June 21, 1932. D. E. PETTY ET AL 1,864,213

RECORDING APPARATUS

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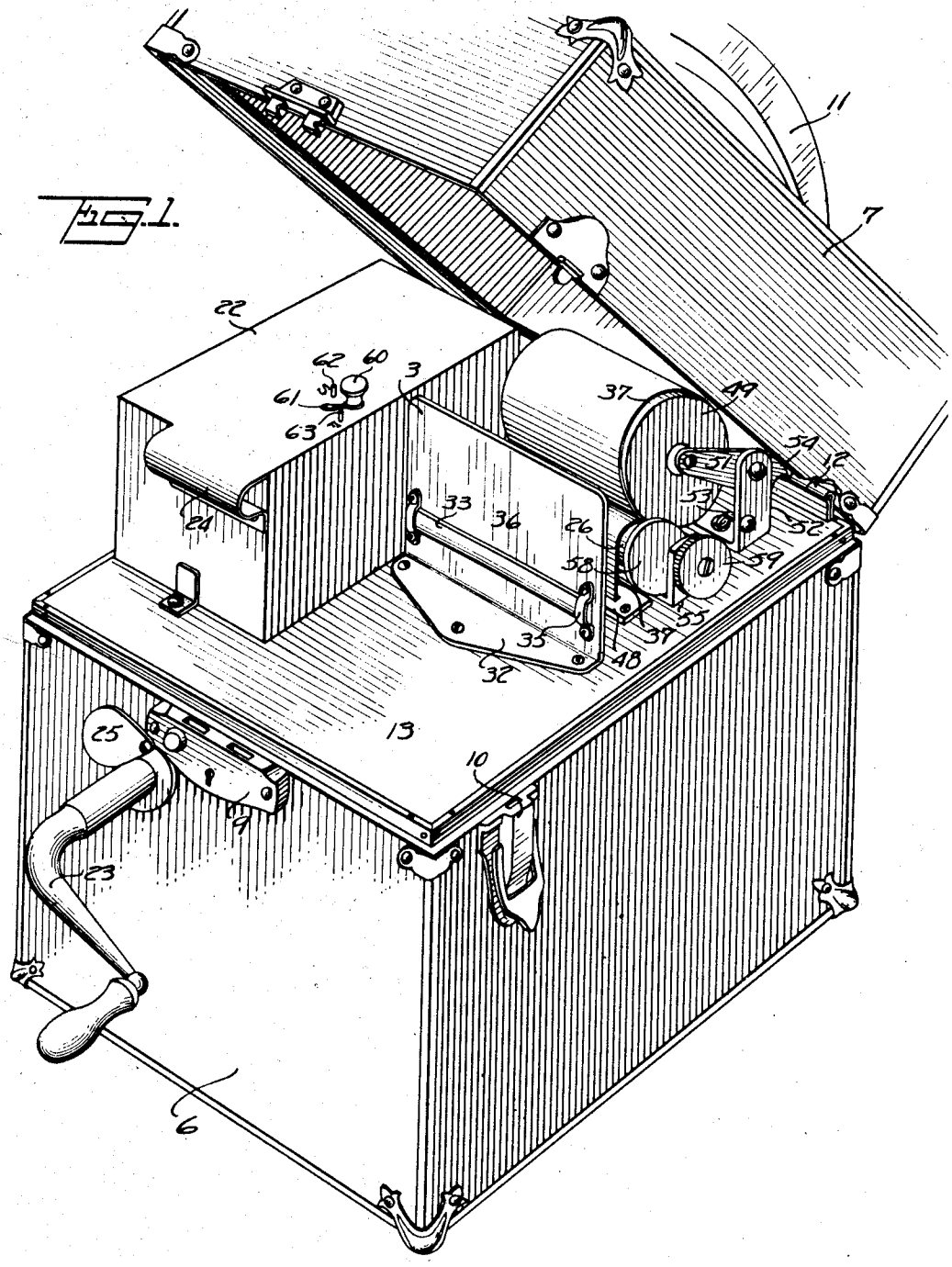


FIG. 1.

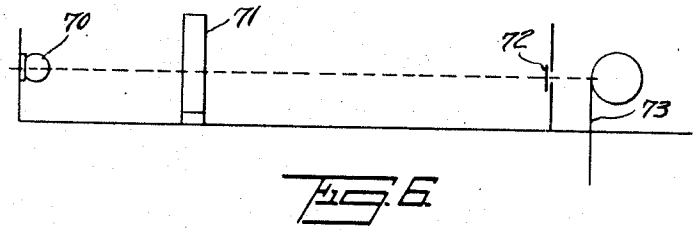


FIG. 6.

