A. P. WARNER & A. B. CADMAN.

SPEED MEASURING EQUIPMENT FOR RAILWAY OR OTHER CARS.

APPLICATION FILED OCT. 14, 1907.

1,038,509. Patented Sept. 10, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

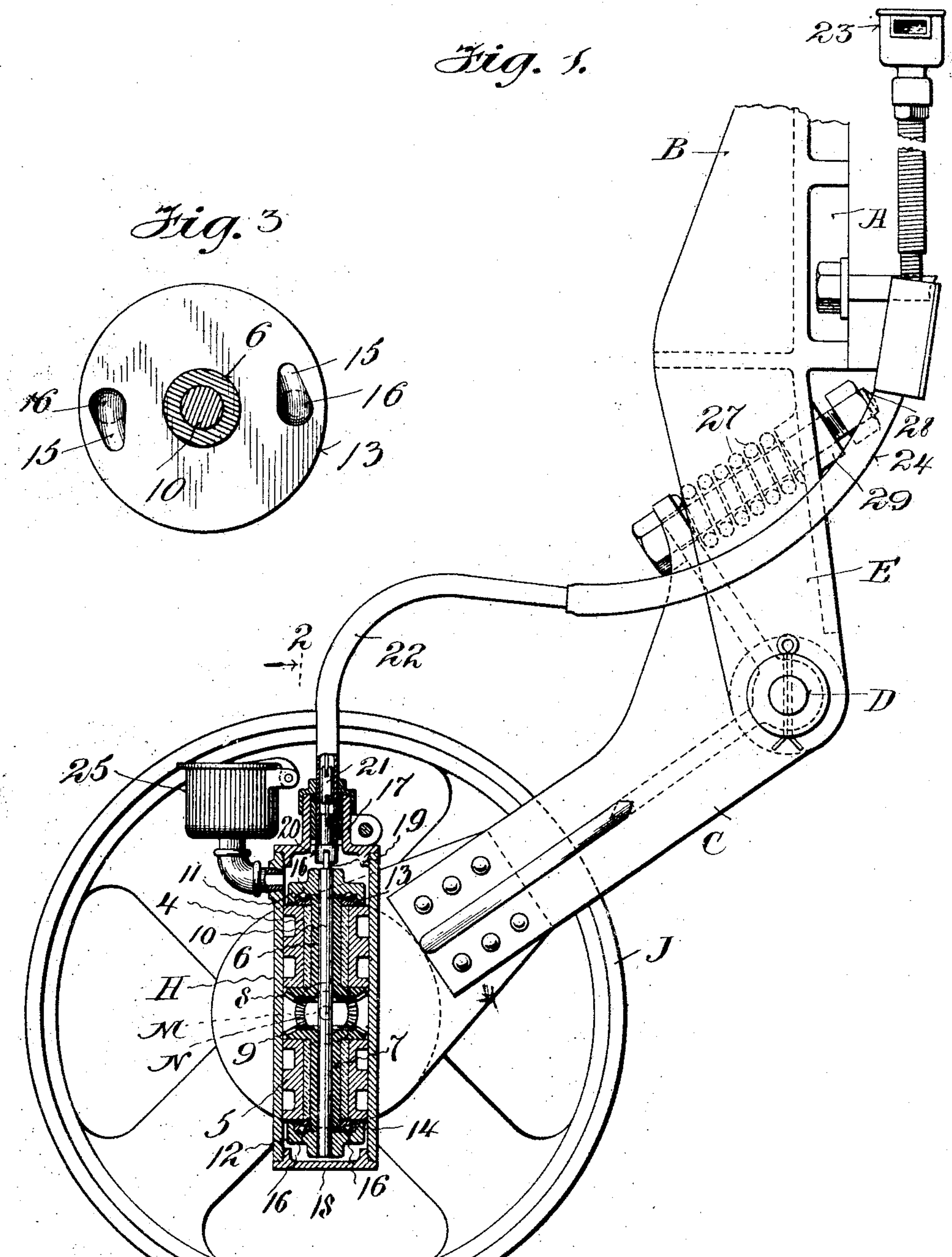

Fig. 3

Witnesses:
Chas. J. Clagett
Joseph Klein.

