Sept. 3, 1957 C. E. JUSTIS 2,804,691

MOBILE DRAFTING APPARATUS

Filed Aug. 13, 1953 3 Sheets-Sheet 1

FIG. 1

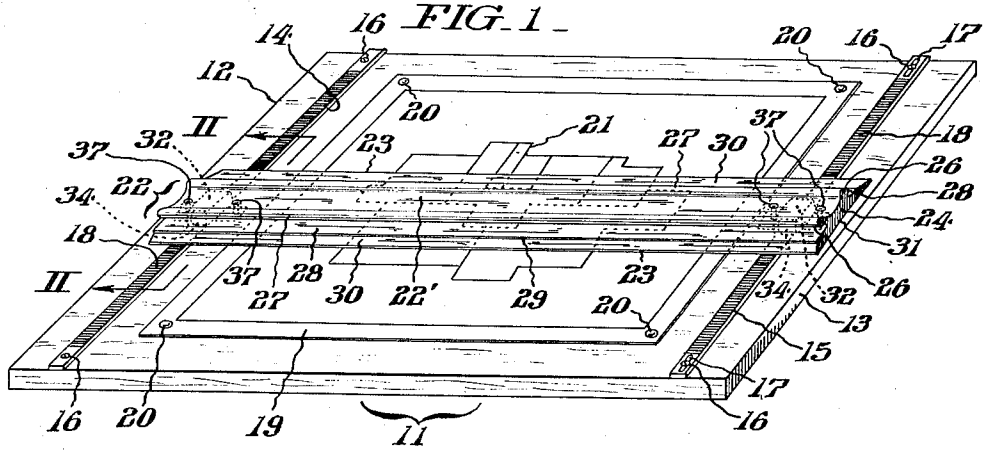


FIG. 2

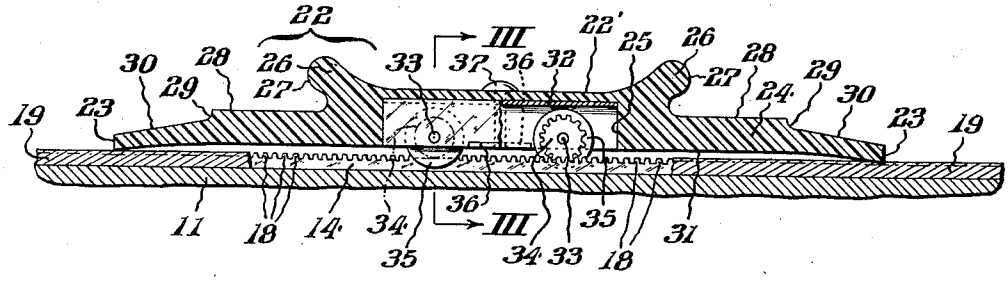


FIG. 3

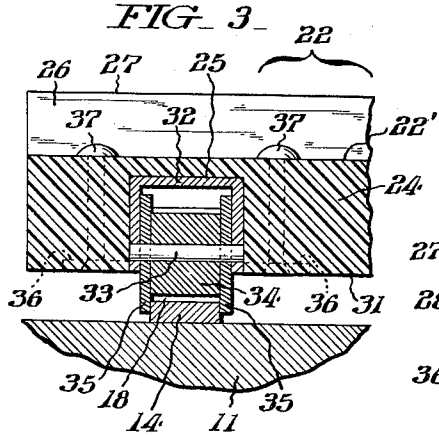
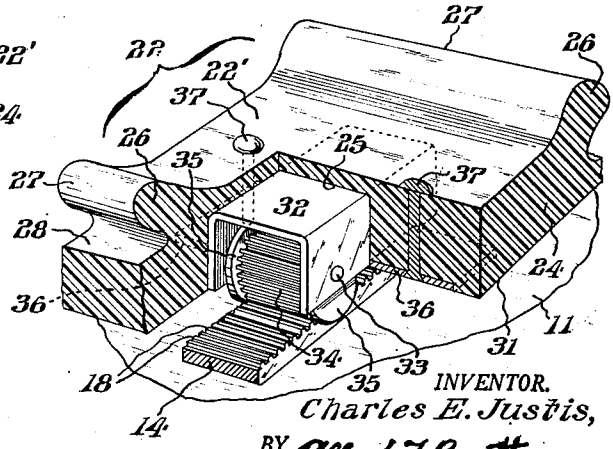


FIG. 4



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FIG. 5.

