

G. VILLENEUVE.

DRAFTING INSTRUMENT.

APPLICATION FILED JULY 2, 1909.

1,006,704.

Patented Oct. 24, 1911.

2 SHEETS-SHEET 1.

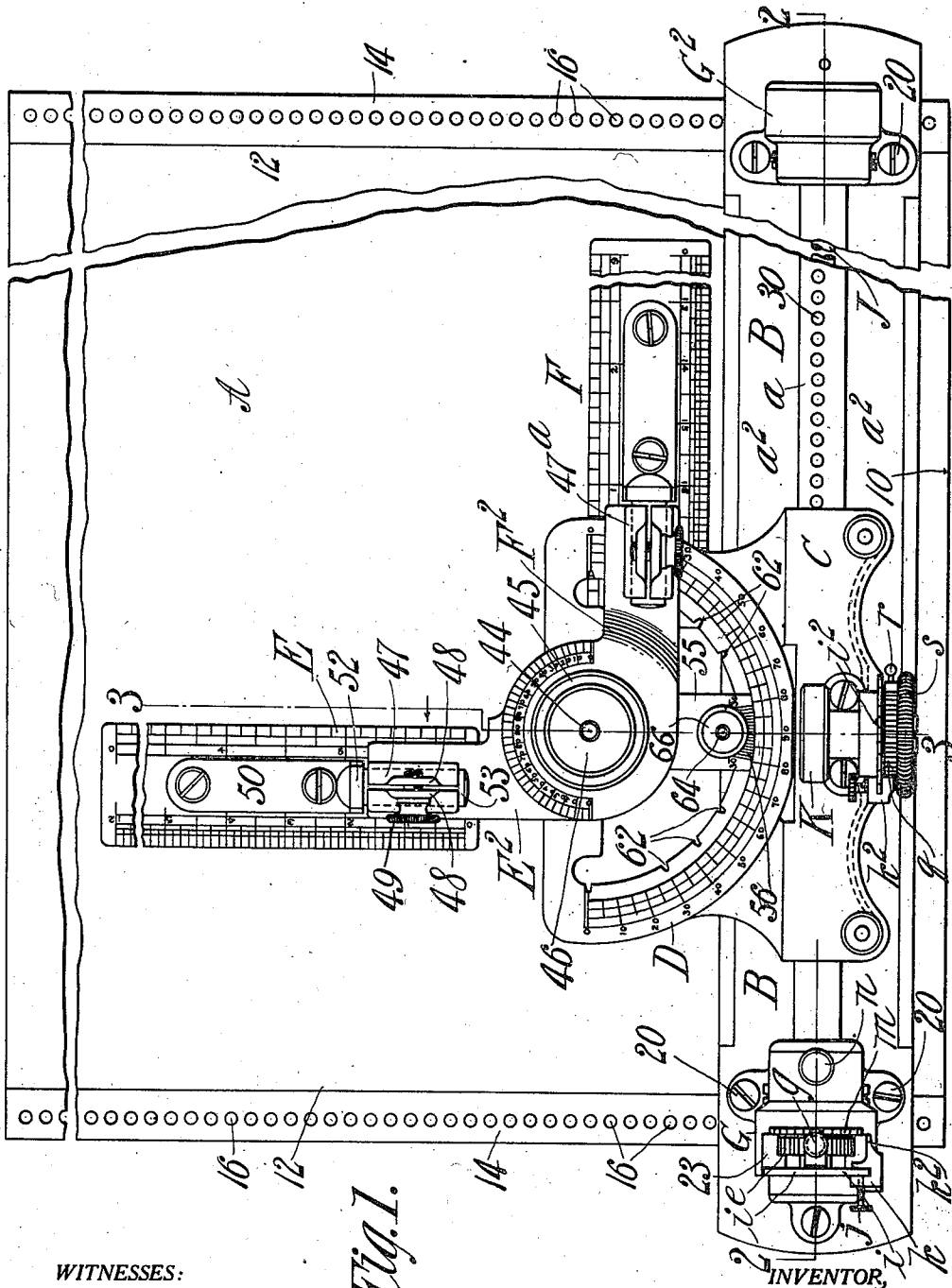


Fig. 1.

