjusting shaft and the adjusting knob is provided with a slit plug socket, has the disadvantage that the adjusting knob must be pressed uninterruptedly onto the square end so that it will not disengage itself unintentionally. However, this type of attachment is insufficient especially whenever, as for example in the case of travel alarm clocks, the adjusting shaft for the hands carries out a double function, namely whenever it is coupled in one position, for example, with the adjusting edge of the alarm clock, and in another position achieved through its axial shifting is coupled with the change gear of the drive for the hands. In that case there exists the danger especially that upon repeated operation of the adjusting shaft the adjusting knob will get lost.

SUMMARY AND OBJECTS OF THE INVENTION

The invention eliminates these and other disadvantages of the hitherto customary adjusting shafts through the fact that, at the end of the coupling of the adjusting shaft and the adjusting knob having an axial passage, radially engaging expanding means, accessible at the rear opening of the passage of the adjusting knob, have been provided besides paraxial border surfaces engaging in a positively locking manner, as well as a shelf on the shaft constituting an inner support for the adjusting knob. As a result of that the adjusting knob has been coupled with the adjusting shaft for the transmission of revolving and thrusting forces in a manner that it cannot get lost. Since the expanding means are accessible at the rear opening of the adjusting knob, they can be put into their nonexpanding position by means of a suitable tool, so that the adjusting knob can be pulled off the shaft. In a further development of the invention for the purposes of an alarm clock, whose adjusting shaft is shifted axially by means of the adjusting knob for the purpose of an adjustment of the hands indicating time or setting the alarm, said adjusting shaft at its other end besides the coupling end has a tip-stretched tooth wheel drive for the alternate engagement with the adjusting wheel for the alarm clock or the change gear for the hands and has furthermore an axial dead end bore, with which it is guided on a bearing pin which is tip-stretched on the baseplate bar, and is therefore fixed. For practical purposes, a disk-shaped collar is formed onto the adjusting knob, which together with a perforation in the rear wall of the housing corresponding to it, constitutes a seal against dust getting into the clockwork mechanism. The adjusting shaft and the adjusting knob according to the invention may be made from any desired raw material; but a design made of plastic is preferred in accordance with the invention.

DESCRIPTION OF THE DRAWING

Further characteristics and advantages of the invention will result from the subsequent description of a design given by way of example in the drawing and from the patent claims. Each time at an enlarged scale:

FIG. 1 shows the parts of the drive for the hands and the adjusting means for the hands of an alarm clock mechanism, which are essential for an understanding of the invention, together with the axially shiftable adjusting shaft in side view;

FIG. 2 shows the adjusting shaft with an adjusting button put on in a lateral sectional view, once more enlarged in comparison to FIG. 1;

FIG. 3 shows the adjusting shaft in front view of the adjusting button; and

FIG. 4 shows the coupling end of the adjusting shaft in a perspective presentation.

DETAILED DESCRIPTION

The clockwork mechanism illustrated (partially) in FIG 1 of the drawing consists of the baseplate **11**, the intermediate plates **12** and **13** and the rear wall **14** of the housing. Support pillars **15** hold the above-mentioned parts together. Between the plates **12** and **13** and partially **12** and **11**, the driving mechanism for the second hand **16**, the minute hand **17**, the hour hand **18** and the alarm hand **19** are mounted. **20** is the adjusting wheel for the alarm, **21** the change wheel of the driving system for the hands indicating time. The adjusting shaft **22** has a shaft element **22*a*** with which it is mounted axially shiftably in the plate **13**. The gear drive **22*b*** has been formed onto the front end of the adjusting shaft **22** facing the hands **16** to **19**. It is intended to be in engagement with the alarm-adjusting wheel **20** in the forward position of the adjusting shaft (FIG. 1), in retracted position on the other hand to be in engagement with the change wheel **21** of the drive for the hands indicating time. A pressure spring **23** built in with pretension holds the adjusting shaft in its front position. A perforation **12*a*** has been provided in the plate **12**, which allows the gear drive **22*b*** to pass through in the case of an axial shifting of the adjusting shaft **22**. For mounting the front end of the adjusting shaft **22**, a pivot journal **11*a*** has been formed to the inside of the baseplate **11**, said pivot engaging with a dead end bore **22*c*** in the front side of the adjusting shaft **22**.