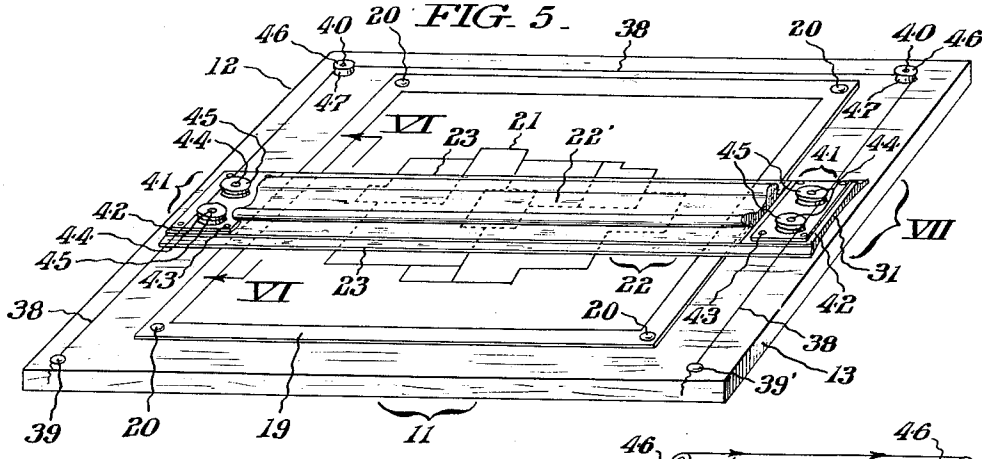


FIG. 5a.

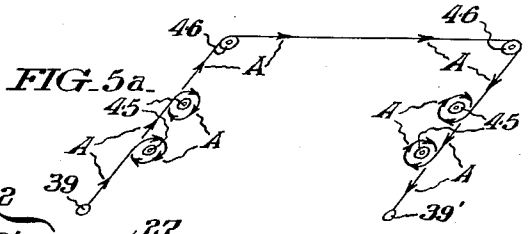


FIG. 6.

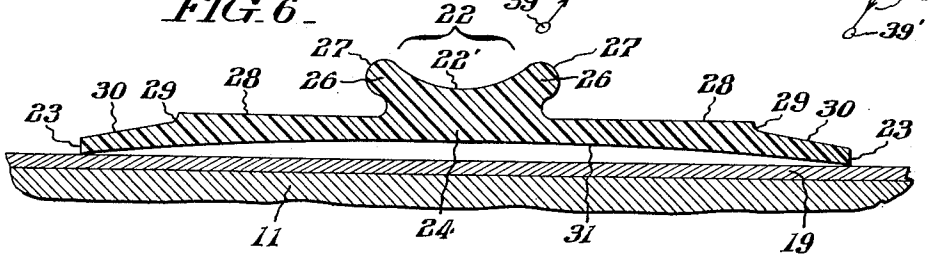
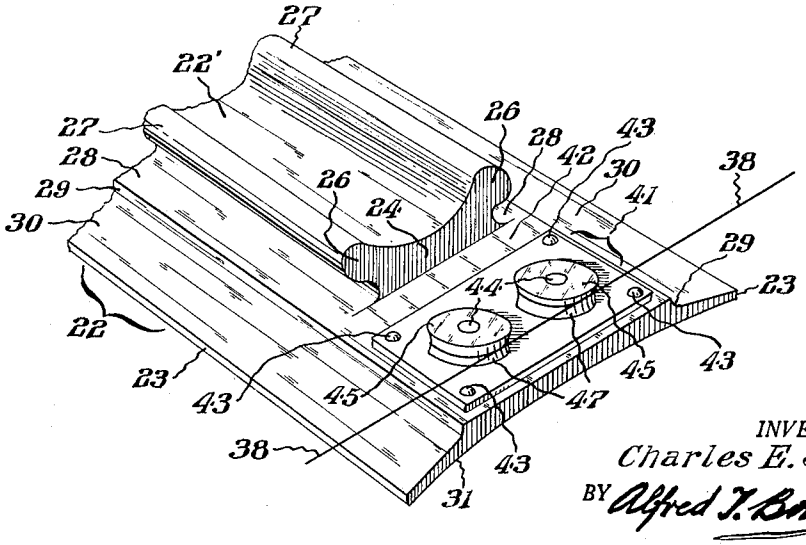


FIG. 7.