WITNESSES:

H. L. Sprague
R. M. Mowry

George Villeneuve
BY

W. J. Bell

ATTORNEY

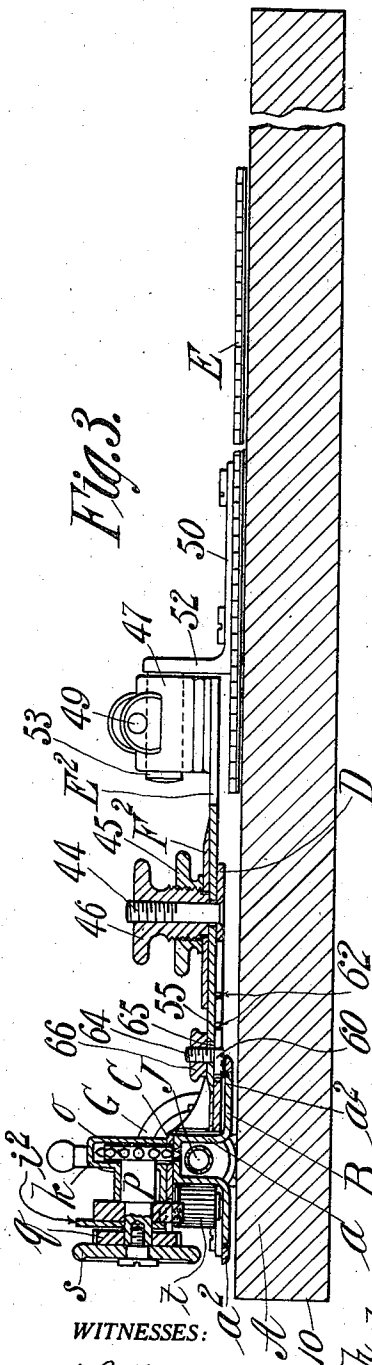
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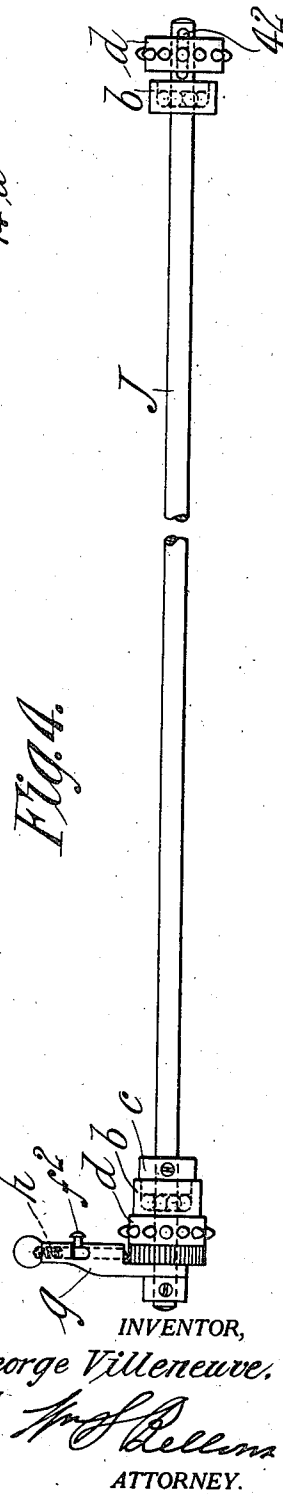
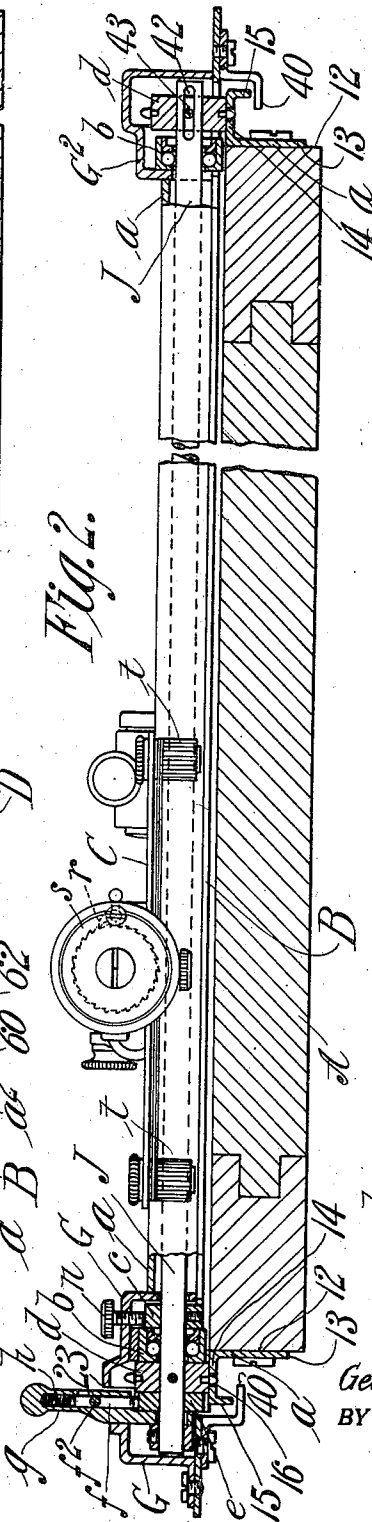
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2 SHEETS-SHEET 2.