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FIG. 2.

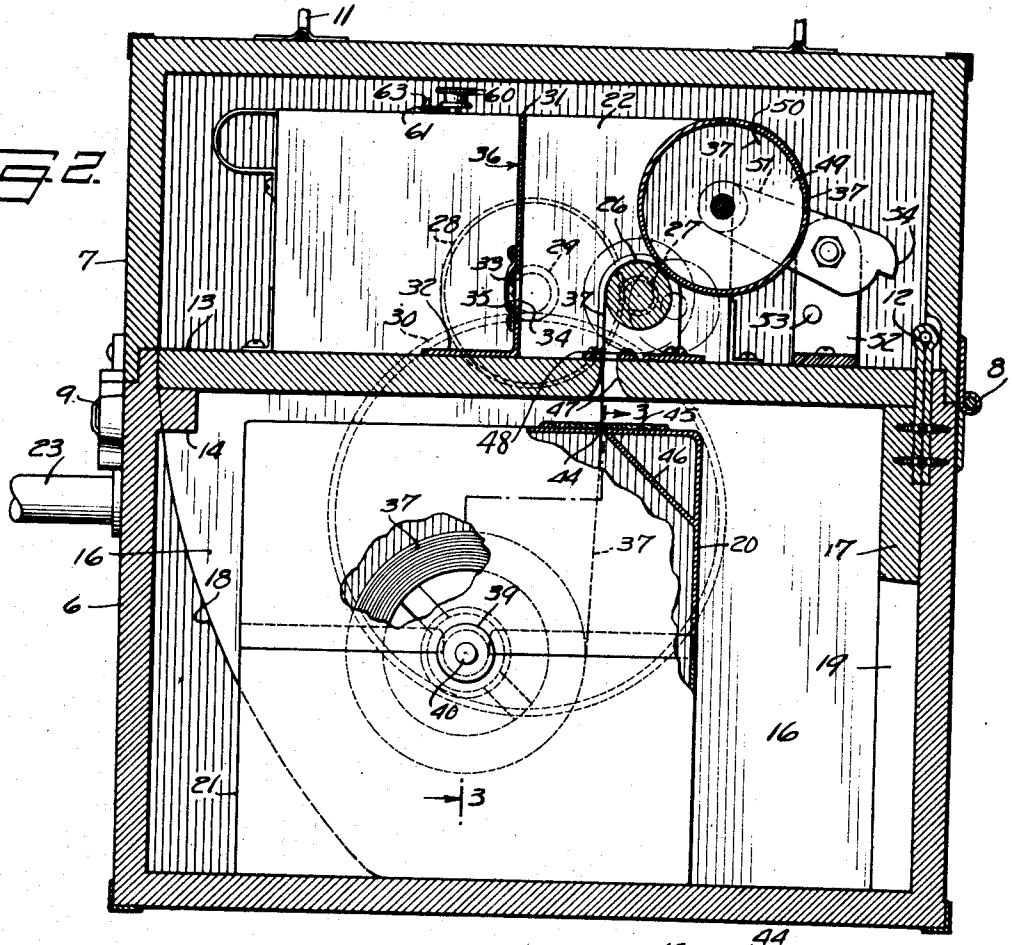


FIG. 4.

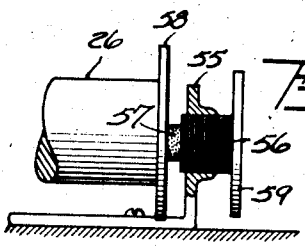


FIG. 3.

