PATENT SPECIFICATION

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Complete Accepted: Jan. 28, 1924.

COMPLETE SPECIFICATION.

An Improved Calculator for Power Transmission Belting.

We, JOHN TULLIS & SON, LIMITED, a British company, and HARRY PRICE TULLIS, a British subject, both of St. Ann's Works, 86, John Street, Bridgeton, Glasgow, Scotland, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

In connection with power transmission belting problems repeatedly arise involving the correlation of the three terms, belt speed, horse power transmitted, and belt width; in other words for given quantities or factors of two of these terms it is often necessary to find the corresponding quantities or factors of the third term. A slide rule or calculator for this purpose and suitable for single or double leather belting is set forth in the Specification of Patent No. 6680 dated 18th April, 1891.

A problem of frequent occurrence, involving the correlation of the three terms above mentioned, is to find the width of belting suitable for transmitting a given horse power at a given linear belt speed; but, there are different kinds of belt, such as leather and balata, as well as various plies of the same kind from which to select, so that, for the sake of economy, it is advisable to determine the required width for each of these in order to compare costs. This cannot be done with known belting calculators without the exercise of the mental faculties in converting the result obtained for one kind of belting into the equivalent result for the other kinds. Such mental calculation, although simple, becomes tedious by repetition and takes up a fair amount of time.

The object of the present invention is to provide an improved calculator by the aid of which such problems relating to belting can be expeditiously solved simultaneously for different kinds and plies of belting without requiring any mental calculation whatever.

To the attainment of this object the invention consists of a calculator for power transmission belting comprising a body or stock, and a co-acting slide or equivalent, having scales graduated in terms of linear belt speed, horse power transmitted, and width of belting and also marked for various kinds as well as different plies of belting, whereby the corresponding widths of all of these kinds and plies can be found simultaneously, at one operation of the calculator, for any given belt speed and horse power.

The calculator can be made of paper board, metal, wood, or other suitable material but is preferably made of paper board, with the scales and directions for their use properly printed thereon.

The reverse side of the calculator may have scales graduated in terms of pulley diameters, revolutions per unit of time, and linear belt speed.

One constructional form of calculator in accordance with the invention is illustrated by way of example on the accompanying drawing, whereon:—

Fig. 1 is a face view, Fig. 2 a medial longitudinal section and Fig. 3 a back view.

As illustrated, the calculator comprises a body or casing A of paper board, formed with a longitudinal slot A^1, and a slide B inserted into said slot through corresponding openings A^2 in the end walls of the stock.

One side or face of the stock is provided with an upper scale and a lower scale, one, denoted by *a*, being graduated in terms of belt speed in feet per minute and the other, denoted by *b*, being graduated in terms of width of belt in inches. On the slide B adjacent the scale *a* is a scale *c* graduated in terms of horse power transmitted, and the

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other edge of the slide adjacent the scale *b* has a number of indices for different kinds and different plies of belting. In the present example there is an index for single leather belting, one for double leather belting, and eight for balata belting, denoting, respectively, three, four, five, six, seven, eight, nine and ten plies of this material.

The scales are based on the fact that, within certain limits, the horse power transmitted by leather or balata belting varies directly as the speed and also directly as the width of the belt. As a standard we have taken that a single leather belt one inch in width travelling at one thousand feet per minute with a minimum arc of contact with the pulleys of 180° will transmit 1.5 H.P.; a double leather belt 2.4 H.P.; and a balata belt of three, four, five, six, seven, eight, nine and ten plies, 1.21 H.P.; 1.81 H.P.; 2.42 H.P.; 3.03 H.P.; 3.63 H.P.; 4.24 H.P.; 4.84 H.P. and 5.44 H.P., respectively. We have computed all the necessary results from this data and have arranged same in logarithmic progression upon the slide rule in the the scales *a*, *b*, *c*. A standard other than the one given by way of example may be taken, if desired, but from our many years of experience in connection with belting, we find the one stated above to be satisfactory.

To find the width of belt required for any given belt speed and horse power it is only necessary to set the horse power to be transmitted on scale *c* opposite the belt speed on scale *a* when the widths for the different kinds and plies of belting can all be seen at a glance opposite their indices, so that their relative values can be instantly compared. No cursor is required for the operation.

The arrangement is not only suitable for finding the widths of belts but for finding the quantity or factor of any one of the terms or scales *a*, *b* *c* corresponding to given quantities or factors of the other two terms or scales.

As shown in Fig. 3 the reverse side of the slide rule may be graduated for the purpose of solving the equation:—
Belt speed = π × diameter of pulley × revolutions per unit of time.

To this end the reverse side of the stock has an upper scale *d* graduated in terms of belt speed in feet per minute and a lower scale *e* graduated in terms of pulley diameters in inches while on the reverse side of the slide B is a scale *f* adjacent the scale *d* graduated in terms of revolutions per minute, the scale being graduated in logarithmic manner from computed results.

