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SEARCH ROOM

Sept. 6, 1960 R. LEGRAND 2,951,365

ULTRA-SONIC APPARATUS FOR THE DETECTION OF DEFECTS IN RAILWAY RAILS

Filed April 9, 1957 2 Sheets-Sheet 1

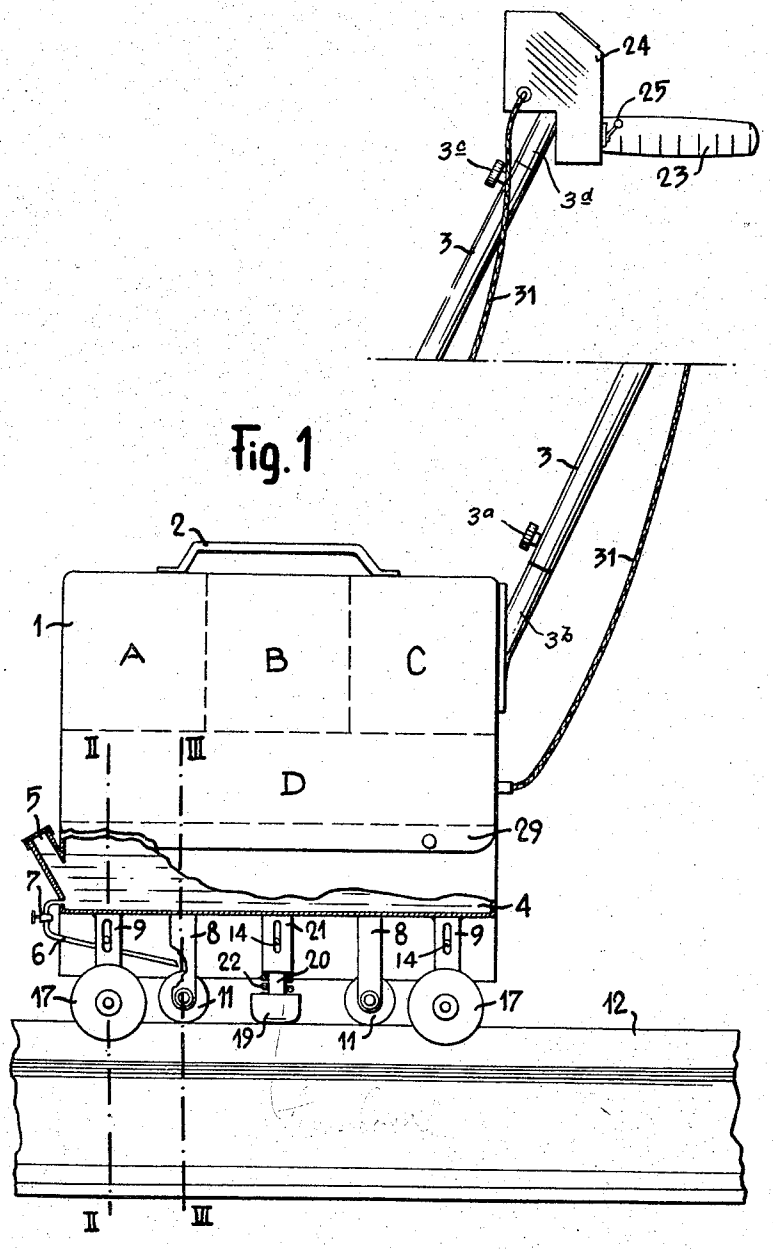


Fig. 1

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Fig. 2

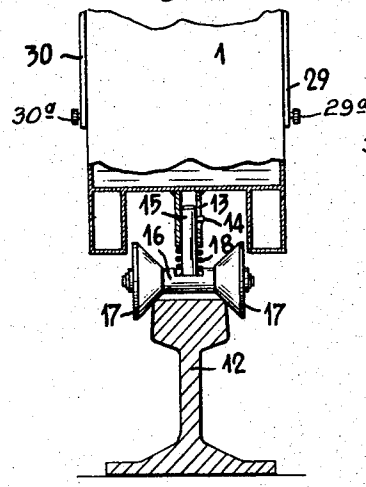
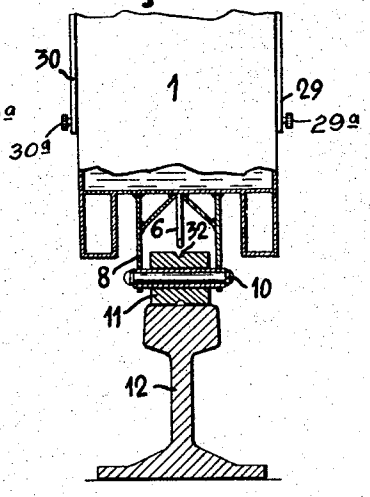