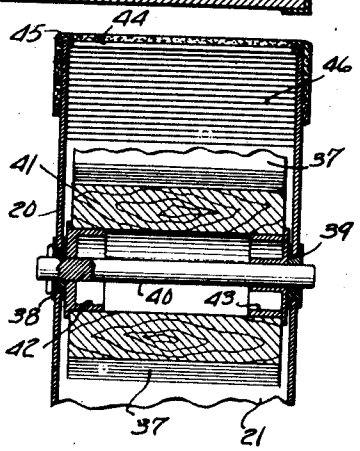
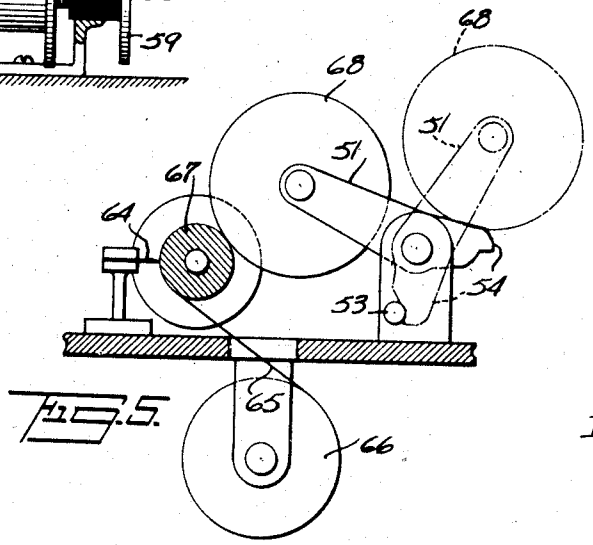


FIG. 5.



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UNITED STATES PATENT OFFICE

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RECORDING APPARATUS

Application filed March 27, 1928. Serial No. 265,010.

This invention relates to recording apparatus of the type in which vibrations or movements are recorded on a strip of paper or other material as the latter is caused to move at a known speed past a marking or recording element.

In accordance with the preferred embodiment of our invention a strip or band of light-sensitive photographic paper is exposed to a light beam or shadow which is caused to move or vibrate with the movement or vibration to be recorded.

One object of our invention is to provide improved means for the operation and accommodation of a travelling strip or band in a recording apparatus of the above type.

A further object of the invention is to provide improved means for the exclusion of light in a photographic recording apparatus of the type briefly referred to above.

A still further object of our invention is the provision of improved means for facilitating the observation of a moving light beam or shadow in a photographic recording apparatus.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings and particularly pointed out in the appended claims, it being understood that various changes in the form, and minor details may be made without departing from the spirit of the present invention, and although our invention is particularly applicable to an apparatus of the photographic recording type certain features thereof may be advantageously applied to an apparatus of the type having a recording pen or stylus of the usual well known form for tracing a record on a strip or chart of ordinary non-sensitive material.

In the drawings:—

Fig. 1 is a perspective view of the apparatus with the cover or lid partly thrown back; Fig. 2 is a cross-section of the apparatus with the cover or lid closed; Fig. 3 is a section of a portion of the band carrving chamber and of the pay-off roll mounted therein; Fig. 4 is a detail view of the stop device for the band operating means; Fig. 5 is a side view—partly in section—showing apparatus including a marking pen or stylus; and Fig. 6 is a diagrammatic view illustrating the operation of the apparatus.

Referring to Figs. 1 to 4 a portable box or case 6 has a cover or lid 7 hinged thereto at 8 and is fitted with a lock 9, retaining catches 10 and a handle 11. Mounted on hinges 12 at the rear of the box is a platform or board 13 which may rest at its front edge on a ledge 14 provided at the interior of the front of the box, the hinges 12 permitting of the board 13 being swung upwardly to give access to a compartment between this board 13 and the bottom 15 of the box. Depending from the underside of the board 13 is a partition 16 and a rear wall 17 which are normally supported upon the bottom 15 of the box so that the whole structure is rigid, and objectionable vibration is avoided. The front edge 18 of the partition 16 is cut away to clear the upper edge of the front of the box when the board 13 is swung upwardly, the ledge 14 is cut away so as to accommodate the said partition 16 and the rear wall 17 is recessed at 19 so as to avoid engagement with a casing 20, 21 (hereinafter referred to) when the board 13 is raised as above described. Secured upon the upper surface of the board 13—over an opening in said board—is a case 22 which accommodates part of a spring motor of any suitable or well known type, which is mounted upon the side face of the said portion and the winding of the said motor is effected by means of a removable crank handle 23 inserted through a hole which is provided in the front of the box and has a swivel plate 25 for the exclusion of light and dust when the handle is not in use. Extending from the front of the case 22 is a hand grip or ledge 24 to facilitate the raising of the board 13. Projecting through the side of the case 22 is a horizontal roll 26 which is driven through the medium of gear wheels 27, 28, 29, 30 of the said spring motor. A vertical partition wall 31 is mounted in front of the said roll 26 and is secured to the board 13 by means of the flange 32 at its lower edge. In the wall 31 a horizontal slot 34 is provided

and an elongated lens 33 is secured over this slot by means of the end clips or straps 35 and a beam of light or a shadow is projected through the lens by means of a galvanometer or other instrument of any suitable or well known type under the influence of the movements or vibrations to be recorded. The light beam or shadow moves horizontally across the lens in unison with the movements or vibrations to be recorded and the front face 36 of the wall 31 may be provided with a white enamel or other finish to facilitate detection and observation of the movements of the light beam or of the shadow as the case may be.