Arthur P. Warner and Addi Benjamin Cadman Inventors
By their Attorney
Samuel E. Darby

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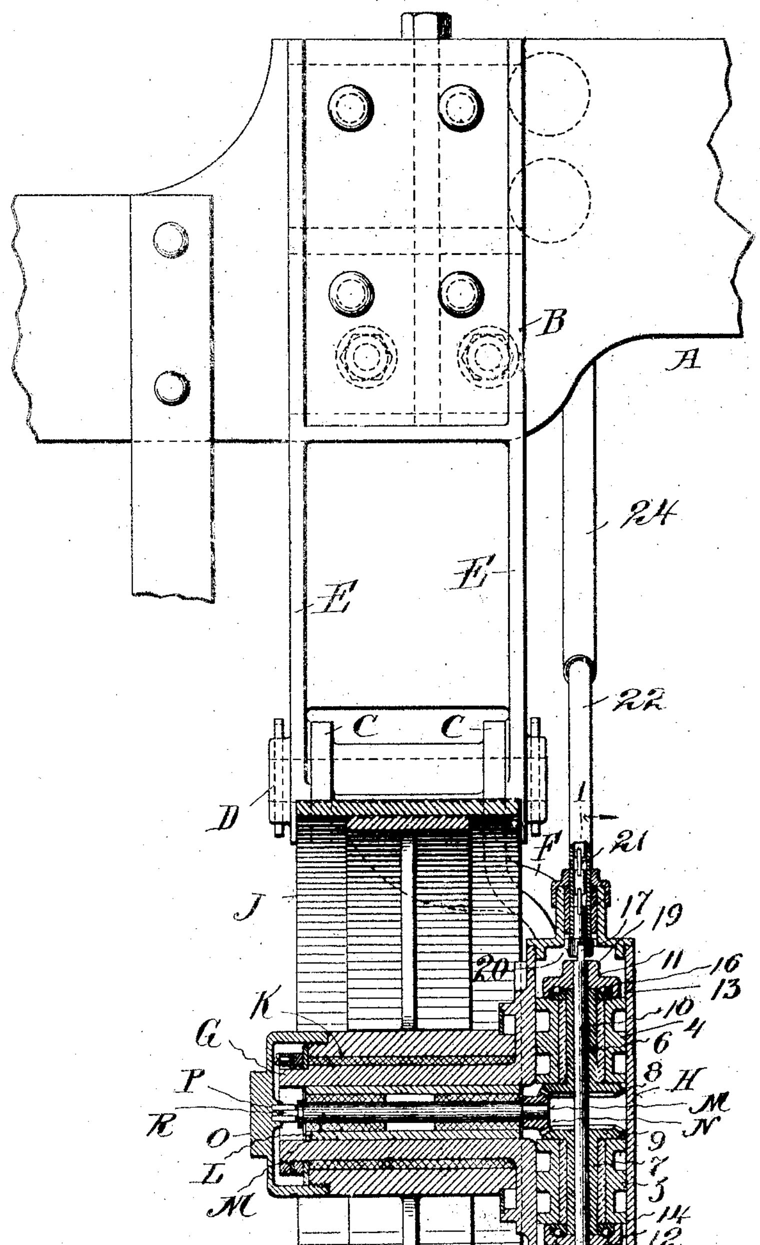
2 SHEETS—SHEET 2.

Fig. 2.



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and Addi Benjamin Cadman
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Samuel E. Darby

UNITED STATES PATENT OFFICE.

ARTHUR P. WARNER AND ADDI BENJAMIN CADMAN, OF BELOIT, WISCONSIN, ASSIGNORS TO WARNER INSTRUMENT COMPANY, OF BELOIT, WISCONSIN, A CORPORATION OF WISCONSIN.

SPEED-MEASURING EQUIPMENT FOR RAILWAY OR OTHER CARS.

1,038,509. Specification of Letters Patent. **Patented Sept. 10, 1912.**

Application filed October 14, 1907. Serial No. 397,292.

To all whom it may concern:

Be it known that we, ARTHUR P. WARNER and ADDI BENJAMIN CADMAN, citizens of the United States, and residing at Beloit, county of Rock, State of Wisconsin, have made a certain new and useful Invention in Speed-Measuring Equipment for Railway or other Cars, of which the following is a specification.