To find the belt speed when the pulley diameter and the revolutions per minute are given it is only necessary to set the index *g* on the slide B opposite the given diameter and then read off the belt speed on scale *d* opposite the given number of revolutions on scale *f*. When the belt speed has been found in this manner the width of belting required can be found by using the scales *a*, *b*, *e*, on the opposite side of the calculator in the manner already described.

Indices may be marked adjacent the scale *b* to suit kinds and plies of belting other than those given in the example and the calculator may be made in the form shown or in circular form with, or without, the scales *d*, *e*, *f* on the reverse side.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A calculator for power transmission belting comprising a body or stock, and a co-acting slide or equivalent, having scales graduated in terms of linear belt speed, horse power transmitted, and width of belting and also marked for various kinds as well as plies of belting, whereby the corresponding widths of all of these can be found simultaneously, at one operation of the calculator, for any given belt speed and horse power without mental calculation, substantially as described.

2. A calculator as claimed in Claim 1, the reverse side of which has scales graduated in terms of pulley diameters, revolutions per unit of time and belt speed per unit of time, substantially as described.

3. A slide rule calculator for power transmission belting made substantially as described and illustrated.

Dated this 29th day of June, 1923.

H. D. FITZPATRICK & Co.,
Chartered Patent Agents,
94, Hope Street, Glasgow.

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Fig.

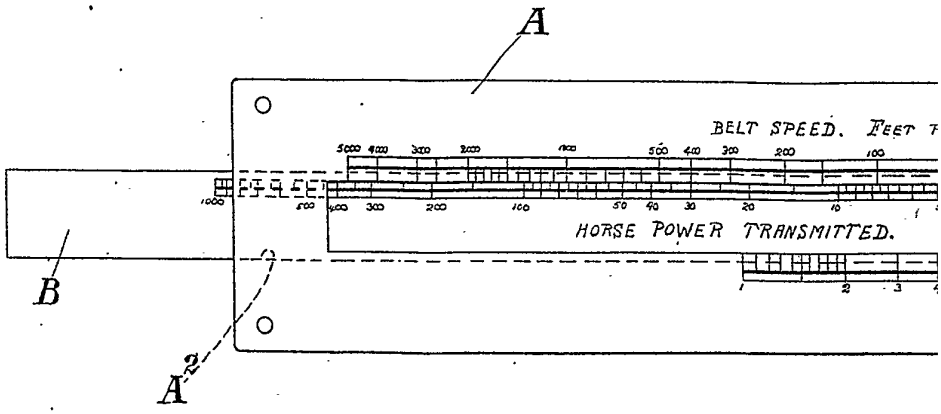


Fig.

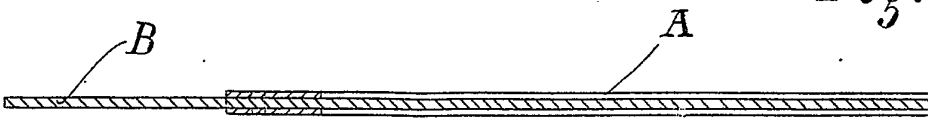


Fig.

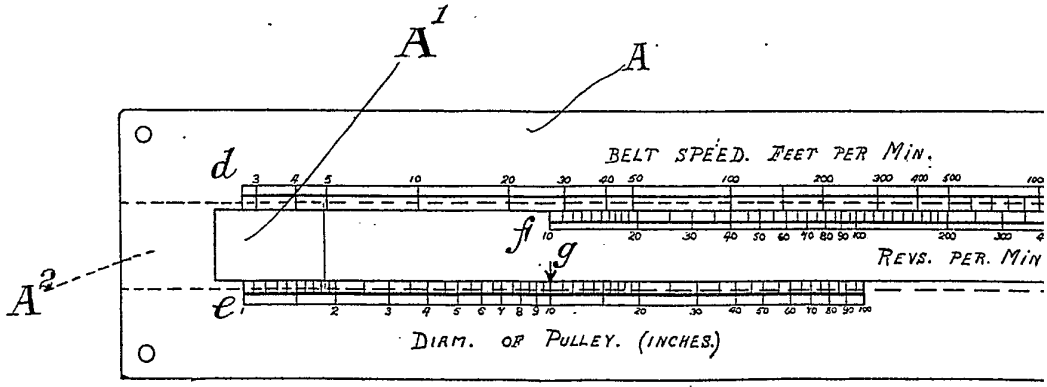


Fig. 1.

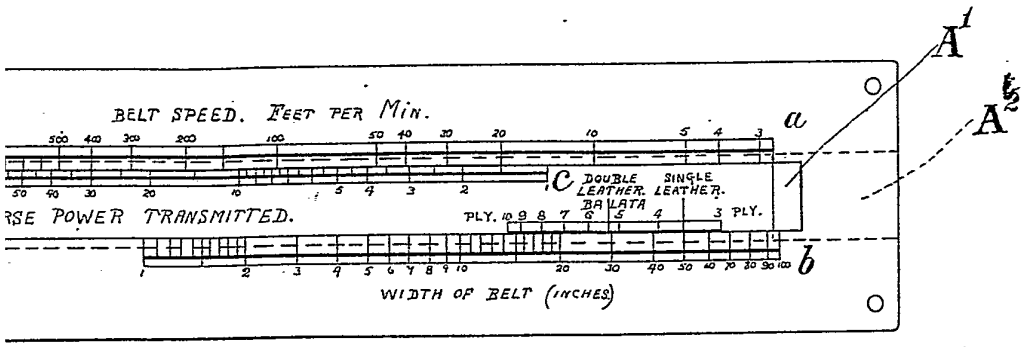


Fig. 2.