The coupling end of the adjusting shaft **22** is somewhat recessed so that a support surface **22*d*** will develop, on which the adjusting knob **24** is seated with the front surface **24*a*** of the collar **24*b*** for sealing against dust. Laterally to the coupling end of the adjusting shaft **22**, a pair of paraxial edge surfaces **22*e*** have been formed. The knob **24** has an axial passage equipped with counter surfaces **24*c*** which fit in a positively locking manner. The coupling end of the adjusting shaft **22** has furthermore been slit at **22*f*** and has been provided with expanding hooks **22*g*** pointing radially outwardly, which engage positively locking in the coupling position via supporting surfaces **24*d***, which are formed by an enlargement of the axial passage of the knob. Through the expansion means, the adjusting knob **24** is coupled in a positively locking manner with the adjusting shaft **22** for the transmission of axial forces. In order to be able to pull the knob **24** from the adjusting shaft **22**, rear seat surfaces **22*g*** have been attached to the expanding hooks **22*g***. A pair of pincers for example is applied to these, the expanding hooks are compressed resiliently and as a result the hooks **22*g*** are lifted off the supporting surfaces **24*d*** on the knob, so that the knob can be pulled off. When pushing the knob **24** onto the adjusting shaft **22**, the surfaces **22*h*** serve as sliding guide surfaces for the resilient compression of the hooks and introduction of the knob into the axial passage. The collar **24*b*** formed onto the adjusting knob **24** fits in a dustproof manner into the perforation **14*a*** in the rear wall **14** of the housing.

The assembly of the adjusting shaft **24** is accomplished as follows: While the base plate **11** is still lifted off the frame **12/13/15**, the adjusting shaft **22** with washer **25** already pushed into it and with the feeder spring **23** will be slid into the frame. Now the adjusting wheel **20** for the alarm and the hour wheel **26** are inserted. Now the baseplate **11** is put on in such a manner that its pivot journal **11*a*** reaches the front bore **22*c*** of the adjusting shaft. Then the adjusting knob **24** is pressed from the rear side of the clockwork mechanism onto the coupling end of the adjusting shaft **22**, until the expansion hooks **22*g*** reach beyond the supporting surfaces **24*d*** on the knob.

By way of summary, it will be recognized that knob surface means **24***d* may be viewed as abutment means engaged by locking means **22***g* of the shaft **22**. In addition, shaft surface means **22***e* may be viewed as first surface means disposed in complementary and usually abutting engagement with second surface means **24***c* of the knob **24**. The mutual abutting engagement which occurs between the surface means **22***e* and **24***c* in response to knob rotation serves to prevent rotation of the knob relative to the shaft in each of opposite directions of knob rotation so as to ensure unitized rotation of the knob and shaft.

What is claimed is:

1. In a clockwork mechanism having hands adjustable by a shaft assembly, said shaft assembly comprising:

a shaft;

a knob;

said knob being releasably coupled to a first portion of said shaft,

said knob being formed with an axial bore, and

said knob having abutment means extending generally transversely of said axial bore;

mutually abuttable first and second surface means carried by said shaft and said knob respectively and operable, in response to mutual abutment therebetween, to prevent rotational movement of said knob relative to said shaft in each of opposite directions of knob rotation;

said shaft being formed with radially expanding means;

said radially expanding means being provided with locking means,

said locking means being lockingly engageable with said transversely extending abutment means to prevent axial movement of said knob relative to said shaft and permit axial movement of said knob to induce axial movement of said shaft, and

said locking means being operably accessible at an outer end of said axial bore of said knob when said knob is mounted on said shaft.

2. A clockwork mechanism according to claim **1** wherein:

said first portion of said shaft is provided with a longitudinal slot to form two expandable resilient projections, which projections define said locking means;

the terminal ends of said projections are formed with radially extending portions whereby said projections are generally hooklike in configuration; and

said axial bore in said knob is formed with an internal shoulder, defining said abutment means, for lockingly retaining the radially extending portions of the terminal ends of said projections when said knob is mounted on said shaft.

3. A clockwork mechanism according to claim **2**:

wherein each said radially extending portion of each said projection is formed with a partial frustoconical surface tapered toward the terminal end of each said projection whereby

said resilient projections are forced together by a wedging action on said surfaces by the internal surface of said knob defining said axial bore as said shaft is forced into said axial bore of said knob; and

wherein a tool may be inserted within said axial bore to engage said frustoconical surfaces of said projections to force said projections together to disengage said projections from within said axial bore.

4. In a clockwork mechanism according to claim **1** wherein:

said shaft assembly is axially shiftable;

a second portion of said shaft is formed with a pinion drive portion;

said pinion drive portion being alternately engageable with an alarm-adjusting gearwheel and a time-indicating hand adjustment as said shaft is axially shifted;

said clockwork mechanism has a baseplate;

said baseplate is provided with a pivot-bearing pin extending normally therefrom; and

said second portion of said shaft is formed with an axially extending bore which is slidingly and rotatingly mounted on said pivot bearing pin.

5. A clockwork mechanism according to claim **1** wherein:

said clockwork is provided with a rear wall having an aperture for the insertion of said shaft;

said knob being formed with a collar portion which abuts the surface of said rear wall defining said aperture whereby dust is prevented from entering said clockwork mechanism through said aperture.

6. In a clockwork mechanism according to claim **5** wherein said shaft, said knob, said baseplate and said rear wall comprise a plastic material.