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COMPUTING DEVICE

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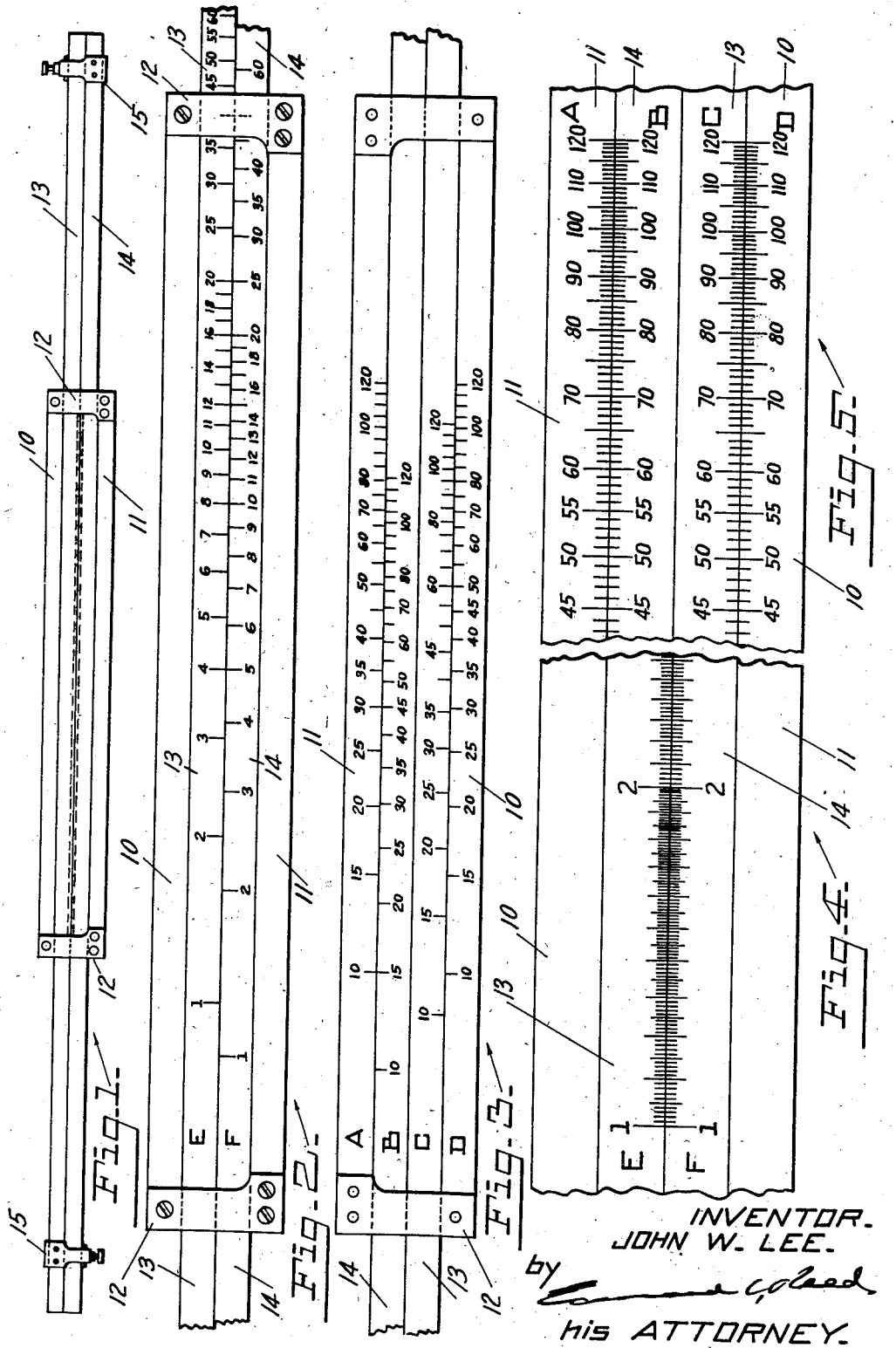

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

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COMPUTING DEVICE

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2 Claims. (Cl. 235—70)

This invention relates to a computing device and is designed more particularly for computing the number of teeth required in each gear of a gear combination in order to transmit power at a selected ratio. When it has been determined that power should be transmitted by a desired gear combination at a given ratio it is often very difficult to determine the exact number of teeth required in each gear of the combination in order to secure the selected ratio. In practice it has been customary to test various possible gear combinations to ascertain which will most nearly accomplish the desired results. To do this it is necessary to compute the ratio at which the power would be transmitted by the various gear combinations tested. There is no definite guide for selecting the gear combinations which are so tested and often it is necessary to test a large number of combinations before one is found that has the desired ratio. Obviously such a proceeding is tedious and unsatisfactory.