H. L. Sprague
P. M. Mowry



INVENTOR,
George Villeneuve.
BY *Prof. Bellina*
ATTORNEY.

UNITED STATES PATENT OFFICE.

GEORGE VILLENEUVE, OF PITTSFIELD, MASSACHUSETTS.

DRAFTING INSTRUMENT.

1,006,704.

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To all whom it may concern:

Be it known that I, GEORGE VILLENEUVE, a citizen of the United States of America, and resident of Pittsfield, in the county of Berkshire and State of Massachusetts, have invented certain new and useful Improvements in Drafting Instruments, of which the following is a full, clear, and exact description.

- 10 This invention relates to a drafting machine or apparatus and particularly pertains to a device of the character indicated by means of which the lines on a sheet of paper on a drawing board may be made in parallelism with each other and all either parallel with the base or perpendicular lines of the board or at any desired angle thereto and with any predetermined distance of spacing.
- 20 The device is especially available for the plotting of surveyors' plans or maps, for section lining drawings or the placing of surface shading or "tints" thereon with absolute uniformity in the spacing of the lines.
- 25 The invention consists in the combination and arrangement of parts hereinafter described in conjunction with the accompanying drawings and set forth in the claims.
- 30 In the drawings:—Figure 1 is a plan view of the drawing machine or apparatus shown as applied on a drawing board; Fig. 2 is a partial front elevation of the drawing machine with some parts of the latter and the drawing board in vertical section as taken on line 2—2, Fig. 1; Fig. 3 is a vertical sectional view taken at right angles to Fig. 2 and on the line 3—3, Fig. 1; Fig. 4 is a view of the feed shaft and appurtenances thereof.

Similar characters of reference indicate corresponding parts in all of the views.

- In the drawings, A represents a drawing board of rectangular form,—10 being understood as the base or lower edge thereof. The drawing board has at its opposite edges 12, 12, which are at right angles to its base edge, and extending preferably the entire length of such edges, metallic strips *a a* secured in place on the edges of the board by screws and each comprising a vertical attachment member 13, a right angular and outwardly extending horizontal member 14 and a depending member 15.
- 55 The horizontal portion 14 of each metallic strip is provided with a series of cir-

cular perforations 16 at regular intervals whereby the strip is constituted, in substance, a rack.

