July 14, 1953 C. H. WROBEL 2,645,016

REDUCING AND ENLARGING MACHINE FOR DRAFTSMAN AND DESIGNERS

Filed Feb. 6, 1952 2 Sheets-Sheet 1

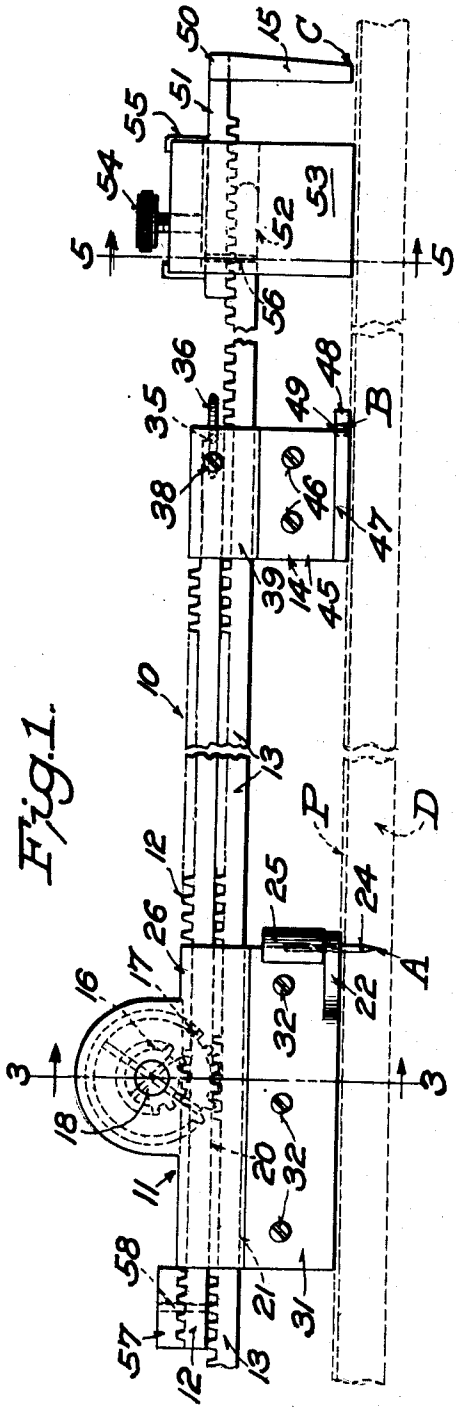


Fig. 1.

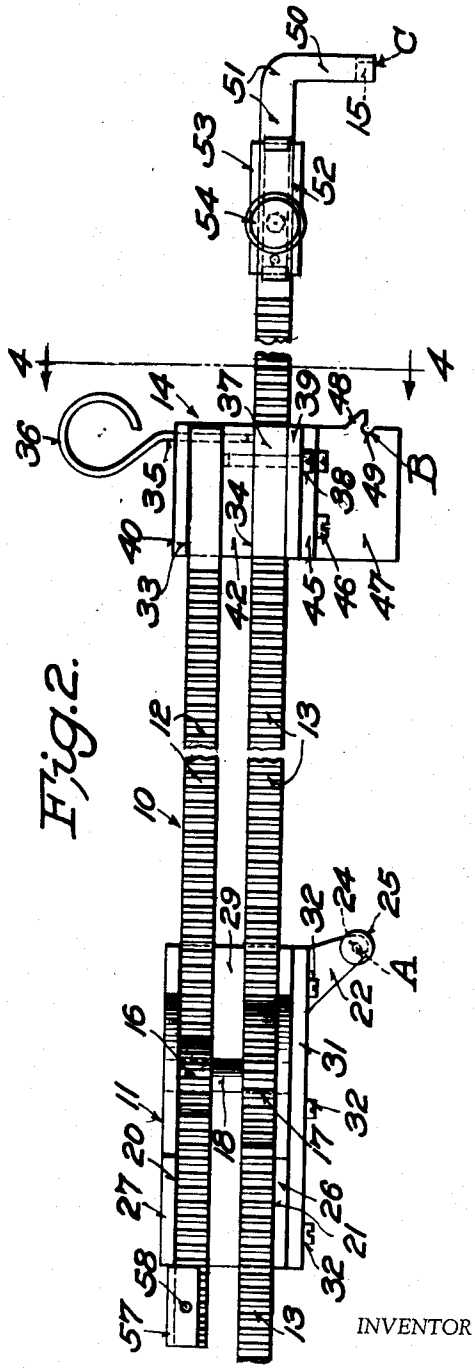


Fig. 2.