Fig. 3



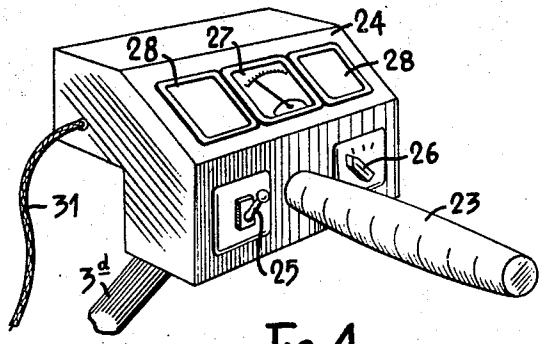


Fig. 4

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2,951,365

ULTRA-SONIC APPARATUS FOR THE DETECTION OF DEFECTS IN RAILWAY RAILS

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6 Claims. (Cl. 73—67.8)

Ultra-sonic apparatus for the detection of defects in railway rails are already known which comprise at least an ultra-sonic transducer adapted to be placed in contact with the upper face of the rail for transmitting ultra-sounds into said latter, means for detecting eventual irregularities in the transmission of ultra-sounds to the interior of the rail and a generator for exciting the indicator.

In general said apparatus shown, for example, in U.S. Patent No. 2,824,979, dated February 25, 1958 are portable and comprise an ultra-sound transducer secured to the end of a stick, said transducer being excited by a generator located in a casing adapted to be hooked to the shoulders of the operator. Said casing contains, in general, the batteries for feeding the generator and the indicating apparatus for detecting eventual irregularities in the transmission of ultra-sound in the interior of the rail. Said casing is relatively heavy and constitutes an inconvenience to the operator. On the other hand, the latter must take constant care in maintaining the stick in a well determined position so that the transducer is placed correctly relatively to the rail.

The present invention has for its subject an apparatus of the above-mentioned type, permitting of considerably facilitating the work of the operator.

For this purpose, the apparatus forming the subject of the invention comprises a compact portable unit guided by hand over a rail and including apparatus mounted on a chassis provided with at least one roller adapted to roll on the upper face of the rail and at least one guide device comprising two surfaces applied by a resilient action against each side of the head of the rail, in such a manner that the chassis is always maintained in the same position relatively to the rail, the ultra-sonic transducer being secured to the chassis.

One form of construction of the apparatus forming the subject of the invention is shown diagrammatically and by way of example in the accompanying drawings, wherein:

Fig. 1 is a view in elevation, a portion being broken away.

Figs. 2 and 3 are sections on the line II—II and III—III of Fig. 1, respectively.

Fig. 4 is a view in perspective of the control board of the apparatus.

The apparatus shown comprises a casing **1** provided with a lifting handle **2** and a demountable pusher stick **3** which includes separable parts and therefore may be readily set up and taken apart when not in use. The lower portion of the casing includes a tank **4** having a filling orifice **5** and an outflow pipe **6** provided with an adjusting tap **7**.

The lower portion of the tank **4** provides a chassis to which are secured two pairs of supports **8**, **8** and **9**, **9**.

Each support **8** is provided with a spindle **10** upon which a rubber roller **11** is mounted. The two rollers **11** are adapted to roll on the upper face or tread of the rail **12**. The two supports **9**, **9** are each formed by

a tube having a slot **13** which receives a stud **14** secured to a rod **15** slidable in the tube. The lower end of the rod **15** carries a transverse spindle **16** having at each end thereof a guide wheel **17**. These guide wheels have conical faces which enable the guide wheels to straddle the head of the rail and readily and easily guide the entire apparatus as it is manually moved over the rail by the pusher stick **3**. Referring further to the assembly of each guide wheel, it will be seen that a spring **18** surrounds rod **15** and applies pressure tending to urge the wheels **17** against the sides of the rail head **12**, namely, both the gauge side, and the field side of the head of the rail.

In Fig. 1, it will be seen that the apparatus is provided with two guide devices each constituted by a group of two wheels **17**, each of said guide devices being secured near one end of the chassis of the apparatus. It will thus be seen that when the latter is set on the rail **12**, its weight is supported by the two load carrying rubber rollers **11**, whilst the two groups of wheels **17** impart to the apparatus a well defined traveling position relatively to the rail.

Between the two rollers **11** is located a transducer **19** which is secured to the end of a rod **20** engaging in a tube **21** secured to the lower part of the tank **4**. The rod **20** can slide in the tube **21** and a spring **22** is placed between the latter and the transducer **19** so as to apply this against the upper face of the rail **12** with a substantially constant pressure.

The interior of the casing **1** is divided into a number of compartments A, B, C and D, indicated by the broken lines in Figure 1. The compartments A and B are intended to contain the electronic devices of the apparatus, for example, an ultra-sonic generator in the compartment A and a wobbulator device in the compartment B. The compartment C constitutes a storage chamber for the instrument panel and associated members **23** and **24** secured to the end of the pusher stick **3** as will presently appear more in detail.

The demountable pusher stick includes the sleeve **3** fixed at one end by a knurled-head screw **3***a* to a member **3***b* fastened to the rear wall of the casing **1**. The other end of the sleeve **3** carries a knurled-head screw **3***c* which enables the said sleeve to be detachably connected with a tubular member **3***d* integral with the instrument panel **24**. The control handle **23** is screwed into a threaded bore in the instrument panel **24**.

