Feb. 26, 1957 H. K. ADAMS 2,782,501

NEEDLE CARRYING ADAPTER ARM FOR MAP-MAKING ENGRAVING INSTRUMENTS

Filed July 22, 1955

2 Sheets-Sheet 1

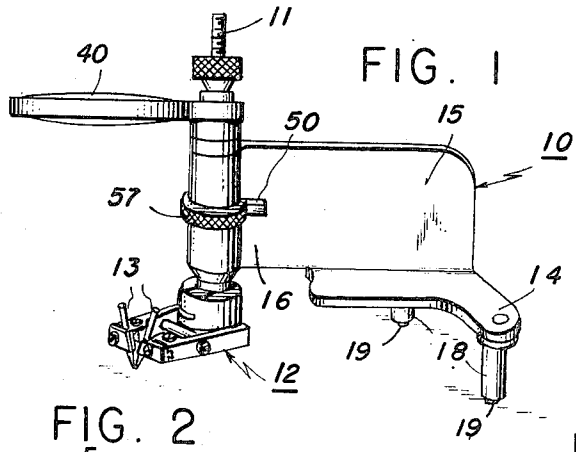


FIG. 1

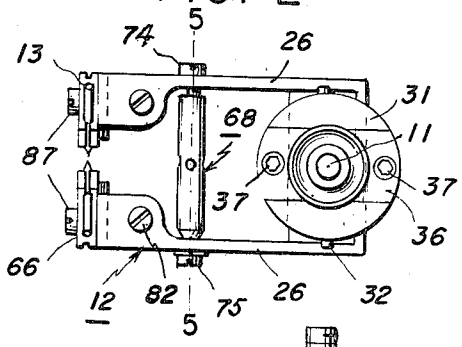


FIG. 2

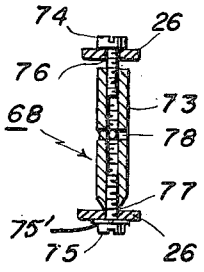


FIG. 5

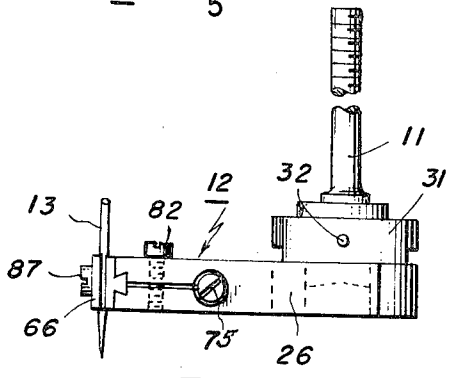


FIG. 3

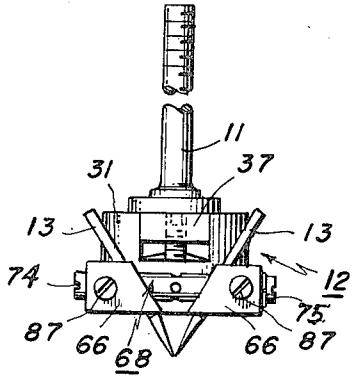


FIG. 4

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2 Sheets-Sheet 2

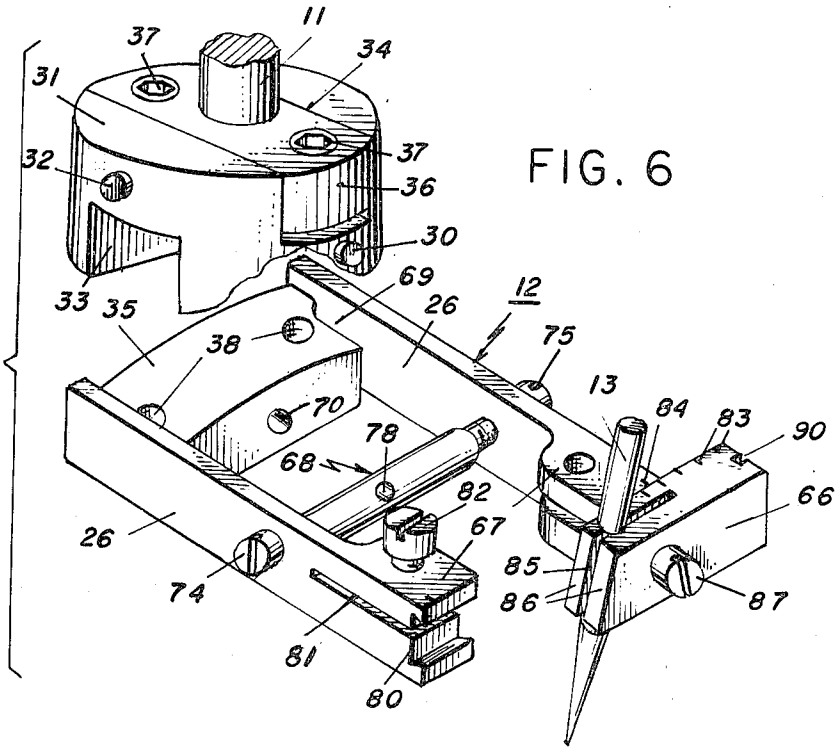


FIG. 6

FIG. 7

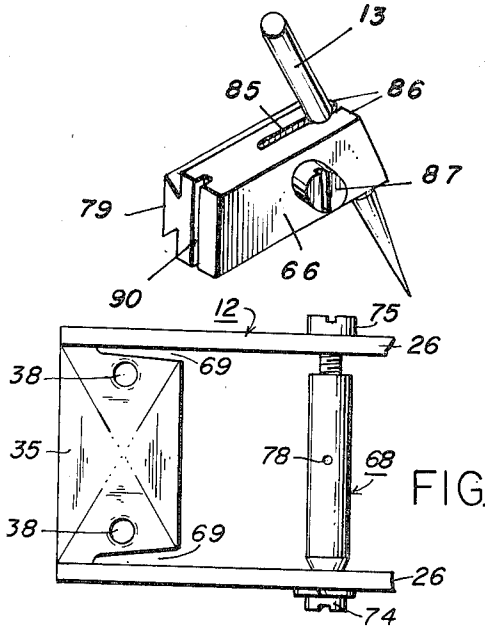
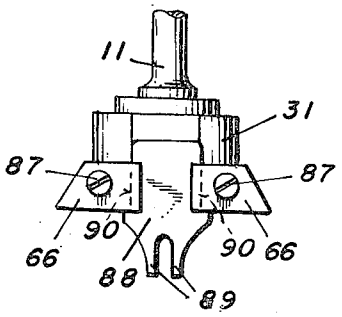


FIG. 8



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2,782,501

NEEDLE CARRYING ADAPTER ARM FOR MAP-MAKING ENGRAVING INSTRUMENTS

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Application July 22, 1955, Serial No. 523,761

9 Claims. (Cl. 30—164.9)

This invention relates to engraving instruments or tools for use in a modern method of map making in which lines are scratched in a semi-transparent coating on a transparent sheet of plastic or glass placed over an aerial photograph of the area to be mapped, there being illuminating means beneath the photograph or negative so that the operator may see through the coated sheet the roads, rivers, buildings and other landmarks and can reproduce or represent them on the sheet by scratching off portions of the coating. These scratched sheets are then used in making the desired map from which reproductions may be made.

The invention relates more particularly to scratching or engraving tools of the character disclosed in my pending patent application Serial No. 386,082, filed October 14, 1953 which has matured in Patent No. 2,735,177, February 21, 1956. That tool comprises a scratching point carrier or body to be held in the fingers and moved over the coated sheet, the body having a three point support, two of the points being laterally spaced legs to slide on the sheet and the third point being the scratching element. The latter is carried by the free end of a horizontal arm on the lower end of a vertical shaft rotatably mounted on the body so that as the tool is moved over the coated sheet the arm may swing to cause the scratching element to trail and follow the curved and irregular paths of rivers, roads, etc. in the illuminated photograph or negative of the area being mapped. In making the maps parallel or equally spaced lines are made to represent some types of roads and the spacing of the double lines, in thousandths of an inch, indicates the character of the road, such as a paved highway, a superhighway, etc. In the tool of said pending application the double lines were made by two laterally spaced scratching ends or points on a single flat blade carried by the swiveled arm of the tool. Since many different spacings of the double lines are used, it was necessary to provide a large number of such blades which come in standard sizes or to make a new non-standard blade to obtain the desired spacing of the scratching points as well as to obtain lines of the desired width.