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FIG. 8

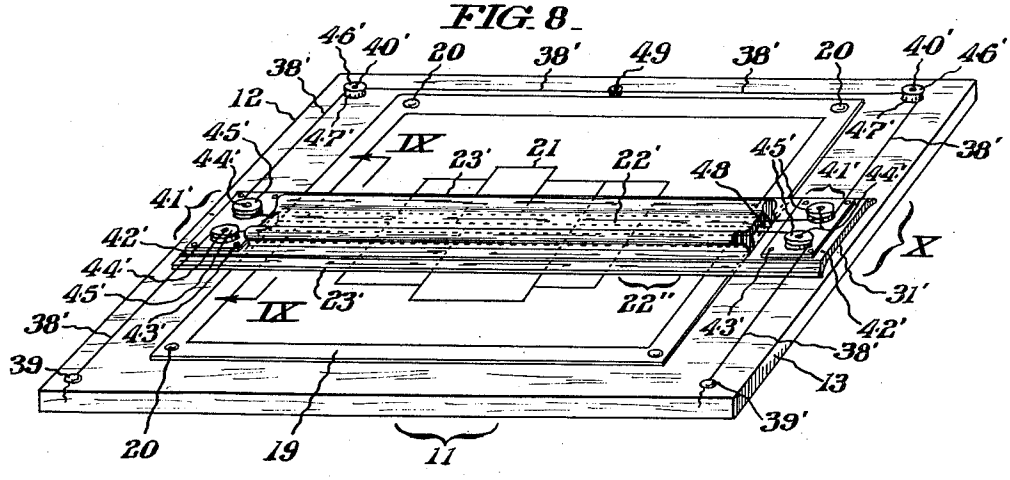


FIG. 9

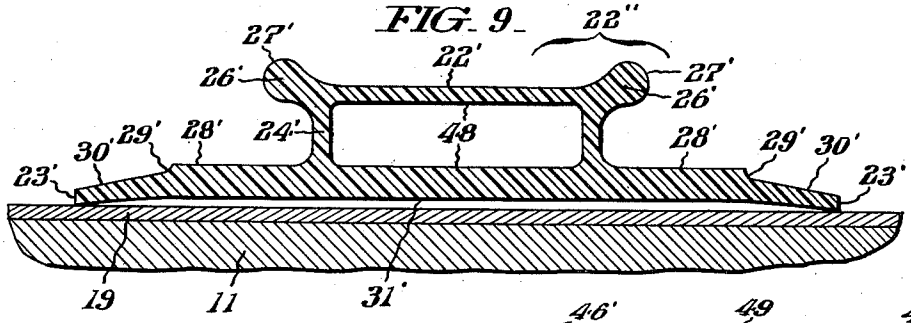


FIG. 8a

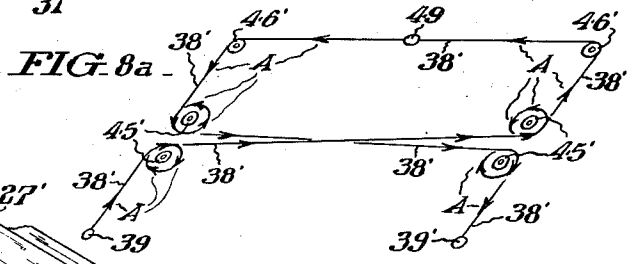
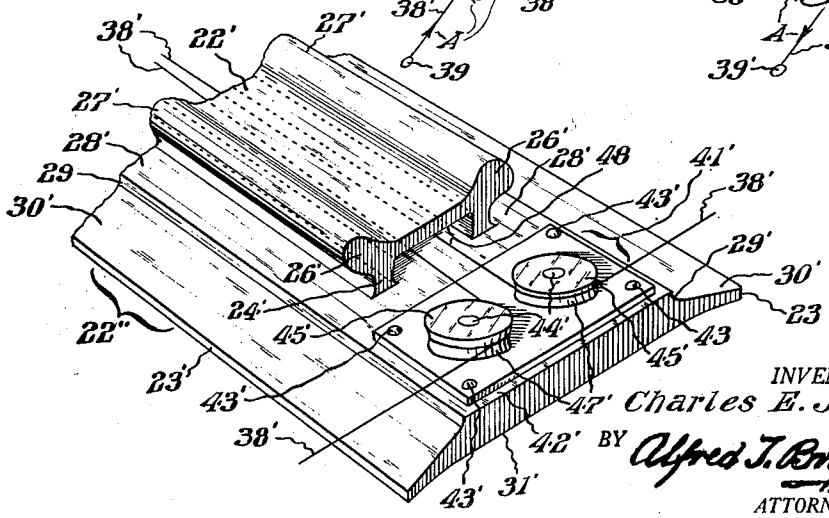


