No. 809,019. PATENTED JAN. 2, 1906.

E. McC. SCOVILLE.

DEVICE FOR CALCULATING HORSE POWER.

APPLICATION FILED JAN. 31, 1905.

Fig. 1.

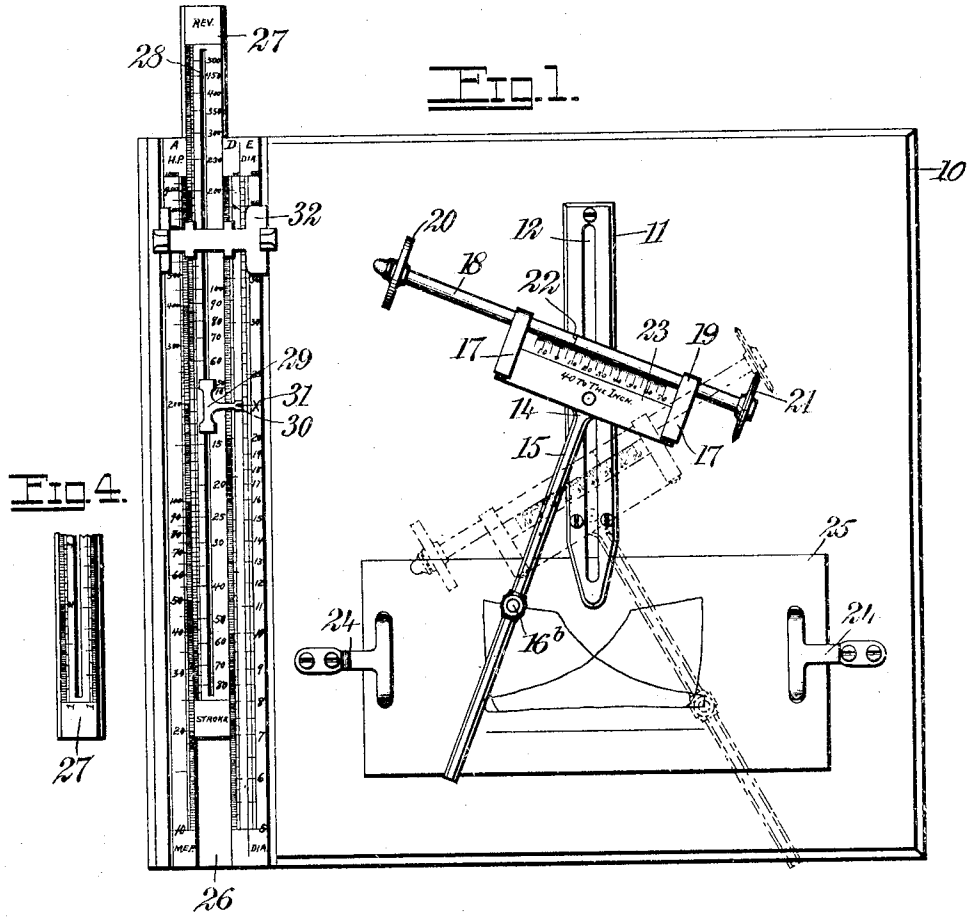



Fig. 4.




Fig. 2.

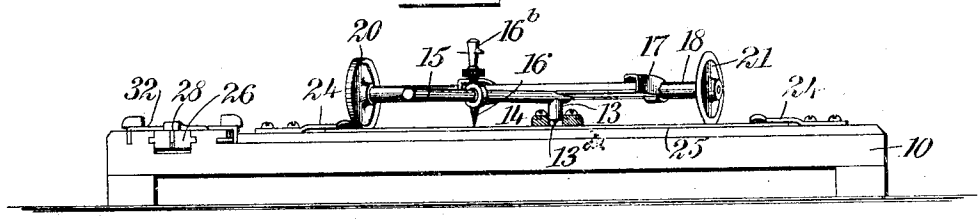
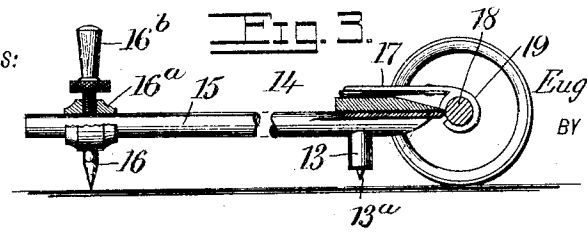



Fig. 3.