The means for the accommodation and operation of the strip or band 37 will now be described. The casing 20, 21 above referred to comprises a lower part 21 fixed to the bottom 15 of the box, and an upper removable part 20 which fits on to the upper edge of the lower part; and the adjacent edges of the upper and lower parts are formed with semi-circular recesses with edges adapted to engage annular recesses in two discs 38, 39 mounted upon a spindle 40 which extends across the casing. The disc 38 is integral with or fast to the spindle 40 and the disc 39 is removable to permit of the removal or replacement of a spool 41 carried on collars 42, 43 on the spindle 40. The spool 41 carries the supply roll of sensitive strip or band 37, and from this roll the band is led through a slot 44 in the top of the upper part 20 of the casing, a slotted felt cover 45 being provided over the slot 44, to prevent the admission of light to the casing, and a bevelled part 46 being provided at the interior of the casing to facilitate threading of a new band 37 through the slot 44. From the slot 44 the band 37 is led upwardly through a slot 47 in the board 13 and through a similar slot in a cover plate 48 and thence over the aforesaid roll 26 by means of which the band is fed at the desired speed with its sensitized surface exposed to the light passing through the lens 33 so that a line is recorded upon the strip or band with transeverse deflections corresponding to the movements or vibrations being recorded. From the roll 26 the band 37 is received by a roll 49 whose arrangement and operation constitute an important feature of the present invention. This roll 49 is hollow and has a slot 50 for the introduction of the end of the band to give the necessary attachment of the band to the roll, and two pivoted arms 51 carry the trunnions or spindle of the said roll in such manner that the roll 49 may swing towards or from the roll 26. The arms 51 are pivotally mounted on a bracket 52 on the board 13 and stop pins 53 on the side faces of the bracket are adapted to engage extensions or tail pieces 54 on the said arms 51, when the roll 49 is swung back out of operative engagement with the driving roll 26. Since the rotary motion of the roll 26 is transmitted to the band take-up roll 49 through contact of the periphery of the roll 26 with the band upon the roll 49 the angular speed of the roll 49 will be automatically varied as the band accumulates upon the latter roll and the circumferential speed of the outer convolution of the band upon the roll 49 is thus accurately timed in accordance with the peripheral speed of the driving roll 26 and effective take-up without looseness or unnecessary tension is assured at all times. The sensitive side of the band 37 faces the center of the roll 49 in the band wound thereon and the uniform tension and winding upon this roll effectively excludes all light from the band. For controlling the operation of the spring motor which feeds the band 37 a bracket 55 is mounted upon the board 13 and is screw-threaded for the reception of a screw 56 arranged eccentrically to the feed roll 26 and having a rubber or like end 57 adapted to engage the end face of a flange 58 on the roll 26, and a disc 59 on the screw 56 provides a convenient and effective means for stopping and starting the motor. It may be desirable to provide means whereby the band may be fed either at the desired uniform operating speed or at a slower speed, and whereby either of these speeds may be conveniently and quickly selected; and for this purpose we preferably provide the usual speed control or governing mechanism of the motor with an ordinary speed regulating knob 60, and provided on this knob 60 is an arm 61 adapted to engage one or other of a pair of stop pins 62, 63 whose positions are chosen to correspond to the two selective speeds for the most efficient and convenient operation of the apparatus.

The operation of the apparatus is illustrated at Fig. 6 in which 70 is a source of light; 71 is a galvanometer having one or more elements whose movements or vibrations are to be recorded; 72 is an elongated lens; and 73 is the moving band of photographic paper which is thus exposed to the light and is subsequently developed to give permanent records of the movements or vibrations over known time intervals.

In the modified apparatus shown at Fig. 5 a pen or stylus 64 is mounted and operated in any suitable manner to move laterally across a strip of paper 65 fed from a pay-off roll 66 over a driving roll 67 and on to a take-up roll 68 which latter is supported and operated in the same manner as the take-up roll 49 hereinbefore described, the inoperative position of the roll 68 being indicated in dotted lines.