One object of the present invention is to provide a device which will enable the operator to determine quickly and easily the final result of a plurality of computations, such as the number of teeth required in each gear of a gear combination to transmit power at a selected ratio.

A further object of the invention is to provide such a device which may be manipulated after the manner of a slide rule.

A further object of the invention is to provide such a device which will be very simple in its construction and operation and which will indicate the desired gear combination without additional computations.

Other objects of the invention will appear as the device is described in detail.

In the accompanying drawing Fig. 1 is a front elevation of a computing device embodying my invention; Fig. 2 is an elevation of one side of such a device on a larger scale and with the slidable members partly broken away; Fig. 3 is a similar view of the other side of the device; Fig. 4 is an enlarged view of a portion of that side of the device shown in Fig. 2; and Fig. 5 is an enlarged view of a portion of that side of the device shown in Fig. 3.

In the drawing I have illustrated the preferred embodiment of my invention and have shown the same as comprising a normally stationary part consisting of two elongate bars 10 and 11 arranged parallel and rigidly connected one to the other. Preferably the two bars are connected at their ends by end pieces 12 which support the bars in laterally spaced relation to provide between them a guideway. Slidably mounted in the guideway between the bars 10 and 11 are two elongate bars 13 and 14 which are capable of longitudinal movement with relation one to the other and with relation to the stationary bars 10 and 11 but preferably fit snugly in the guideway so that they will be held by friction against accidental displacement. Preferably means are provided for connecting the slidable bars 13 and 14 one to the other in adjusted positions and, in the present instance, this is accomplished by clamping devices 15, one of which is rigidly connected to the bar 14 and slidably connected to the bar 13 and the other of which is rigidly connected to the bar 13 and slidably connected to the bar 14, so that both clamping devices will be operative in all positions of relative adjustment of the two bars.

Each of the four bars is provided on one side of the structure with a series of graduations. The graduations on the bars 11 and 10 being indicated in Fig. 3 at A and D and the series of graduations on the slidable bars 14 and 13 being indicated at B and C. The slidable bars 13 and 14 are also provided with a second series of indications which may be arranged in any suitable location with relation to the indications B and C, but to avoid possible confusion I prefer that the last mentioned series of graduations shall be placed on those sides of the bars opposite the graduations B and C, as shown at E and F in Fig. 2. The major divisions of each series of graduations are numbered.

All the series of graduations, or scales, have logarithmic graduations of the same order, such as are used on the ordinary slide rule, but the graduations are differently numbered. In the arrangement shown the graduations of series A, B, C and D, are numbered from 10 to 120, which covers the usual range in the number of teeth in the gears of a four gear combination. The graduations of series E and F are numbered from 1 to 60, and thus include the highest ratio obtainable with gears whose limits are 16 and 120. The spacing of the graduations shown in the drawing is illustrative only and is not necessarily accurate. It will be noted that the slidable bars 13 and 14 are of a length substantially greater than the bars 10 and 11 and the series of graduations E and F are of greater length than the other series and are finely graduated to facilitate the accurate setting of the same with relation one to the other.

The two series of graduations E and F on the slide bars are adjustable with relation one to the other by the longitudinal movement of these bars and are so arranged that any graduation on one bar may be brought into alinement with any graduation on the other bar and in operation these slidable bars are first adjusted to bring into alinement those graduations on the respective bars which indicate the selected gear ratio. As shown in Fig. 2, the selected gear ratio is four to five. After the slidable bars have been adjusted to indicate the selected gear ratio they are con-