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EUGENE McCLELLAN SCOVILLE, OF WAIPAHU, TERRITORY OF HAWAII.

## DEVICE FOR CALCULATING HORSE-POWER.

No. 809,019. Specification of Letters Patent. Patented Jan. 2, 1906.

Application filed January 31, 1905. Serial No. 243,497.

*To all whom it may concern:*

Be it known that I, EUGENE McCLELLAN SCOVILLE, a citizen of the United States, and a resident of Waipahu, Oahu, Territory of Hawaii, have invented a new and Improved Device for Calculating Horse-Power, of which the following is a full, clear, and exact description.

My invention relates to a planimeter, in combination with a support therefor especially adapted for the operation of the planimeter and provided with a new and improved slide-rule particularly designed for calculating horse-power.

The principal object of my invention is to provide means for calculating horse-power from an indicator-card accurately, conveniently, and rapidly.

Further objects of the invention are to provide a portable support for a planimeter having a surface for supporting the moving parts thereof and also for holding the indicator-card and the slide-rule, to provide a planimeter of improved construction, perfectly balanced and capable of being readily set in position to be operated, and also to provide a slide-rule which, while capable of being operated like an ordinary slide-rule, can be used for computing horse-power from mean effective pressure and other necessary data with but two settings.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan showing a preferred form of my invention. Fig. 2 is an end elevation thereof, partly in section. Fig. 3 is a sectional view of a preferred form of planimeter constituting a portion of my invention, showing parts in section; and Fig. 4 is a rear view of a portion of the slide-rule.

A base or support 10 is provided with a flat surface adapted to receive the moving parts of a planimeter and to afford a proper surface for them to operate upon. Secured about in the middle of this surface on the support is an anchor-plate 11, having a longitudinal slot 12. This slot is adapted to receive a projection 13 upon a carriage 14. This projection is provided with a central point or indicator $13^a$. The carriage is provided with a rod 15, upon which is adjustably mounted a tracing-point 16. This tracing-point is mounted in a bearing $16^a$ and is secured in adjusted positions by a thumb-screw $16^b$.

The body of the planimeter, which has heretofore been designated as a carriage, is provided with a pair of springs 17. These springs are adapted to engage a movable shaft or rod 18 and are provided with bearings 19 for that purpose. The shaft 18 is adapted to move longitudinally and rotate in these bearings. Upon one end of the shaft is a smooth-surfaced wheel 20 of enough weight to balance the device and to serve as a balance-wheel for it. Upon the other end the shaft is provided with a wheel 21, having a sharpened edge for engaging the surface upon which the wheels roll and preventing the longitudinal motion of the shaft except by the rotation of the wheel upon its sharpened edge. The shaft is provided with an indicating-mark 22, adapted to show upon a scale 23, held by the springs 17, the mean effective pressure represented by the indicator-card operated upon. The support is provided with clips 24 for securing the indicator-card 25 thereto.

Upon one side of the support three scales A, D, and E are provided. The first of these scales is divided so as to represent mean effective pressures, as is indicated on the drawings by the letters "M. E. P." It is also provided with the letters "H. P." at the top for an obvious purpose. The scale E indicates diameters of the cylinder and is so designated. Between the scales A and D is located a groove 26, in which fits a slide 27. On one end of the slide it is provided with divisions or graduations representing the stroke, as is indicated at the bottom in the drawings, and upon the other end the graduations represent revolutions per minute, as is indicated at the top. This slide is capable of moving longitudinally in the groove 26. The slide is also provided with a longitudinal groove 28, in which is mounted a rider 29. This rider is provided with an indicating-mark 30, and the scale E is provided with a gage-point 31, the purpose of which will be explained. This gage-point is preferably located at a point indicating twenty-two and one-half on the scale E. The rider can be moved along the slide 26, but being mounted thereon will move with it when the slide is moved. The slide-rule can, as usual, be provided with a gage 32. The rear of the slide 27 is provided with gradations, as shown in Fig. 4, similar to those of the standard "Mannheim" scale, so that by removing the rider 29 and inverting the slide the slide-rule can be used in the ordinary manner.