One object of the present invention is to do away with the use of many kinds of blades by employing two or more scratching needles, similar to ordinary phonograph needles, and so mount them on the arm that their pointed scratching ends may be adjusted toward and from each other to produce parallel lines with the desired spacing between them.

Another object of the invention is to provide an adapter arm that may be used in place of the blade-carrying arm and which carries the adjustable pointed needles.

Another object is to provide the swinging or swiveled arm of the tool with means whereby phonograph needles or similar scratching elements may be quickly and easily positioned to obtain a wide range of adjustment so that the double line scratches will represent roads of different widths or other characteristics.

Another object is to provide the swiveled arm with reversible members which in one position clamp the needles and when in a reversed or transposed position, with the needles removed, may clamp between them a flat blade with one or more scratching points. Thus the usefulness of the tool is enhanced since either kind of scratching elements may be used.

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 perspective view of the improved tool;

Fig. 2 is a top plan view on an enlarged scale of the needle carrying arm removed from the body of the tool;

Fig. 3 is an enlarged side or edge view of the arm;

Fig. 4 is an enlarged end view of the arm;

Fig. 5 is a detail section taken on the line 5—5 in Fig. 2;

Fig. 6 is an enlarged perspective view of the arm with one of the needle carriers removed; and of the adjustable coupling between the arm and the shaft;

Fig. 7 is a detail perspective view of one of the reversible needle carriers;

Fig. 8 is a view similar to Fig. 4 showing a flat blade with scratching ends or points mounted on the arm, and

Fig. 9 is a detail top view of the rear or inner portion of the arm and the adjustable member connecting the intermediate portions of its resilient branches.

Referring more in detail to the drawings the numeral 10 denotes as a whole a support or carrier, 11 an upright pivot or shaft rotatable thereon, 12 a horizontal swingable arm on the lower end of the shaft, and 13 a suitable scraping or engraving means on the outer end of the arm. The carrier or body 10 is adapted to be grasped by the fingers and moved over the coated sheet; and it preferably comprises a flat and suitably shaped horizontal base portion 14 and an upright plate or rib 15 extending in a forward and rearward direction and having its front end 16 projecting beyond the base. Extending downwardly from the rear corners of the somewhat triangular shaped base 14 are two supporting legs 18 equally spaced from the longitudinal center of the body. The legs slide over the coating and balls 19 are preferably rotatably mounted in their lower ends. Thus the body may have a slight rocking or tilting movement on the transverse alined balls to permit the fingers to apply a downward pressure on the end or ends of the scraping blade or needles.

In the tool shown in the drawings I have also incorporated the shaft clamping means disclosed and claimed in my Patent No. 2,735,178, February 21, 1956, for frictionally locking the shaft 11 relative to the body of the tool so that the latter may be used for straight line scratching and to facilitate the honing of the scratching points so that they will produce scratched lines of equal weight or width. This shaft clamping chuck includes a milled nut 57 which is disposed in a notch 58 in the extended end 16 of the plate or rib 15 and is rotated to lock or unlock the shaft. Also, as disclosed in both of said patents, a magnifying lens 40 is fixed to the upper end of the shaft 11 to move therewith so that it will always be over the free end of the arm 12 and the scratching element or elements thereon.

Whatever the mounting of the shaft 11 may be, it is important that it be perpendicular to the coated sheet when the tool is in use. It is also important that the laterally spaced scratching ends or points used to make parallel or uniformly spaced lines, be properly positioned relative to the shaft and the coated sheet. That is accomplished by the tilting adjustment of the arm in both vertical and horizontal planes. Such adjustment, as disclosed