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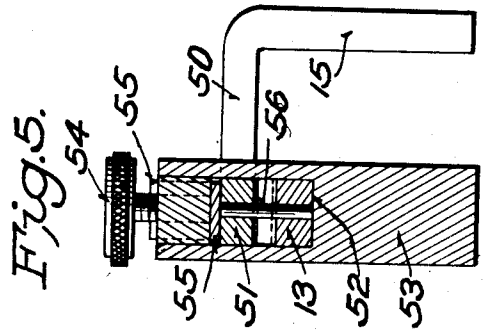


Fig. 5.

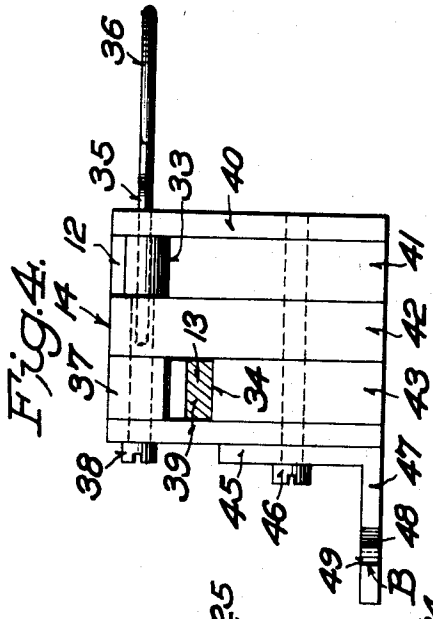


Fig. 4.

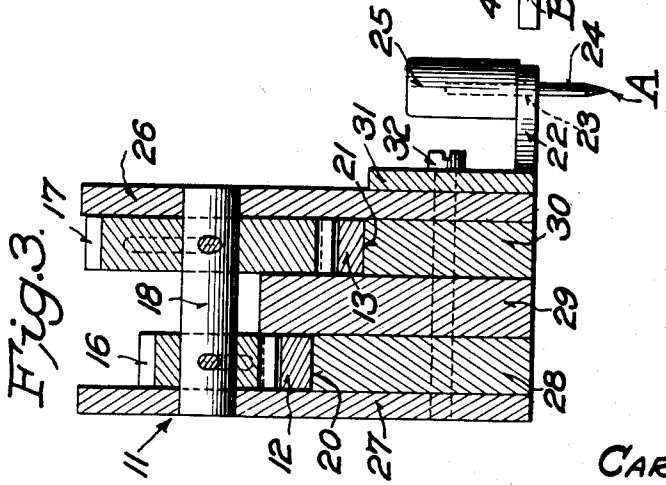


Fig. 3.

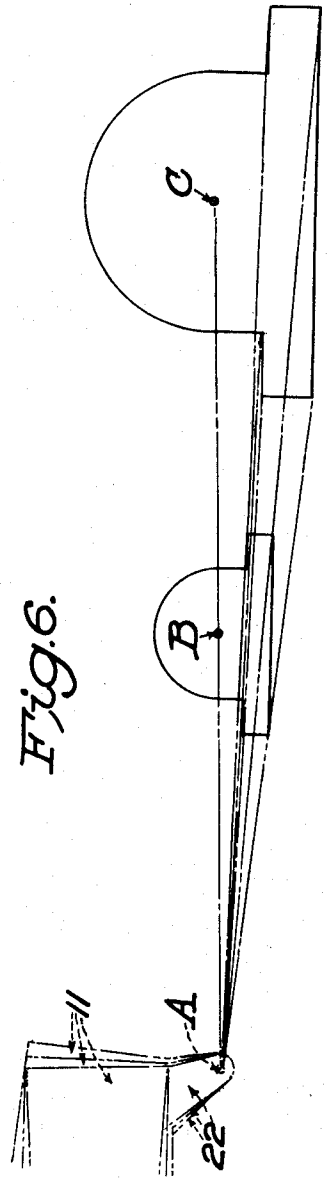


Fig. 6.

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Patented July 14, 1953

2,645,016

UNITED STATES PATENT OFFICE

2,645,016

REDUCING AND ENLARGING MACHINE FOR DRAFTSMAN AND DESIGNERS

Carl H. Wrobel, Detroit, Mich.

Application February 6, 1952, Serial No. 270,150

3 Claims. (Cl. 33—23)

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My invention relates to scaling instruments or machines used by draftsman and designers for reducing and enlarging drawings or the like.

The principal object of the invention is to provide a simple, lightweight and relatively inexpensive machine of this character which may be readily moved about the drawing room and quickly and easily applied to and removed from drawing boards.

Another object of the invention is to provide a device or machine of the above indicated character which, when in use, will have its parts so disposed that both the pattern or drawing being reduced or enlarged and the reproduction thereof will be close to each other and in the direct sight of the user of the instrument.

Another object is to provide a machine of this character which is pivotally mounted on the drawing board by a single pin of the thumbtack type which may be easily pushed into the drawing board and as readily removed.