FIG. 10



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2,804,691

MOBILE DRAFTING APPARATUS

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Application August 13, 1953, Serial No. 374,072

1 Claim. (Cl. 33—80)

This invention has general reference to mobile drafting apparatus and, more particularly, to the species or type involving a straight-edge with associated tractable means whereby said straight-edge may be moved, relative to the working surface of a drafting board, for the purpose of drawing parallel lines in horizontal, or otherwise desired, spacial parallelism.

Such mobile drafting apparatus, as heretofore designed, have generally involved the employment of a flexible wire or twine trained about a series of pulleys, or analogous means, mounted to the drawing board; but such means have proven, in practice, unsatisfactory and inevitably develop irregularities in movement of the straight edge, due to stretch or shrinkage of said wire or twine.

Another disadvantage inhering to previous mobile drafting apparatus, of the species above referred to, is due to their complicated make-up and construction, as well as being difficult to install with the needful accuracy.

Accordingly, my invention has for its primary object to provide an operatively effective mobile drafting apparatus, of the above indicated species, characterized by refinements that ensure positive action, with freedom from developing irregularities during usage.

Another object of my invention is to provide a mobile drafting apparatus, of the foregoing indicated type, including a novel form of straight-edge that is of a design and cross-section highly resistive to the development of frictional restraint, incidental to movement over the paper, or tracing cloth on which the drawing is produced.

A further object of my invention is to provide a mobile drafting apparatus of the species above indicated, which is simple to construct, comparatively cheap to manufacture, and appreciably smoother in action than the generality of such previously known apparatus.

Other objects with ancillary advantages, will hereinafter appear as the nature of my invention is more particularly described; while said invention essentially consists in the novel structural features and combinations of parts, illustrated by the accompanying three sheets of drawings, and the novelty whereof is more specifically defined in the claim.

In the drawings:

Fig. 1, Sheet 1, is a perspective view of a conventional drawing-board equipped with a typical embodiment of the novel straight-edge, and an associated direct-acting mobile means for operating said straight-edge.

Fig. 2 is a detail section, taken approximately on the plane designated by the angled-arrows II—II in Fig. 1; but drawn to a larger scale for purposes of clarity.

Fig. 3 is a cross-section taken on the plane indicated by the angled-arrows III—III in Fig. 2, but drawn to a relatively exaggerated scale for the clearer showing of important details.

Fig. 4 is a fragmentary perspective view, mainly in vertical section, of a portion of the novel straight-edge and associated direct-acting mobile mechanism.

Fig. 5 is a perspective view, somewhat similar to Fig. 1 of an evenly-tensioned single-cable or modified form

of my invention, which is hereinafter fully described, and more particularly adapted for attachment to a conventional drawing-board, by the user thereof, within the marginal confines of such board.

Fig. 5*a* is a line diagram of the single-cable means shown in Fig. 5 and hereinafter fully described.

Fig. 6 is a cross-section taken on the plane indicated by the angled-arrows VI—VI in Fig. 5, but drawn to a larger scale for better illustration of important details of the straight edge.

Fig. 7 is a fragmentary perspective view of one end portion of the straight-edge, taken as typically indicated by the bracket VII, at the right-hand side of Fig. 5, but drawn to an enlarged scale for clarity in illustration.

Fig. 8 is a perspective view of a tandem, evenly-tensioned, cable-means, of my invention, along the lines of Fig. 5, and in which the straight-edge is lengthwise hollowed-out for passage therethrough, with lateral guidance for an intermediate portion of the said cable-means.

Fig. 8*a* is a line diagram of the tandem cable means shown in Fig. 8 and hereinafter fully explained.