This invention relates to speed measuring equipment for railway or other cars.

The object of the invention is to provide an apparatus which is simple in construction, economical to manufacture, and efficient in operation, for measuring the speed of railway or other cars.

A further object of the invention is to provide an apparatus of the character referred to which will efficiently and accurately measure the speed of railway or other cars whether running in one direction or the other.

A further object of the invention is to provide an apparatus of the character referred to which can be readily applied to or removed from the car without disturbing or interfering with the running gear or other mechanism of the car.

A further object is to provide an apparatus of the character referred to which is independent, in the operation and connection thereof, of the running gear, axle, or other moving parts of the car driving mechanism.

A further object of the invention is to provide an apparatus of the character referred to which is accurate in its speed measurements, and wherein such accuracy is not impaired by the wear of axle bearing or of wheel treads, and wherein the operation of the device is not interfered with by hot boxes of axle journal bearings, the wear due to the application of wheel tread brake shoes or other derangements encountered in the operation of railway or other cars.

The invention consists substantially in the construction, combination, location and relative arrangement of parts all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings, and to the various views and reference signs appearing thereon,—Figure 1, is a view in side elevation of a speed measuring equipment for railway or other cars, embodying the principles of our invention, parts broken off, and parts in vertical section on the line 1, 1, Fig. 2, looking in the direction of the arrows. Fig. 2 is a view partly in front elevation and partly in vertical section on the line 2, 2, Fig. 1, looking in the direction of the arrows. Fig. 3 is a detail view of a clutch plate employed in connection with our invention.

The same part is designated by the same reference sign wherever it occurs throughout the several views.

Under service conditions railroad and other cars are subjected to such rough usage as to render the use of speed measuring apparatus in connection therewith exceedingly difficult while maintaining accuracy of such measurements. Where such apparatus is driven from the truck axles or other revolving gearing driven therefrom, the accuracy of the speed measurements or indications is seriously impaired and interfered with by hot boxes of the axle journal bearings, by the slippage of the truck wheels upon the track rails when the brakes are applied with sufficient force or power to lock the axle, and from other derangements incident to and encountered in the service operation of the car. And, in case of a broken wheel or axle, or in case of breakage of the parts of the measuring apparatus, removal of the entire truck or axle, or the putting of the entire truck out of commission is necessitated in order to repair or replace the broken part. This is particularly true in case of breakage of any part of the measuring apparatus. Again, where the measuring apparatus or speed indicating device is driven from the tread of a truck wheel, for instance, the accuracy of the speed measurements or indications is seriously impaired and rendered unreliable by the wear of the wheel treads and the consequent reduction of the effective diameter of the wheel, or by the slippage of the wheel upon the truck rails, or by reason of any uneven wear upon the wheel tread due to the application of the brake shoes thereto. In other words, any arrangement whereby the accuracy of speed measuring or indicating apparatus is subject to and dependent upon the derangements of, and defects developed in, the truck wheels or axles, is objectionable for the reason that accurate and uniform measurements and indications are impossible to be attained thereby.

It is among the special purposes of our present invention to provide a speed measuring and indicating mechanism for use on railway and other cars which is in the form of an independent attachment capable of being readily applied to or removed from a car truck without interfering with or being deranged by the truck axle or wheels, and which may be operated solely by the progression of the car and not from the wheel or axle, and hence, an apparatus which is wholly free from the inaccuracies and impairments due to the wear of wheel treads, brake shoe applications, hot boxes or other derangements of the rough usage of service.

In carrying out our invention we propose to locate the speed measuring or indicating device at a convenient point in a car and to drive the same through transmitting gearing driven from a trolley or drive wheel adapted to contact with a track rail and to be rotated thereby as the car progresses therealong. And we also propose to support such trolley or drive wheel in a bracket adapted to be readily attached to and detached from a truck frame beam or other convenient part, preferably of the truck, and to transmit the rotations of such trolley through suitable gearing adapted to drive the transmitting gearing in continuous direction whether the trolley wheel is rotated in one direction or the other. We also propose to provide means for yieldingly pressing the trolley wheel into contact with the track rail whereby the rotations of such trolley wheel are assured but without imposing undue wear thereon. We also propose to provide efficient means for lubricating the gearing and for preventing the access of grit, dust or dirt thereto.