With the above and other objects and advantages in view, the invention resides in the novel combinations and arrangements of parts and the novel features of construction hereinafter described and claimed, and illustrated in the accompanying drawings which show the present preferred embodiment of the invention.

In the drawings:

Fig. 1 is a front elevation of my improved reducing and enlarging machine with parts broken away;

Fig. 2 is a top plan view with the parts positioned as shown in Fig. 1;

Fig. 3 is a cross section on an enlarged scale taken on the line 3—3 in Fig. 1 looking in the direction of the arrows;

Fig. 4 is a similar cross section on the line 4—4 of Fig. 2;

Fig. 5 is a similar cross section on the line 5—5 of Fig. 1; and

Fig. 6 is a diagram showing the use of the machine.

In Fig. 1 the improved reducing and enlarging machine, designated as a whole by the numeral 10, is shown positioned on a sheet of paper P applied to a drawing board D. The instrument 10 comprises a main body member or block 11 which is pivoted to the board to swing about a fixed pivot point A and through which extend two parallel rack bars 12 and 13 simultaneously slidable in the same direction but at different ratios of movement. The rearmost and slower moving rack bar 12 carries at one end a marker block or member 14 which travels along the

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other rack bar 13 and carries a marking point B in the form of an open notch adapted to receive the point of a pencil so that a dot or mark may be made on the paper. The foremost and faster moving rack bar 13 has at its corresponding end a tracer arm 15 with a point C which is moved over the pattern or drawing that is to be reduced. In the embodiment of the invention illustrated the two rack bars are moved in a ratio of two to one by small and large gears 16, 17 fixed to a shaft 18 journaled in the body 10, the two gears being in mesh with the teeth of the bars 12, 13 respectively. Thus when the tracer point C is moved toward or from the pivot A a predetermined distance, the marker point or notch B will be moved one half of that distance in the same direction. It will be noted upon reference to Fig. 2 that the points A, B and C are in perfect alignment lengthwise of the device, and that they are disposed forwardly of the body and the rack bars. Hence the user will have a clear view of both of the drawings which will be closely adjacent to each other because the points B and C are carried by the corresponding ends of rack bars that move in the same direction.

The body member 11 is of generally rectangular shape having a flat bottom to slide on the paper or like sheet P. In its top are upwardly open longitudinal guide channels 20 and 21 to slidably receive the rack bars 12 and 13 respectively. These bars have their teeth on their upper edges and are retained in the channels by the disposition of the gears 16, 17 immediately above them as seen in Fig. 3. Projecting forwardly from the front wall of the body 11 is a flat arm 22 disposed in contact with the paper and formed with a hole 23 to receive a thumbtack-like pin 24 having a cylindrical head or finger piece 25 at its top. The pin 24 is pushed into the drawing board to attach the device to the latter, and it forms the pivotal axes A about which the device swings. The arm 22 projects at an angle so as to dispose the hole 23 in the plane of the outer end of the body 11. While the body 11 may be made in one piece, I have shown it formed of a front plate 26, a back plate 27, three intermediate plates or blocks 28, 29, 30 and a bracket plate 31, these upright plates being fastened together by two or more machine screws 32 or by other suitable means. The arm 22 is formed integral with the bracket plate 31. The other plates form the guide channels 20 and 21 as seen in Fig. 3. The side plates 26 and 27 have upwardly extending ears formed with alined bearing openings for the ends of the shaft 18 and

serve as shields or guards for the two gears which are fixed to the shaft by pins as shown or otherwise.

The traveling marker member 14 is also in the form of a rectangular or square block with a flat bottom to slide on the paper. It thus supports the extended portions of the rack bars and assists in holding them parallel with each other and the drawing board. In the top of the block or member 14 are two longitudinal channels 33 and 34 which receive the bars 12 and 13 respectively. The rack bar 12 has its right hand end removably fastened in the channel 33 by a pin 35 with a finger piece or loop 36 at its outer or rear end. The rack bar 13 is slidable in the channel 34 and is retained therein by a rectangular guide strip 37 disposed over the teeth of the rack bar and filling the upper portion of the channel, the strip or bar 37 being removably secured in position by one or more screws 38. While the block 14 may be variously constructed, it is shown as composed of a front plate 39, a rear plate 40, three intermediate plates 41, 42, 43 and a bracket plate 45, all fastened together by screws 46. The bracket plate 45 is right angular having at its bottom a forwardly projecting flat portion 47 which slides on the paper. The portion or flange 47 is rectangular and of the same length as the block 14 as seen in Fig. 2. On the outer or right hand edge of the flange 47 is a projection 48 and at the juncture of the forward edge of the projection and the outer edge of the flange is a notch 49 of a size to receive the point of a lead pencil. This notch forms the above mentioned point B.