Fig. 9 is an enlarged-scale cross-section taken on the plane IX—IX of Fig. 8, as viewed in the direction of the respectively-associated angled-portions of said arrows; and

Fig. 10 is a fragmentary perspective view of an outer end portion of the straight-edge, as designated by the bracket X at the right-hand of Fig. 8.

In the drawings aforesaid, like characters of reference are applied to corresponding parts in all the views and, in the following descriptive matter, specific terms are employed for the sake of brevity. However, it is to be understood the scope of my invention is not thereby limited, as each such term is intended to embrace all equivalents which perform the same function for an analogous purpose.

Referring generally to the accompanying drawings; the reference character **11** comprehensively designates a conventional drawing-board, and, primarily to Figs. 1–4, it will be observed said board **11** is equipped, proximate the left-and-right hand side edges **12**, **13** respectively, with comparatively narrow rigid toothed-rack components **14**, **15**. The rack component **14** is conveniently, although not essentially, securely attached to the board **11** as by clamp screws **16**; whereas the right-hand rack-component **15** is provided with elongate slots **17** for passage of clamp screws **16**, in order that the teeth **18** of both rack components **14**, **15** may be accurately "set" and firmly secured in directly aligned spaced registration, for a purpose hereinafter further referred to.

A sheet of drawing paper **19** is shown in Figs. 1, 5 and 8, more particularly, as applied to the drawing board **11** by aid of conventional thumb-tacks **20**; while **21** indicates a building floor-plan, for instance, as being drawn thereon; although it will be readily understood any other right-lined image can be drawn thereon.

Turning now to the straight-edge **22** of Figs. 1–4, more particularly, the same is preferably made of transparent plastic, and conveniently of the cross-section best understood from Figs. 2–4. In other words the straight-edge **22** is of blade or strip formation to embody parallel edges **23**, **23**, with an intermediate and medially lengthwise stiffener or body-portion **24**. The body-portion **24**, it is to be particularly remarked, is provided with relatively-lateral downwardly-open rectangularly-contoured pockets **25** proximate the ends of said straight-edge **22**, and located to over-travel the track components **14**, **15** aforesaid, as hereinafter fully clarified. Additionally the straight-edge body-portion **24** embodies opposingly-inclined spaced-ribs **26** having rounded-edges **27**, that afford grippage when moving the straight-edge **22** (up and down) vertically of the drawing paper, or the like **19**. Additionally, it is to

be remarked that the respective straight-edge rib rounded-edges **27** merge with relatively-reduced parallel flats **28**, slightly-inclined outwards and downwardly, relative to the horizontal, and stepped down at **29** to provide flanking sections **30** tapering to the straight-edge parallel edges **23** hereinbefore referred to. The under face of the straight-edge **22**, it is to be particularly noted is slightly concaved, transversely, as indicated at **31**, Figs. 2, 6, 7, 9 and 10, so that the parallel-edges **23**, **23**, thereof make line contact on the drawing paper **19** only; whereby the frictional contact of the parts **19** and **22** is reduced to a minimum; while the operational movement of the part **22** is raised to an optimum, due to the practical elimination of frictional resistivity developing between said parts **19** and **22**. It is, also, to be noted that the grippage-ribs **26**, **26**, define therebetween a troughing or rest **22'** for temporary retention of pencils, pens, and other articles commonly used by draftsmen, without slippage of said items onto the drawing paper **19** and rolling from-off the board **11**.

Referring now to the rectangular downwardly-open pockets **25** in the straight-edge **22**, it will be observed that they, respectively, afford snug inset-housing for an inverted channel-section hanger-device **32**, in turn providing journal bearing, by aid of spaced spindles **33**, for duplex tooth-gears or pinions **34** with associated anti-friction material spaced washers or guide flanges **35** for co-action with the registering toothed-rack **14** or **15**, in an obvious manner. It will be, of course, understood that the teeth **18** of the respective rack components **14**, **15** and pinions **34** are complemental to ensure positive and smooth operation of the straight-edge **22**. It is likewise to be observed, that the hanger devices **32** are rigidly secured in the respective pockets **25** by aid of an inset transverse clamp-plate **36**, preferably intermediate the duplex pinions **34**, and associated hold-fast elements or rivets **37**. Furthermore, it is to be particularly noted that, by use of the spaced duplex-pinions **34**, the straight-edge **22** is at all times positively maintained in balance, or kept in parallelism with respect to the rack components **14**, **15**; and thereby restrained against any lateral "rocking" motion.