Figs. 1 to 4 of the drawings and the foregoing description disclose the best mode in which we have contemplated embodying our invention as applied to a photographic apparatus, and Fig. 5 discloses the application of certain features of our invention as ap-

plied to an apparatus operating with a marking pen or stylus but it will be understood that, in the further practical application of our invention, many changes in form and construction may be made, as circumstances require or experience suggests without departing from the spirit of our invention within the scope of the appended claims.

What we claim is:—

1. In a photographic recording apparatus of the character described, operating mechanism for a travelling light-sensitive band comprising, a light-proof case for the band, a rotary band-driving member, means for leading the band to and partly around the driving member, take-up means for the band comprising a band-receiving roll, means for normally supporting the roll with the outer non-sensitive surface of the band thereon in contact with the peripheral surface of the said driving member, and means for supporting the said roll in an inoperative position out of engagement with said driving member, and means to permit the passage of the band from the said case to the driving member while excluding light.

2. In a photographic recording apparatus of the character described, operating mechanism for a light-sensitive travelling band comprising, a case for the unused band, a rotary band-driving member, means for guiding the band partly around said driving member, a motor for operating the driving member at uniform speed, a rotary band-receiving roll driven at the same peripheral speed as the said driving member, and means to permit the passage of the band from the said case to the driving member while excluding light.

3. A photographic recording apparatus of the character described comprising a closed case, a rotary member for driving a band of photographic paper, a rotary member receiving the exposed photographic paper with the sensitive side inwards and driven at progressively decreasing speed as the band accumulates thereon, and means to permit the passage of the band continuously from said closed case to the said driving member while excluding light from the case.

4. A photographic recording apparatus of the character described comprising a rotary member for driving a band of photographic paper, means for guiding the paper partly around said driving member, a motor for driving the said member at a constant predetermined speed, a rotary take-up member for the exposed band, and a case enclosing the unexposed band, said case being slotted to permit the passage of the band to the said rotary driving member while excluding light from the case.

5. In a photographic recording apparatus of the character described rotary means for driving the band of photographic paper, a rotary member for receiving the exposed band, and means for carrying the unused band comprising a case with upper and lower sections, overlapping edges for the exclusion of light between said sections, semi-circular recesses in said edges, discs grooved for engagement with the edges of said recesses, a band carrying spool between said discs, and means located between the spool and the said rotary member to exclude light and permit the passage of the band.

6. In a photographic recording apparatus of the character described rotary means for driving the band of photographic paper, rotary means for receiving the exposed band, and means for carrying the unused band comprising a case with upper and lower sections, overlapping edges for the exclusion of light between said sections, semi-circular recesses in said edges, discs grooved for engagement with the edges of said recesses, a spindle carried by said discs, end collars on the spindle, a band-carrying spool removably mounted on said collars, and means located between the spool and the said rotary member to exclude light and permit the passage of the band.

7. In a photographic recording apparatus of the character described rotary means for driving the band of photographic paper, rotary means for receiving the exposed band; and means for carrying the unused band comprising a case with upper and lower sections, overlapping edges for the exclusion of light between said sections, semi-circular recesses in said edges, discs grooved for engagement with the edges of said recesses, a band carrying spool carried by said discs, a slot in the said upper section for the passage of the band, and a slotted flexible member for preventing the passage of light through the slot in the upper section while permitting the band to pass from the spool to the said rotary member.

8. In a photographic recording apparatus of the character described rotary means for driving the band of photographic paper, rotary means for receiving the exposed band, and means for carrying the unused band comprising a case with upper and lower sections, overlapping edges for the exclusion of light between said sections, semi-circular recesses in said edges, discs grooved for engagement with the edges of said recesses, a band carrying spool between said discs a slot for the passage of the band from said spool to said rotary means, and a bevelled part in the upper section for facilitating the introduction of the end of the band into said slot.

9. In a photographic recording apparatus of the character described, a horizontal roll for driving the band, means for guiding the band partly around said roll, a parallel band-receiving roll driven from the said band-driving roll by frictional contact, a band supply

spool, a light excluding case for said spool, and a light excluding aperture to permit the passage of the band from said spool to said rolls.

In testimony whereof we have signed our names to this specification.

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OLIVE SCOTT PETTY.