These various objects and purposes may be accomplished in a wide variety of specific mechanisms. While, therefore, we have shown and will now describe one form of mechanism as illustrative of an operative embodiment of the principles of our invention, and the best form in which we at present contemplate carrying our invention into practical operation, still we do not desire to be understood as meaning that our invention is to be limited or restricted to the exact form of construction and arrangement shown.

Referring to the drawings reference sign A, designates a beam or other convenient part of a truck frame.

B, is a bracket or hanger adapted to be detachably bolted or otherwise secured to the part A; and C, is an angle arm pivotally mounted at its angle upon a pin D, in depending arms E, of bracket B. The lower or free end of the angle arm C, is bent or deflected laterally, as indicated at F, and has secured thereto by bolts or otherwise, a casting having a hollow cylindrical hub portion G, and a hollow cylindrical casing H, arranged, in the particular form shown, in right angular relation with respect to the hub portion. The trolley wheel J, is journaled to revolve upon the hub portion G. If desired a sleeve or lining K, of soft metal or other bearing material, may be interposed between the bearing surfaces of the interior of the trolley wheel and the exterior of the hub portion G. Within the bore of the hub portion G, is a bearing sleeve L, in which is journaled a shaft M, having one end arranged to extend transversely into the casing H, and carrying a bevel gear N. The rotations of the trolley wheel J, may be imparted to the shaft M, in any suitable or convenient manner. We have shown a simple arrangement wherein a cap O, is arranged to be detachably connected to the hub of the trolley wheel J, and having a split boss P, at the axial center thereof, said split boss arranged and adapted to receive a nib or projection R, on the end of shaft M. This shaft is journaled in the geometrical axis of the hub portion G and hence, also, in the geometrical axis of the trolley wheel and consequently, when the cap O, is applied, as clearly shown in Fig. 2, the rotations of the trolley wheel are transmitted to the shaft M, and the two revolve together in whichever direction the trolley wheel may rotate. The cap O, also serves the purpose of excluding dust, dirt, grit or the like from the bearings of said wheel and shaft. Arranged within the portion or casing H, on opposite sides of the end of shaft M, and the bevel gear N, thereon are bearing blocks 4, 5. In each of these bearing blocks is journaled to rotate a hollow shaft 6, 7, arranged in axial alinement with each other. On the proximate ends of shafts 6, 7, are mounted or formed bevel gears 8, 9, respectively, said gears meshing with and driven by bevel gear N. The bevel gears 8 and 9 being respectively arranged on opposite sides of gear N, said shafts 6 and 7, are rotated in opposite directions with respect to each other. Extending longitudinally through the axially alined bores of shafts 6 and 7, is a shaft 10, to the respective ends of which are fixed or secured the oppositely presented blocks 11, 12, constituting members of clutches. The other members of the clutches comprise disks or rings 13, 14, respectively fixed or secured to the hollow shafts 6, 7, and respectively coöperating with the clutch members 11, 12. In each ring or disk 13, 14, are formed tapering grooves 15, see Fig. 3, said grooves being tapering in depth, and each adapted to receive a ball 16, said balls being interposed between the juxtaposed surfaces of blocks

11 or 12, and their coöperating disks or rings 13, 14. The grooves 15 in the one ring or disk 13, extend in reverse direction with reference to the grooves in the other ring or disk 14.

From this description it will be seen that when a ring or disk 13, 14, is revolved in a direction to crowd the balls 16 toward the narrow or shallow parts of the grooves 15, said balls are thereby pressed against the coöperating clutch member 11 or 12, as the case may be, while, since the other shaft 6 or 7 is always revolved in the opposite direction, the balls 16 in the grooves of the other ring or disk are crowded toward the wider or deeper parts of their grooves, thereby releasing the engagement with their coöperating clutch member, and consequently the shaft 10 is rotated in a continuous direction, whether driven from hollow shaft 6 or from hollow shaft 7. In other words, shaft 10 is always driven in the same direction whether the trolley wheel J is rotated in one direction or the other. The casing H, is provided with end caps 17, 18, which close the ends of said casing thereby preventing access of dust, dirt or the like to the gearing shaft bearing and clutch mechanisms, above described.