The tracer arm 15 is vertically disposed and of rectangular shape in cross-section so that one of the corners of its lower end forms the point C. The arm 15 depends from the forwardly projecting portion 50 of a right angular member 51. The longitudinally extending portion of the latter is disposed in overlapping engagement with the outer or right hand end of the rack bar 13 to which it is detachably and adjustably secured. As shown in Fig. 1, the portion 51 has on its bottom teeth to engage the teeth of the bar 13, and these interengaged and overlapped portions are disposed in a rectangular passage 52 extending longitudinally through a combined clamping and supporting member 53. The latter is in the form of a vertically disposed rectangular block with a flat bottom slidable on the paper so that it forms a supporting leg for the outer end of the rack bar 13. A thumb screw 54 is disposed in a threaded hole in the top of the member 53 to force the overlapped portions of the bars 13 and 51 downwardly to clamp them in the opening 52. If desired a thin metal strip or shim 55 may be positioned in the top of the opening 52, as shown in Fig. 1, for the end of the set screw 54 to thrust against. Also if desired the overlapped portions of the bars 13 and 52 may be connected by a pin 56 to prevent any endwise movement of one bar relative to the other.

To prevent the rack bar 12 from being pulled out of the body 11 I provide a stop 57 at the inner or left hand end of that bar for engagement with the corresponding end of the body. Such stop may be in the form of a block positioned on the bar 12 and fastened by a pin. On the bottom of the stop block may be formed teeth to mesh with those on the rack bar. To permit the device to be shown on a larger scale on the drawings, parts of the two rack bars have been omitted. While the device may be made in various sizes, I have obtained good results in quickly reducing drawings by a device having an overall length of about 40", a width of 1⅝", and a height of 2", and weighing only 2¼ pounds. The device has been described as a reducing instrument but for enlarging the procedure would be reversed between points B and C. It is also to be understood that the ratio of movement of the rack bars may be changed by varying the ratio of the two gears. The machine may be sold in sets of different ratios, but when a machine of the described ratio has been used to reduce a drawing to one half scale, the operation may be repeated on the half scale drawing to obtain a quarter scale drawing, etc.

From the above detail description it is believed that the use and operation of the machine will be understood and especially in connection with the diagram shown in Fig. 6. In this view the body 11 with its arm 22 swings about the pivotal axis A, the pin 24 in the drawing board, when the tracer arm 15 is shifted to move the point C to different places or point on the large view at the right in Fig. 6 which is to be reduced one half. When the point C is at each of the places or points a pencil is used to make a dot in the notch B. The various dots are then connected to make the reduction shown.

From the foregoing, taken in connection with the accompanying drawing, it will be seen that novel and advantageous provision has been made for carrying out the objects of the invention, and while preferences have been disclosed, attention is invited to the possibility of making variations within the scope of the invention as claimed.

I claim:

1. A light-weight portable scaling instrument for draftsmen and designers comprising a pair of parallel rack bars having teeth on their upper surfaces, an upright body of rectangular shape having in its top upwardly open longitudinal channels in which said rack bars are slidable, a pair of opposed bearing ears projecting upwardly from the front and rear sides of said body, a shaft journaled in said ears and having fixed thereto a pair of gears of different ratios for engagement with the teeth of the respective rack bars to slidably retain the latter in their channels, an arm projecting forwardly from said body and having a hole to receive a pivot pin insertable in a paper covered drawing board to pivotally mount the body with said rack bars extending beyond one end of the latter, means spaced horizontally from said one end of the body to support said extended ends of the rack bars, said means including an upright block provided with a flat base to slide on the paper on the drawing board and with a guideway in its upper portion through which one of said rack bars extends and is slidable, means removably fastening the other of said rack bars to said block, a horizontal flange projecting forwardly from the lower portion of said block and having a notch to receive a pencil point, and a member carried by the end of said rack bar which extends beyond said block and provided with a pointer, said hole, notch and pointer being longitudinally alined.

2. The structure of claim 1 in which said body includes front and rear side plates and an intermediate portion, said side plates forming portions of said channels and having said bearing ears on their upper edges, and means for detachably fastening said side plates to said intermediate portion.

3. The structure of claim 1 in which said mem-

ber is a bar of right angular form with one of its arms projecting forwardly and then downwardly to form said pointer and its other arm projecting longitudinally in overlapping contact with the rack bar extending from said block, together with a second upright block having in its upper end a passage to receive said overlapping portions of the right angular member and its associated rack bar, and a set screw for removably clamping said overlapped portions in said passage, said second block having a flat bottom to slide on the drawing paper and support

said pointer and the extended rack bar which carries it.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,349,250	Albee	Aug. 10, 1920

FOREIGN PATENTS

Number	Country	Date
18,174	Great Britain	1893
791,503	France	Sept. 30, 1935