Turning now to the modified form of my invention illustrated in Figs. 5–7, inclusive, all parts corresponding with those previously described are indicated by like reference characters, to obviate unnecessary repetitive explanation and, accordingly, only those items which characterize this form or type of my invention will now be particularly set forth. In the first place, it is to be observed that the straight-edge **22** corresponds with the one previously explained, excepting that it is comparatively of lighter weight and smaller cross-section; whereas the rack-and-pinion means **14**, **15** and **34**, for motivating the straight-edge **22** relative to the drawing-board **11**, is substituted by an equally-tensioned single-strand element **38** and associated anchorages **39**, **39'** fixed guide-points **40** and tractable-devices **41**. The tractable-devices **41** are, preferably, rigidly attached to the stepped or shouldered ends **42** of the straight-edge body-portion **24**, as by rivets **43** or the like, see Figs. 5 and 7 to best advantage. It is, also, to be particularly remarked, that each tractable-device **41**, is preferably in the form of a plate including vertical studs or pins **44** affording journal-bearing for horizontally-rotative circumferentially-grooved pulleys or spools **45**. Attention is further drawn to the fact that the stationary guide-points **40**, above referred to, are provided with similar circumferentially-grooved small spools **46**; also that the concavity of the groove **47** around the respective spools **45** and **46** is critical, or of a curvature that they normally tend to jointly maintain the strand element **38** centrally thereof, whereby frictional development therebetween, during operation of my invention, is reduced to zero, for all practical purposes.

Referring now to the placement or winding of the single-strand element **38**, and assuming a start be made at the left-hand anchorage **39**, and by noting the associated direction-indicating arrows A, Fig. 5*a*, that said element **31** is coiled once about the left-hand lower spool **45** with a clockwise turn, then drawn up and similarly coiled about the upper left-hand spool **45**. From the just mentioned spool **45** the strand element **38** is next passed partially about the upper left-hand guide-point **46**, and correspondingly on to the right-hand guide-point spool **46**; whereupon the strand element **38** passes down to the upper right-hand tractable-device spool **45** and coiled once about the latter with a right-hand turn; whereupon it is similarly passed around the associated lower spool **45** and, from the last-mentioned spool **45** it is brought to and secured by the right-hand anchorage **39'**. From this explanation, and due to the evenly-tensioned character of the strand-element **38** it will be clearly understood that the tractability of the straight-edge **22**, as a mobile unit, is positively attained; as the turns and bends effected therein, in the aggregate, conduce to the definite removal of any possibility of frictional grippage developing.

Referring now to Figs. 8, 9 and 10, which show what I preferably have, for the purpose of differentiation termed a tandem, or further modified, form of my invention, along the lines of that illustrated by Figs. 5–7, inclusive, and wherein like parts, to those previously set forth, are hereinafter designated by corresponding characters of reference in order to dispense with unnecessary repetitive descriptive matter. Firstly, it is to be observed that the straight-edge body-portion **24'** is provided with a longitudinal-bore **48** conveniently, although not essentially, of rectangular cross-section, as best shown in Figs. 9 and 10. In other words, the bore **48** is preferably of comparatively shallow depth relative to its width for a purpose later on herein again referred to. In addition it is to be particularly noted, that the equally-tensioned strand element **38'**, in this form of my invention, is of greater length than that used in connection with the species shown by Figs. 5–7 inclusive, also that said strand **38'** is divided, and firmly held or secured, medially of its length by means of a suitable clamp-device **49**, Fig. 8 only, for reverse placement or directional-guidance. In other words, it is to be understood that the form of my invention, now being described, differs from that shown by Figs. 5 to 7, mainly in the provision of the straight-edge **22''** with the longitudinal bore **48**; and the use of a stationary or fixed clamp-device **49** for the purpose of dividing the substantially-longer strand element into relatively opposing equal tractive sections **38'** which jointly serve to effectively and positively balance the movement of the straight-edge **22''**. It is also to be remarked, and as better understood by aid of the diagram, Fig. 8*a* that the strand-element **38'**, starts at the anchorage **39** and is given a right-hand turn around the left-hand lower guide-spool **45'**, and then passed through the straight-edge longitudinal-bore **48**, whereupon it is given a counter-clockwise turn about the upper right-hand guide-spool **45'**; and from said upper spool **45'** such strand-element **38'** is passed to the stationary guide-point **46'** and on to securement by the clamp-device **49**, Figs. 8 and 8*a*. The free-portion of the strand-element **38'** is thereupon passed to, and partially-trained about the left-hand guide-point **46'** and downwardly to the upper guide-spool **45'**; thence through the straight-edge bore **48** to the lower right-hand guide-spool **45'**, around which it is given a single right-hand turn and led to the right-hand anchorage **39'** where it is secured, as previously explained in connection with Figs. 5–7.