B represents a flat horizontal bar to rest on or in proximity to the upper side of the drawing board parallel with its base edge 10, said bar B having a feed motion up and down on the board; and it carries bodily a carriage C appurtenant to which is a protractor D having straight edge radius arms E and F to constitute rulers on the scale bars and angle determining members. The bar B is made in the form of an inverted channel *a* with horizontal base extensions *a*² at opposite sides of the channel portion *a*, and the said bar has at its opposite end portions the casings G, G² affixed thereon by the screws 20, 20,

Provided within the casings G and G² and affixed to the latter in any suitable manner are bearings *b* to support the end portions of a feed shaft J and permit the free rotation thereof, the friction of the shaft in its bearings being reduced by the provision of the balls as indicated. The feed shaft has at its opposite end portions cog wheels or pinions *d d*, the teeth of which have engagements in the perforations 16 of the rack bars at each end of the drawing board so that when rotative movement is imparted to the shaft in either direction the bar B will be caused to move upwardly away from or downwardly toward the base edge of the drawing board and always parallel therewith. The collar *c* affixed on the shaft at one side of one end bearing *b* prevents the shaft from having any endwise movement in one direction while the pinion *d* affixed on the shaft at the opposite side of the bearing prevents the shaft from moving in the opposite direction. Appurtenant to the shaft at the left hand of its left hand pinion *d* is a ratchet wheel *e* with which coacts a pawl bar *f* which is slidable in manner of a bolt in the pawl carrying arm or lever *g*, the pawl being pressed to engagement with the teeth of the ratchet by the spring *h* as shown in Fig. 2. The pawl carrying arm is, at its lower portion, hung on the feed shaft J whereby it may have its oscillatory movement with the shaft as its support and fulcrum; and the casing G is apertured through its top to permit the swinging movements of the pawl carrying arm which extends above the top of said casing. The casing G adjacent the pawl

carrying arm is formed with an arc shape flange *i* about which straddles and to which is secured, by the screw *j*, the ratchet stop *k*, an extension member *k*² of which extending across the aperture 23 in the top of the casing G to the right hand side of the ratchet wheel *e*, registers with graduations *m* on the partially cylindrical top of the casing. By having the part *k* serve as an abutment, which may be variably positioned to limit the degree of the swinging movement of the pawl carrying arm, the amount of the ratchet feed movement of the shaft and the rack and pinion movement of the bar B at each actuation may be determined and uniformly accomplished.

n, Figs. 1 and 2, represents a screw engaging through the top wall of the casing G and having a tension-engagement against the collar *c* which is affixed on the shaft. By more or less tightening the screw it may exert a frictioning or tensioning effect to prevent too free rotation of the shaft J, and yet its purpose usually is not to prevent the operation of the shaft, although in some cases it will be desirable to set the screw hard against the collar to prevent any rotative movement of the shaft as might be desirable at times when the bar B is required to be held absolutely stationary and absolutely immovable on the drawing board.

For parallel ruling the straight edged radius bar F will usually be employed; but for oblique section lining or the making of vertical lines the radius bar E will usually be employed, and the spacings thereof accomplished by the movements from right to left, or vice versa of the carriage C, on which both the radius bars F and E are mounted with capabilities of swinging movements for the acquirement by each of a position at any angle to the base or altitude lines.

The inverted trough-shaped portion of the bar B, on which the carriage C is slidably fitted has in the top wall of such trough portion a regularly spaced series of perforations 30 engaging in which is a small cog wheel or pinion *o* in a casing K which casing is formed on or affixed to the carriage C and constituting a journal bearing for the pinion carrying shaft *p* which has a ratchet wheel *q* affixed thereon coacting with which is a ratchet catch or pawl *r*, carried on a hand wheel *s* loose on the shaft, and by which the shaft may be turned.