It is to be understood that the principal object to be attained by this invention is the complete calculation of the horse-power from the indicator-card and other data known by any person whether skilled in mathematics or not and without the employment of any mathematical calculations. The manipulation of the slide-rule is effected by only two settings, which, it is believed, has not heretofore been accomplished.

The operation of the embodiment of the invention which is illustrated in these drawings will now be described. The indicator-card 25 is placed under the clips 24 in an obvious manner. A scale 23, corresponding to the indicator-spring, is placed on the planimeter under the springs 17. The points $13^a$ and 16 are then set to the extreme length of the diagram on the indicator-card and the thumb-screw $16^b$ tightened. The planimeter is then placed in position with its fulcrum-pin 13 in the slot 12. The mark 22 on the axle or shaft is set to zero on the scale 23. The paper is preferably pricked to show the starting-point of the tracing-pin, and the diagram is traced in a right-hand direction until the starting-point is reached. The indicating-mark 22 will then indicate the mean effective pressure directly upon the scale 23. By setting the points $13^a$ and 16 six inches apart and using a scale having sixty divisions to the inch areas in square inches can be directly computed on the planimeter instead of mean effective pressure. After obtaining the mean effective pressure with the planimeter the slide 27 of the rule should be so set that the stroke in inches as represented on the lower half of the slide is opposite the calculated mean effective pressure upon the scale A. The rider 29 is then moved along the slide until its indicating-mark 30 coincides with the gage-point 31, the slide of course remaining stationary during this adjustment. The slide is then moved, carrying the rider until the latter is opposite the cylinder-diameter in inches on the scale E. Then on the scale A, opposite the revolutions per minute as represented upon the upper half of the slide, the horse-power can be directly read. If in extreme cases the reading is off the board, the rider can be set to half the cylinder diameter and the result multiplied by four. As an example, taking an engine twenty by forty-two, M. E. P. seventy-five pounds, R. P. M. sixty, set the point 42 on the slide to "75" on the lower scale A. Then without moving the slide set the rider to the gage-point on the scale E. Then move the slide carrying the rider with it until the indicating-mark on the rider coincides with the numeral "20" on the scale E, and on the scale A opposite the reading "60" on the upper part of the slide read the result—namely, three hundred horse-power. If the diameter of the cylinder for any desired horse-power is required, set the stroke to the M. E. P., set the marker to the gage-point 31, set the revolutions to the horse-power desired, and opposite the marker read the diameter on the scale E. It will be noticed that the scale D is not employed in these calculations; but it is retained because upon inverting the slide a regular slide-rule can be obtained.

While I have illustrated and described a particular embodiment of my invention, it will be readily understood that the latter is not limited to that embodiment, but may be constructed in many other forms, and that many modifications may be made without departing from the spirit of the invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A calculating device comprising a pair of scales, one being provided with a stationary gage-point, and a slide having a scale adapted to register with one of the first-mentioned scales and provided with a rider slidably mounted thereon and adapted to register with the other stationary scale and with the gage-point.

2. The combination with a support, of a slide-rule thereon having two stationary scales, and a slide provided with a scale and with a rider slidably mounted thereon and adapted to register with one of said stationary scales.

3. A calculating device, comprising a pair of scales, one representing mean effective pressures in horse-powers, and the other representing cylinder diameters, the second scale being provided with a stationary gage-point, a slide having a scale adapted to register with the first-mentioned scale and provided with a rider slidably mounted thereon and adapted to register with the second stationary scale and with the gage-point.

4. A device for calculating horse-powers, comprising a stationary scale having divisions representing mean effective pressures and horse-powers, a second stationary scale having divisions representing cylinder diameters and a gage-point among said divisions, and a slide adapted to move along both of said first-mentioned scales and provided with a scale representing revolutions per minute and length of stroke and having a rider slidably mounted thereon adapted to register with the second of said stationary scales and with said gage-point.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EUGENE McCLELLAN SCOVILLE.

Witnesses:
F. B. WEST,
F. W. MAKNIDER.