and claimed in said Patent No. 2,735,177, comprises a cross head or bar **36** at the lower end of the shaft **11**, a coupling member between that bar and a similar bar at the inner end of the arm, pivot pins disposed in planes at right angles to each other and pivotally connecting the two bars to the coupling member and pairs of adjusting screws coacting with those parts so that the arm may be tilted longitudinally in a vertical plane and tilted transversely or laterally about its longitudinal axis. The coupling member **31** is cylindrical and has in its top a diametrical channel **34** to receive the cross bar 36. A pivot pin **32** connects these parts. In the bottom of the member **31** is a similar diametrical channel **33** which is at right angles to the channel **34** and which receives a bar-like portion **35** of the arm **12**. A pivot pin **30** connects these parts and is disposed in a plane at right angles to the pin **32**. Two adjusting screws **37** are threaded through the end portions of the cross bar **36** to thrust against the bottom of the channel **34** to control the slight swinging movement of the coupling **31** on the pivot pin **32**. Two similar screws are threaded through the bar portion **35** of the arm on opposite sides of the pivot pin **30** and thrust against the bottom of the channel **33** to adjust the arm on the coupling **31**. While in Patent No. 735,177 the bar portion **35** of the arm extends longitudinally thereof, in the present case the bar **35** extends transversely of the arm **12**, as shown in Fig. 6. Therefore, the arm will be vertically tilted or angled in a longitudinal direction on the pivot pin **32**, and will be tilted transversely or laterally about its longitudinal axis on the pivot pin **30**.

The arm **12** has two opposed side portions or branches **26** connected at their inner ends by the transverse bar portion **35**, the spaced outer ends of the branches carrying means for clamping two needles **13** which may constitute the said scraping or engraving means. The two needles are removably clamped at the inner ends of two longitudinally alined slides **66** mounted in enlarged outer ends **67** of the two branches and adjustable toward and from each other for a quick and approximate adjustment for the scraping points of the needles with respect to each other. A finer adjustment of the needle points may be effected by moving the two branches **26** toward and from each other by an adjustable connection **68** between the intermediate portions of the branches.

The forked or generally U-shaped arm **12** is preferably made from one piece of steel or other metal and to enable the two branches or side bars **26** to be more readily sprung toward or from each other, longitudinal slits **69** are formed adjacent the ends of the bar **35** so that the branches **26** are more resilient. The slits or cuts **69** may be at slight angles and extend partly into both the cross bar **35** and the branches so as to reduce the horizontal thickness of the connected ends of the branches to leave only a small amount of metal connecting the inner or rear ends of the branches to the cross bar; but I preferably make the slits **69** as shown in Fig. 6 and Fig. 9 wherein they extend only into the cross bar and are parallel with and next to the branches. Thus the effective length of each branch **26** is increased so that it may be more readily sprung laterally than a shorter branch. As shown in Fig. 6 the cross bar **35** has at its center a longitudinally extending hole **70** to receive the pivot pin **30**. Near its ends are vertical threaded holes **38** to receive the adjusting screws; and its top surface is slightly curved to enable the bar to have a limited tilting movement in the channel **33**. The adjustable connection **68**, as shown in Fig. 5, comprises an internally screw threaded tube **73** and two headed screws **74** and **75** threaded in its ends. The screw **74** passes through a smooth or non-threaded hole **76** in one of the arms **26** while the screw **75** is in a screw threaded hole **77** in the other branch. The heads of the two screws engage the outer faces of the branches and the tube or sleeve **73** has one or more transverse holes **78** to receive the end of a

lever or other tool by which the tube may be rotated. A lock washer **75'** is beneath the head of the screw **75** to lock or hold it when the sleeve is rotated to spring the branches **26** toward each other.

The needle clamps or slides **66** are small generally rectangular blocks of metal formed on their rear faces with dove-tail ribs **79** slidable in similar shaped horizontal grooves **80** formed in the extremities of the enlarged portions or heads **67** at the outer ends of the two branches **26**. For the purpose of fixing the needle carriers or slides **66** in adjusted positions, the enlargements **67** are formed with horizontal slits **81** which extend inwardly from the central portions of the bottoms of the dove-tailed grooves **80**. The two halves of each groove thus form clamping jaws which may be frictionally clamped on one of the ribs **79** by means of a vertical screw **82** rotatable in a hole of the upper jaw and threaded into a hole in the lower jaw of the clamp. To facilitate the adjustment of these needle carriers a series of graduation marks **83**, preferably in .020 of an inch, are formed along the top of the carrier or slide **66** at its rear edge for coacting with a zero mark **84** on the flat top of the coacting enlargement or head **67**. By this means the two needle carriers or clamps may be quickly set the same distance from the longitudinal axis of the arm and at approximately the desired spacing of the needle points so a finer adjustment may be made by the use of the screw sleeve or tube **73**.