*k*² represents a pawl stop adjustable on a flange *i*² of the casing, very much similar in form and capability for action to the pawl stop *k* hereinabove referred to in conjunction with the rotative feed devices for the shaft J.

In the operation, the feed movement of the bar B up and down on the board will be secured by the swinging movements of the

pawl carrying arm *q*, between the limits constituted by a margin of the aperture 23 in the casing G', and the pawl-stop *k* which may be adjusted to position nearer to or farther from the margin of the aperture as desired; and when desired to have the bar B free to be slid quickly and for a considerable distance, the pawl may be temporarily lifted from its engagement with the ratchet wheel through means of the finger stud *f*²; and any lifting displacement of the bar B upwardly away from the board or displacement of the bar from its proper rack and pinion engagement with the board is prevented by the angle lugs 40, 40, which are affixed on the underside of the end portions of the bar and have engagements by members thereof under down turned portions 15, 15, of the metallic strips in which the rack bars are comprised. The feed movement of the carriage C may be accomplished by the back and forth rotative movements of the pawl-carrying hand-wheel *s*, which carries the pawl *r* from a point of engagement against the top of the carriage as far as permitted by the properly adjusted pawl stop *q*.

In order that the pinion or cog wheel on the right hand end of the feed shaft may be self adjusting, so as to always be in mesh with the rack irrespective of any swelling or shrinking of the drawing board, such pinion is engaged on the feed shaft by having its central aperture made for a slip fit on the shaft, the extremity of which is formed with a longitudinal slot 42,—the pin 43 penetrating the body of the cog wheel and engaging through the slot.

The radius bar or ruler E is carried by a holder E² which is pivotally engaged about an upstanding screw stud 44 on the carriage (in which the protractor D is comprised), its confinement in any given adjustment being by means of the clamping nut 46. The holder E² has a split hub-like part 47 with ear lugs 48, 48, at each side of the cleft engaged with which is a clamping screw 49; and the radius bar or scale ruler E has a foot piece 50 formed as a part of which is an upstanding member 52, provided with a horizontal stud 53 which fits in the circular aperture in the split hub 47 and is detachably confined therein by the clamping screw 49. Scales having different graduations may be interchanged in the holder E² as desired. The inner or forward extremity 55 of the holder E² has vernier lines 56 for registry with the graduations in circular arrangement on the protractor D; and in order that the radius bar comprising the scale E and the holder E² may be adjusted and held at any of the more commonly required angles, such as those of fifteen, thirty or forty-five degrees, the slidable dog 60 is provided for detachable engagement with any of the angle determining notches 62 formed on the con-

cave edge of the protractor D, this dog 60 comprising a lower block or engagement member and an upstanding screw 64 which may have a limited movement in slot 65 in the arm or portion 55 of the radius bar holder E²,—the nut 66 operating as a member for sliding the dog and also for binding it, temporarily, in any given set position.

The radius bar comprising a scale or ruler F is detachably carried by a holder F² therefor which has a clamping hub 47^a similar to the one provided for the bar or ruler E; and the holder, which is in the form of a flat plate, rests on the top of the holder E², is pivotally engaged about the aforementioned screw stud 44, and is confined by the clamping nut 45, which has a screw thread engagement on the exterior of the nut 46. It is seen in Fig. 3 that the bearing extremity of the nut 46 is entered through an opening therefor in the upper holder F² while the nut 45 has a clamping bind only on the holder E² so that the nuts individually and independently confine the radius bar holders 25 for which they are respectively provided, and so that either holder may be loosened to be swung without loosening the other.

In order that the holder F² for the bar or ruler F may be swung entirely around its pivotal center of motion, the outer part of the holder F² is upwardly offset from the part which is clamped by the nut 45.

I claim:—

1. In a drafting device, in combination, a drawing board having racks at its opposite upright edges, a bar arranged horizontally crosswise of the board, and a rotative shaft journaled thereon and having toothed wheels at its opposite extremities engaging with the racks, a carriage engaged with and slidable horizontally along the length of said bar, and provided with an affixed protractor plate, means for imparting rotative movements to said shaft and means for imparting a feed movement to the carriage along the length of said bar, and a pair of radius arms pivotally connected at a common center on the carriage, and one thereof having a member for registering with the protractor.