nected one to the other for movement thereafter in unison, as by the clamping devices 15. The adjustment of the slidable bars 13 and 14 to indicate the selected gear ratio will, of course, similarly adjust the series of graduations B and C on the opposite sides of these bars to positions determined by the selected gear ratio. When the slidable bars have been so adjusted they may be moved in unison with relation to the stationary bars until graduations of the series B and C are brought simultaneously into substantial alinement, respectively, with graduations in the series A and D, and the numbers of the alined graduations, of the respective series, will indicate the number of teeth required in the respective gears of a four gear combination to transmit power at the selected ratio. As shown in Fig. 3, the graduation 30 of series A is in line with graduation 45 of series B and graduation 60 of series C is in line with graduation 50 of series D, thus indicating that the selected ratio of transmission may be secured with gears having respectively 30, 45, 60 and 50 teeth. It may not always be possible to simultaneously aline graduations in the respective series of graduations with exactness and, in some cases, the graduation of one series may not be in exact alinement with the graduation of the cooperating series. Under these circumstances the operator may compute the ratio at which power will be transmitted by the combination indicated and make such minor changes as may be necessary to secure the exact ratio, but when very fine graduations are used the ratio of the indicated gears will be so near the desired ratio that no change will be necessary. It will frequently happen that two or more graduations in each of series A and B will be in line simultaneously with the alinement of two or more graduations in series C and D and the operator then has his choice of two or more combinations. For example, it will be noted in Fig. 3 that graduations 10 of series A and 15 of series B are in alinement and that graduations 30 of series C and 25 of series D are substantially in alinement.

In using the device the operator first adjusts the slidable bars with relation one to the other to indicate on the series of indications E and F the ratio at which it is desired to transmit the power, as the ratio four to five of Fig. 2. He then clamps the two slidable bars one to the other, reverses the position of the device to bring the graduations A, B, C and D into view and adjusts the slide bars in unison with relation to the stationary bars until he finds two pairs of graduations in substantial alinement at the same time and, as has been stated, the numbers of the alined graduations indicate gear combinations having the desired ratio.

It will be obvious that if the operator desires to ascertain the ratio at which power will be transmitted by an available gear combination this may be done by adjusting the scales A—B and C—D to indicate the respective gears of that combination, and this adjustment of the scales B and C will result in the adjustment of the scales E and F to indicate the ratio at which the power will be transmitted by that gear combination. Likewise it will be apparent that the device may be used for computations other than gear combinations. For example, it may be used to compute at one setting the final results of a series of operations of various kinds, such as finding the product of two common fractions or selecting two factors of a common fraction, it being understood, of course, that the several series of graduations would be such as to conform to the desired computations.

While I have shown and described one embodiment of my invention I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a device of the character described, a normally stationary part comprising two members rigidly connected one to the other in spaced relation to provide a guideway between them and each having a series of graduations, and two members slidably mounted in said guideway for movement with relation one to the other and with relation to said stationary part and having on one side thereof cooperating series of graduations so arranged that a selected graduation on one slidable member may be moved into line with a selected graduation on the other slidable member to indicate a selected gear ratio, means beyond the end of said stationary part for rigidly securing said slidable members one to the other, each slidable member having on the other side thereof a second series of graduations to cooperate with the graduations on the adjacent stationary member, said second series of graduations being so arranged that the adjustment of said slidable members in unison with relation to said stationary members and with the first mentioned series of graduations on said slidable members in said selected positions will move graduations of the respective second series simultaneously into substantial alinement with graduations on said stationary members to indicate a gear combination determined by the relative adjustment of the first mentioned series of graduations on said slidable members.

2. In a device of the character described, two normally stationary elongate bars rigidly connected one with the other in spaced relation and each having a series of graduations, two elongate bars slidably mounted between and extending beyond both ends of said stationary bars in all operative adjustments thereof and each having a series of graduations, the series graduations on said slidable bars being adjustable with relation one to the other by the relative movement of said bars to indicate a selected gear ratio, operable means carried by said slidable bars near the ends thereof for rigidly connecting said slidable bars one to the other in any adjusted position thereof, each slidable bar having a second series of graduations to cooperate with the graduations on the adjacent stationary bar, the relative positions of the two second series of graduations being so determined by the relative adjustment of said slidable bars to indicate said selected gear ratio that the movement of said slidable bars in unison with relation to said stationary bars will cause certain graduations of the two second series of graduations to register simultaneously with the graduations on the respective stationary bars to indicate the number of teeth required in each gear of a four gear combination to transmit power at the selected ratio.

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