From the foregoing description it is felt that the manner of operating the straight-edge **22** or **22''** will be self-evident, or well understood by any draftsman in that it is moved up or down relative to the board **11** in accordance with prevailing practice. It will, however, be equally well appreciated that either of the species shown by Figs. 1–4, Figs. 5–7 and Figs. 8–10; are smoothly operable with a minimum of effort incidental to the elimination of all factors that, heretofore, tended to develop frictional resistance. It is also to be noted that by providing

one of the rack-components **15**, as shown in Fig. 1, with means enabling its lengthwise adjustment of the items **16, 17**, the racks **14, 15** can be readily "set" and locked with their teeth **18** in accurate registration, and so maintained during usage of the straight-edge **22**. Also it is to be noted that in the modification, shown by Figs. 8–10, the intersection of the strand-element portions **38'** tends to greatly enhance the well balanced operational effectiveness of the related species or form of my invention.

In the hereinbefore set forth description of the straight edge structure it is stated that the oppositely inclined spaced ribs **26** of Figs. 1 and 6 afford a grippage for effectively moving the straight edge over the drawing paper or drawing surface and also that these ribs define a troughing between them for the temporary retention of pencils, pens, etc. In addition to this novel construction, it will be observed upon reference to the several figures of the drawing that the over-all width of the straight edge is materially greater than the over-all width of the longitudinally extending central portion referred to as the lengthwise stiffener or body portion **24**. Consequently it will be seen that by reason of this difference in the relative width of the stiffener and of the straight edge as an entirety, there is provided the advantage that the user of the device can very effectively grip the ribs **26** and firmly hold the straight edge against movement while drawing a marking implement along the entire length of either of the parallel edges **23**. In other words, this location of the gripping ribs a substantial distance inwardly from the edges **23** enables the user to draw lines without interference from the fingers holding the straight edge in position by gripping the ribs **26**.

It will, of course, be recognized that while reference in the foregoing paragraph has been made specifically to the ribs **26**, the same advantages accrue from the construction of the ribs **26'** forming a part of the stiffener or body portion **24'** of the structure shown in Figs. 8 to 10.

From the foregoing, it will be clearly apparent that by my present invention there is provided a simple, efficient and very satisfactory mobile drafting means or apparatus which is comparatively cheap to manufacture, easy to use, and furthermore effects a considerable saving of time; while being easy to install, and use; and which is immune against derangement when in service.

Changes in, or modifications of the embodiments of my invention may occur to those skilled in the art without departure from the practical concept of the present invention; accordingly, to determine its scope reference is directed to the following claim. I, therefore, do not wish to be limited to the exact constructions illustrated and described, but aim to cover by the terms of said claim all those alterations and modifications which rightly come within the scope and purview of the following claim.

I claim:

A straight-edge for a drafting apparatus of the character described, said straight-edge comprising an elongate one piece unitary body of substantial over-all width and having a bottom portion with a transversely arched bottom side and a medial lengthwise stiffening portion upon the top side, said stiffening portion being over-all of a width materially less than the bottom portion and said bottom portion extending at the ends beyond the ends of the stiffening portion and the extended ends having substantially flat top shoulder surfaces, said stiffening portion being formed with upwardly diverging longitudinal finger gripping ribs forming an intervening trough, the over-all width of said stiffening portion being materially less than that of the bottom portion whereby said gripping ribs lie a substantial distance inwardly from the longitudinal edges of the bottom portion, and a pair of peripherally grooved spools supported upon and spaced transversely of each shoulder surface for horizontal rotation and lying within the space defined by the width of the stiffening portion.

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