2. A drawing board having parallel racks at its opposite edges, a bar slidably engaged with the rack provided board, and having the form of a long inverted trough provided with a longitudinal opening at its bottom, and provided with a series of regularly spaced perforations in its top, a rotative shaft journal supported by said bar and located in and extending through the trough opening thereof and provided with pinions engaging in the racks of the board, means for imparting a step by step rotative feed movement to the shaft, a carriage engaged with and slidable along said trough like bar having a shaft rotatively mounted thereon,

provided with a cog wheel engaging in said perforations, means for imparting a rotative feed movement to the last named shaft and a straight edged bar mounted on said carriage and extending over and in close proximity to the surface of the drawing board.

3. In a drafting device, a drawing board having at its opposite upright edges, metallic members affixed thereto, each having a horizontal portion thereof provided with regularly spaced perforations, a bar and a rotative feed shaft journaled on said bar and having pinions at its end engaging in said perforations, said bar having at its extremities depending angular members engaging under portions of the said metallic perforated members, a carriage slidable along the said bar and a radius bar or ruler connected to and extending from the carriage and having a position in proximity to the upper surface of the board.

4. In a drafting device, a drawing board having a rack at its edge, a bar movable up and down on the face of the board having a rotative shaft provided with a pinion in mesh with the rack, having a ratchet wheel affixed thereon and having an affixed collar, a feed pawl coacting with the ratchet wheel, and a screw adapted to have as required a frictional or a binding engagement with said collar, a carriage slidable along the length of the bar and a ruler carried by and extending from said carriage on the face of the drawing board.

5. In a drafting device, a drawing board having strips at its opposite edges provided with regularly spaced perforations for constituting a rack, a bar having a rotative feed shaft journaled thereon and provided at its end portions with cog wheels engaging in the perforations of said strips, one of said cog wheels being longitudinally slidable but non-rotative relatively to the feed shaft, means for turning the feed shaft, and a carriage slidable along said bar having a straight edge radius arm projecting therefrom.

6. In a drafting device, in combination, a drawing board having racks at its opposite upright edges, a bar and a rotative shaft journaled thereon and having toothed wheels at its extremities engaging with the racks, a carriage slidable along the length of said bar, and provided with an affixed upstanding screw stud, means for imparting rotative movements to said shaft and means for imparting a feed movement to the carriage along the length of said bar, a radius arm having its inner extremity resting on the carriage and having a hole therein by which it is fitted over said stud, another radius arm having a portion thereof resting on the first named radius arm, having a hole there-through larger than the one in the first arm, and through and beyond which said stud

upwardly extends, a nut both internally and externally threaded screwing on said stud and having the lower end thereof extended through the larger hole in the upper radius bar and engaging the lower bar, and another nut screw engaging on the first named nut and having at its bottom an engagement with the upper radius bar.

7. In a drafting device, in combination, a drawing board having racks at its opposite upright edges, a bar and a rotative shaft journaled thereon and having toothed wheels at its extremities engaging with the racks, a carriage slidable along the length of said bar, and provided with an affixed curved protractor plate having angle determining notches in its concave edge, means for imparting rotative movements to said

shaft and means for imparting a feed movement to the carriage along the length of said bar, and a pair of radius arms pivotally connected at a common center on the carriage, and one thereof having a longitudinal slot therein, a part comprising a dog for engagement and disengagement with and from the said angle determining notches, and a screw stud upwardly extending through said slot, and a nut engaging on said screw stud and having a bottoming engagement on the slot provided radius arm.

Signed by me at Springfield, Mass., in presence of two subscribing witnesses.

GEORGE VILLENEUVE.

Witnesses:

G. R. DRISCOLL,

WM. S. BELLOWES.