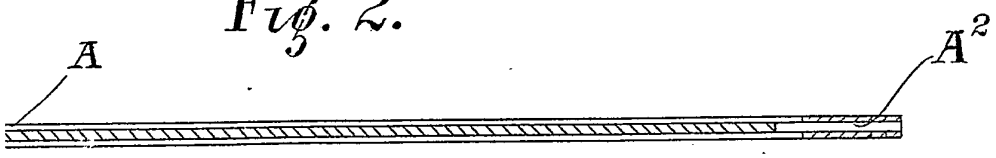
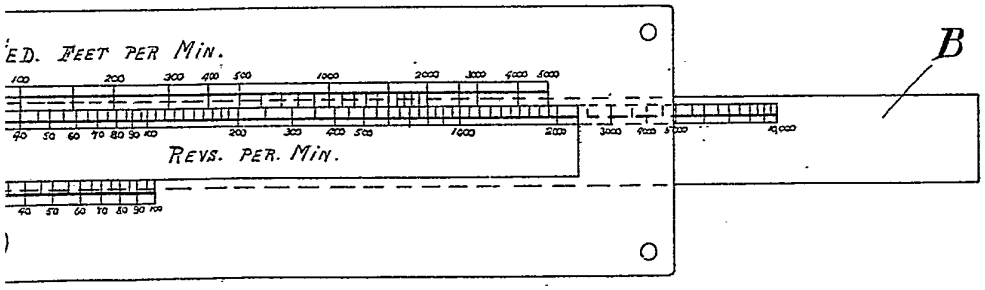


Fig. 3.



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[This Drawing is a reproduction of the Original on a reduced scale]

Fig. 1.

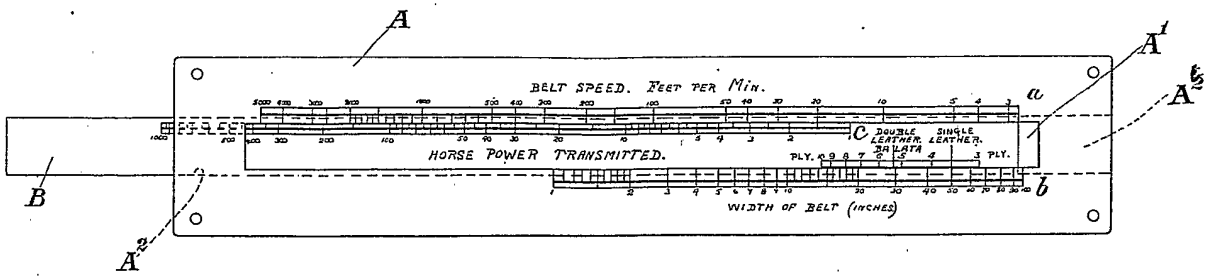


Fig. 2.

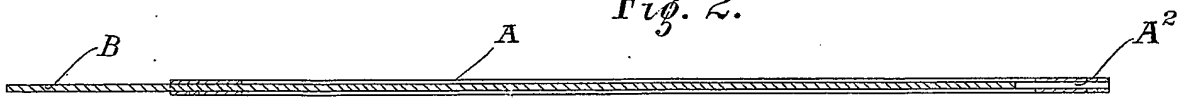
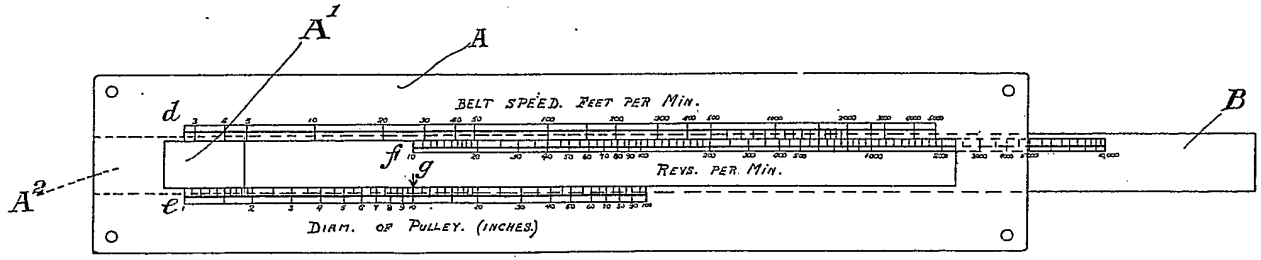


Fig. 3.



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