It is obvious that many other forms of clutch mechanism may be employed without departure from the spirit or scope of our invention. The form shown, however, is well adapted for our purposes.

One end of shaft 10, is provided with a nib 19, adapted to be received in a split boss 20, forming the terminal connection of a flexible transmitting gear or shaft 21, housed with a suitable sheathing 22, and leading to the speed measuring or indicating instrument 23, on the car. If desired, the transmitting gear or its sheathing may be passed through a sleeve or guide 24, fixed upon or secured to the bracket B.

If desired, and in order to efficiently lubricate the drive gearing and bearings of the various revolving parts thereof, oil may be supplied to the interior of casing H, in any suitable or convenient manner. We have shown an oil cup 25, delivering into the casing H, for this purpose and supplying oil to all the bearings in said casing as well as to the bearings in the hub portion G, the caps O, 17 and 18, serving to retain the lubricating oil within said casing and hub.

It is desirable that the trolley wheel J, be yieldingly maintained in contact with the track rail indicated at 26, Fig. 1, and to accomplish this result we arrange a spring 27, to exert its tension upon the upper arm of the angle arm C, and constantly tending to rock or swing said angle arm about its pivot pin D, in a direction to yieldingly press the trolley wheel into contact with the track rail. The spring 27 is carried upon a bolt 28, and its tension is adjusted by means of a nut 29, carried by the bolt and against which one end of the spring 27 bears, the other end of the spring bearing against the end of angle arm C.

While we have shown the trolley wheel J, arranged to bear against the track rail 26, and while we prefer such arrangement, still our invention is not limited in this respect as it is obvious that the said wheel may bear against the tread of a truck wheel, if so desired.

From the foregoing description it will be seen that we provide an exceedingly simple and efficient speed measuring or indicating mechanism in the form of an attachment which can be readily applied to a truck frame and which is independent in its operation of the axle or other part of the car driving mechanism and wherein the accuracy of the speed indicating or measuring device is not impaired by wear of the truck wheels, wherein the speed of the car may be accurately measured or indicated whether the car moves in one direction or the other, and wherein sufficient lubrication is maintained and dust and dirt excluded.

Many variations and changes in the details of construction and arrangement might readily occur to persons skilled in the art and still fall within the spirit and scope of our invention. Our invention, therefore, is not to be limited or restricted to the exact and specific details shown and described. But

Having now set forth the object and nature of our invention and a construction embodying the principles thereof, what we claim as new and useful and of our own invention, and desire to secure by Letters Patent is:—

1. The combination with a supporting bracket, and an arm pivotally mounted thereon, of a casting carried by said arm, said casting having a hub, a driving wheel mounted on said hub, a shaft journaled in said hub, connections between said shaft and wheel, a speed indicator, transmitting gearing for driving said indicator and gearing intermediate said transmitting gearing and shaft, including automatic clutch devices, whereby said transmitting gearing is driven in constant direction whether said shaft is driven in one direction or the other.

2. The combination with a supporting bracket, and an arm yieldingly mounted thereon, of a casting carried by said arm, a hub mounted on the casting, a driving wheel journaled on said hub, a shaft having bearing within the hub and connected to said wheel to be driven therefrom, a counter shaft also journaled in said casting, gears mounted thereon and arranged on opposite sides of the first mentioned shaft and geared thereto, clutches for coupling said

gears to said counter shaft, a speed indicator, and transmitting connections intermediate said counter shaft and indicator.

3. The combination with a supporting bracket and an arm yieldingly mounted thereon, a driving wheel journaled on said arm, a shaft also journaled in said arm and in concentric relation with reference to said wheel, connections between said wheel and shaft, a countershaft journaled in said arm, gears mounted thereon and arranged to be driven in relatively reverse directions by said first mentioned shaft, automatic clutch connections between said gears and countershaft, a speed indicator, and means actuated by said countershaft for driving said speed indicator.