The compartment D contains batteries for supplying the generator with electrical energy. The casing **1** is provided on each of its side faces with covers **29** and **30** which enable the compartments A, B, C and D to be closed. These covers **29** and **30** are provided with a hinge (not shown) extending the length of their upper edges, while their lower edges are selectively maintained in closed position by the knurled-head screws **29***a* and **30***a*, respectively.

The instrument panel **24** is shown in perspective in Fig. 4 and comprises a switch **25** for setting the apparatus in operation, a commutator **26**, a measuring instrument **27** and a loudspeaker located in the interior of the casing, of which the front face constitutes the said panel. Two openings **28**, closed by a wire mesh, are provided for allowing of the passage of the sounds emitted by the loudspeaker. A terminal, not shown in the drawing, permits of connecting headphone for the operator. The commutator **26** permits of sending the signal of detection of faults to the loudspeaker, or to the instrument **27**, or even to headphone.

The assembly described is very practical in use, as the workman who has to verify a particular section of the rail can leave with the apparatus collapsed and having the appearance of a small case. Before departure,

he fills the tank **4** with a liquid, generally with water to which has been added a moistening product. When the workman has arrived at the site he opens his case, takes out the stick **3**, which for the purpose of transport has been secured to the under face of one of the covers **29** or **30**. The sleeve **3** as previously indicated is fastened to the casing or housing **1** on one side and on the other side to the panel **24** by tightening the screws **3***a* and **3***c*; then the handle **23** is screwed into the instrument panel **24**. An electric cable **31** is provided for connecting the board **24** to an electronic appliance contained in the casing **1**. Then he sets the apparatus on the rail to be checked, actuates the tap **7** to allow of a slight flow of liquid contained in the tank **4**, and then pushes the apparatus along the rail whilst holding it by the hand piece **23**, it being understood, after having actuated the switch **25** and eventually the commutator **26**.

The liquid flows drop by drop on the roller **11** which precedes the transducer **19**. As will be seen in Fig. 3, said roller **11** has a peripheral groove **32** adapted to collect the liquid flowing through the pipe **6** and to deposit it in the form of a thin film on the upper face of the rail **12** just in front of the transducer **19**. It is known that this thin layer of liquid is necessary to permit of a good transmission of the ultra-sounds between the transducer **19** and the rail.

It is necessary that the transducer remains constantly in contact by the whole of its surface with the rail **12** and, for this purpose, it is advantageous that it is connected to the rod **20** through the medium of a universal joint, which is not shown in the drawing.

It will be understood that numerous modifications may be made in the apparatus described, and in particular the guide device may be replaced by another device comprising two surfaces applied by an elastic action against each side of the head of the rail. It is possible to simplify the apparatus by providing only a single rolling roller and a single guide device, said roller and device being located in proximity to the transducer. However, the guiding obtained is not so efficient and the apparatus would necessitate greater attention on the part of the operator.

I claim:

1. A portable carriage manually movable forwardly or backwardly over a railway rail and having thereon supersonic fissure detecting apparatus used in determining defects in said rail, comprising, in combination, a chassis, a housing on said chassis in which said apparatus is mounted, a pusher stick detachably mounted on the housing, a load carrying roller on the underside of the chassis and adapted to roll on the rail tread, and a spring urged guide roller aligned longitudinally of the chassis with said load-carrying roller and having its inner face contoured to embrace the gauge and field sides of a rail head

to hold the chassis for movement on the rail as said chassis is manually pushed thereover by the stick.

2. A portable carriage for supersonic fissure detecting apparatus operated by hand over the head of a railway rail for detecting defects in the rail, said carriage comprising, in combination, a chassis, a compartmented housing on the chassis, a demountable pusher stick carried by the housing, load-carrying rollers arranged in spaced alignment longitudinally of the carriage and extending downwardly therefrom to roll on the rail tread, and downwardly spring urged rollers also on the chassis and aligned with said load-carrying rollers, each roller having a conical medial portion embracing both the gauge side and the field side of the rail head to hold the chassis on the rail as it is manually pushed thereover and means also on the underside of the chassis for establishing communication between the detecting apparatus and the rail.

3. Apparatus according to claim 2, wherein, the means for establishnig communication between the detecting apparatus and the rail is a transducer carried by the chassis between the load carrying rollers to also engage the tread of the rail, a tank for liquid mounted on said chassis, and a pipe extending from said tank and discharging in the direction of one of the load carrying rollers for flowing liquid onto said roller and thus moisten the upper face of the rail to render it more conductive to the transducer as it passes thereover.

4. Apparatus according to claim 2, wherein, said housing is provided with a demountable sectional pusher stick including an operator's handle and an instrument panel adjacent said handle, said panel having control and indicating elements in viewing proximity to the operator, said stick and panel when demounted being stored in a selected compartment of said housing.

5. An apparatus according to claim 2, wherein, the load carrying rollers have non-metallic coverings and the transducer located between the two load carrying rollers is held in contact with said rail by a spring.

6. An apparatus according to claim 2, wherein, the load-carrying tread engaging rollers are each provided with medial grooves to channel and spread a conductive liquid on the rail tread in advance of the means for establishing communication between the detecting apparatus and the rail.

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