While the cylindrical pointed needles **13** may be variously fastened to the blocks or carriers **66**, the latter are preferably constructed to adjustably clamp them, and the two needles are preferably set in the downwardly converging relation shown in Fig. 4 so that their points may be observed through the lens **40**. The opposed ends of the clamp blocks **66** are also upwardly and outwardly inclined. The needle clamping action is obtained by forming in the blocks vertical slits **85** which extend inwardly from their inclined ends to provide two clamping jaws **86**, the opposed faces of which have grooves or seats to receive one of the needles. The jaws **86** are caused to frictionally bind the needle by a horizontal screw **87** passing through a hole in the outer jaw and threaded into the inner jaw.

While the above described structure is for adjustably mounting two pointed needles, the tool may be used to hold a flat blade **88** with one or more scratching points **89**, as shown in Fig. 8. To do that the blocks **66** must be reversed or transposed on the branches **26** and their flat vertical ends formed with opposed vertical slots **90** to receive the parallel side edges of the blade **88**, the needles **13** being, of course, removed from the clamping blocks. This feature enhances the usefulness of the tool, since under some circumstances the use of a blade may be preferable to the use of two needles.

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 scratching tool carrying arm for a map making engraving instrument of the type having an elongated body to be grasped by the fingers and moved over a coated sheet, the body having means at its rear to support it for sliding movement and at its front a vertically disposed rotatable shaft carrying at its lower end a horizontally swingable tool carrying arm, said arm being made of metal and comprising a pair of laterally opposed branches united at their inner ends by a connecting portion supported from the shaft, an elongated slide at the outer end of each of said branches, said slides being longitudinally alined and disposed transversely of said branches in the same hori-

zontal plane, tool supporting means on each of said slides, and means fastening said slides in adjusted positions.

2. The structure of claim 1 in which each of said slides has a longitudinally extending dove-tail rib and in which each of said fastening means comprises a pair of resilient clamping jaws integral with one of the branches and undercut to slidably receive one of said ribs, and a clamping screw for each pair of jaws to frictionally bind them on the associated rib.

3. The structure of claim 1 in which said branches and said connecting portion of the arm are resiliently connected to permit the branches to have a limited movement toward and from each other, and a longitudinally adjustable member between the intermediate portions of the branches to vary their spacing.

4. The structure of claim 3 in which there are partial slits in the metal uniting said branches to the ends of said connecting portion to provide the resiliency which permits the branches to have the said limited movement.

5. The structure of claim 3 in which said longitudinally adjustable member comprises an internally screw threaded tube disposed transversely between intermediate portions of the branches, the latter having alined openings; one of which is screw threaded, a headed screw threaded through the threaded opening and into one end of the tube and another headed screw rotatable in the other opening and threaded into the other end of the tube.

6. The structure of claim 1 in which said tool supporting means for each slide comprises a pair of opposed resilient jaws at the inner end of the slide formed by vertically slitting said end, the opposed jaws having seats to receive a pointed cylindrical scratching needle, and screw means associated with each pair of jaws to clamp the needle in the opposed seats.

7. The structure of claim 1 in which said tool supporting means for each slide comprises vertical notches at the opposed inner ends of the slides to receive the opposed side edges of a flat blade having at its lower end means to scratch a coating on a flat sheet.

8. The structure of claim 1 in which said slides are transposable from one branch to the other to enable either a pair of scratching needles or a flat blade with a scratching end to be supported, each of said slides having at one end clamping means to receive and hold a needle and at its other end a vertical notch to receive and hold one vertical edge of a flat scraping blade when the latter is disposed in the notches of the two slides.

9. The structure of claim 1 in which the connecting portion of said arm extends transversely and has a resilient connection with said branches, a longitudinally adjustable connecting member between intermediate portions of said branches to vary their spacing, said slides having dove-tail ribs, the outer ends of said branches being transversely enlarged and having opposed undercut clamping jaws to receive the ribs of said slides and screws associated with the jaws to provide said slide clamping means, the enlarged ends of said branches having zero marks and said slides having longitudinal series of scale graduations to coact with said zero marks.

No references cited.