4. The combination with a supporting bracket, and an angle arm pivotally mounted at its angle upon said bracket, of a casting carried by said arm, said casting having a hub, a driving wheel mounted on said hub, a shaft journaled in said hub, connections between said shaft and wheel, a speed indicator, transmitting gearing for driving said indicator, and gearings intermediate said transmitting gearing and shaft, including automatic clutch devices, whereby said transmitting gearing is driven in constant direction whether said shaft is driven in one direction or the other, and a spring acting upon one arm of said pivotally mounted angle arm and operating to yieldingly press said wheel into a casement with a driving surface.

5. The combination with a supporting bracket, and an arm pivotally mounted thereon, of a casting carried by said arm, said casting having a horizontally extended hub, a driving wheel journaled on said hub to revolve thereon, a shaft journaled longitudinally in said hub, connections between said shaft and wheel, a countershaft arranged in right angular relation with said first mentioned shaft and also journaled in said casting, a speed indicator, transmitting gearings for driving said indicator, and gearings intermediate said transmitting gearings and said countershaft including automatic clutch devices whereby said transmitting gearing is driven in constant direction whether said shaft is driven in one direction or the other, and gearings intermediate said first mentioned shaft and said counter shaft, whereby the latter is driven from the former when said wheel is rotated.

6. The combination with a supporting bracket, and an arm pivotally mounted thereon, of a casting carried by said arm, said casting having a horizontally extending hub, a driving wheel mounted on said hub to revolve freely in either direction, a drive shaft journaled internally in said hub, connections between said shaft and wheel whereby said shaft is driven from said wheel, a countershaft also journaled in said hub and geared to said first mentioned shaft, a speed indicator, transmitting gearing for driving said indicator, and gearings intermediate said countershaft and indicator including automatic clutch devices whereby said transmitting gearing is driven in constant direction whether said shaft is driven in one direction or the other.

7. The combination with a supporting bracket and an arm pivotally mounted thereon, of a casting carried by said arm, said casting having a horizontally extending hub, a driving wheel journaled to rotate freely in either direction upon said hub, a shaft concentrically journaled within said hub, connections between said shaft and wheel, a countershaft, gearings intermediate said first mentioned shaft and said countershaft for driving the latter in a direction corresponding to the direction of rotation of the first named shaft, a speed indicator, transmitting gearings for driving the same, and gearings intermediate said transmitting gearings and countershaft indicating automatic clutch devices, whereby said transmitting gearing is driven in constant direction whether said countershaft is driven in one direction or the other.

8. The combination with a supporting bracket, and an arm pivotally mounted thereon, of a casting carried by said arm, said casting having a hub, a driving wheel journaled to rotate freely in either direction upon said hub, a shaft concentrically journaled within said hub, connections between said shaft and wheel, a counter shaft geared to said first mentioned shaft, a speed indicator, transmitting gearing for driving said indicator, oppositely arranged gears on said countershaft, and means for coupling the one or the other of said oppositely arranged gears to said shaft, said oppositely arranged gears operating to drive said intermediate gearing.

9. The combination with a supporting bracket, and an arm pivotally mounted thereon, of a casting carried by said arm, said casting having a hub, a driving wheel journaled upon said hub to rotate freely thereon in either direction, a counter-shaft also journaled in said casting, gearing connections between said wheel and said countershaft, a speed indicator, and gearings intermediate said countershaft and indicator for driving the latter in constant direction whatever the direction of rotation of the wheel.

10. The combination with a supporting bracket, and an arm yieldingly pivoted thereon, of a casting carried by said arm, said casting having a journal hub, a driving wheel journaled to freely rotate upon said hub in either direction, a countershaft also journaled within said casting, gearings in-

termediate said driving wheel and countershaft, a speed indicator, driving connections therefor, and gearings intermediate said countershaft and driving connections including automatic clutch devices, whereby said indicator is driven in constant direction whether said driving wheel and countershaft is driven in one direction or the other.

In testimony whereof we have hereunto set our hands in the presence of the subscribing witnesses, on this 26th day of September A. D., 1907.

ARTHUR P. WARNER.
ADDI BENJAMIN CADMAN.

Witnesses:
C. H. WARNER,
E. M. THOMPSON.