Feb. 21, 1956 H. K. ADAMS 2,735,177

ENGRAVING INSTRUMENT USED IN MAP MAKING

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Fig. 1.

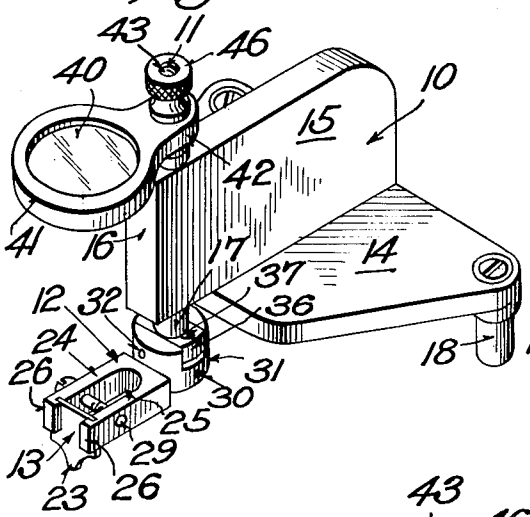


Fig. 2.

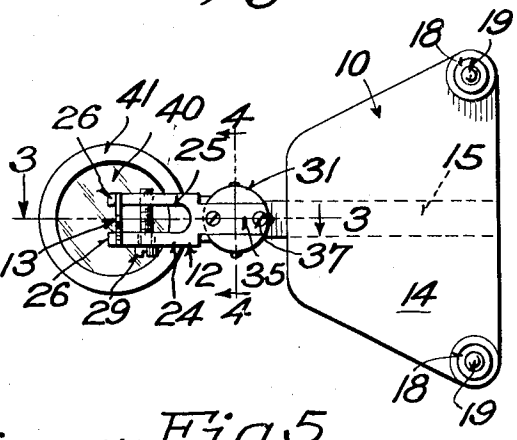


Fig. 3.

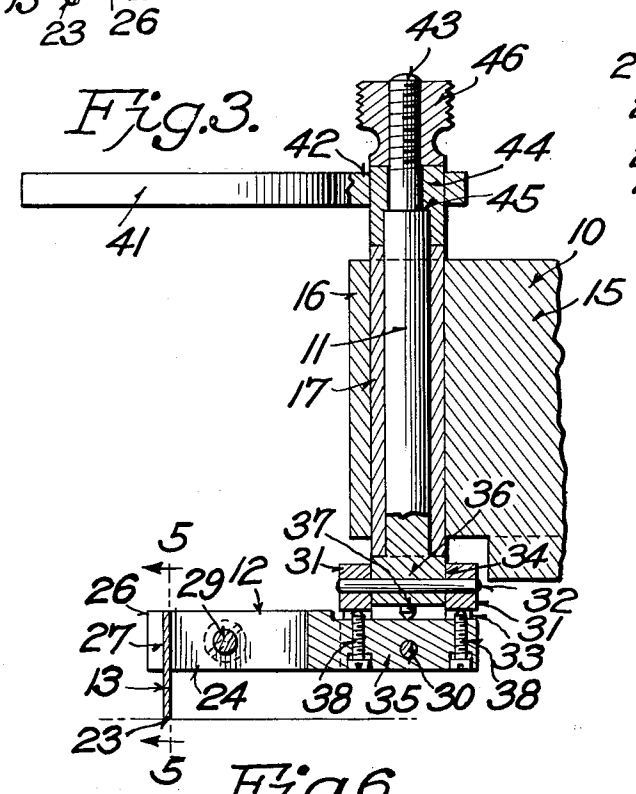


Fig. 5.

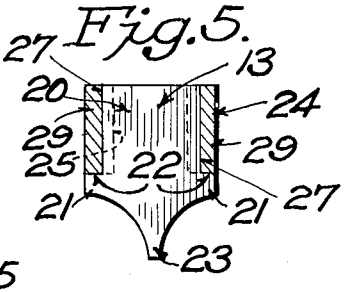


Fig. 4.

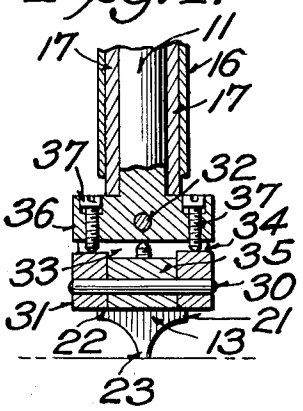


Fig. 6.



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ENGRAVING INSTRUMENT USED IN MAP MAKING

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8 Claims. (Cl. 30—164.9)

This invention relates to engraving instruments or tools used in making maps.

Since the advent of aerial photography a new and less expensive map making procedure has come into practice. Briefly stated, the new procedure is to take photographs from airplanes of the area to be mapped and these photographs are placed on a transparent glass top of a table or the like with illuminating means beneath the top; and over the photographs are placed sheets of transparent acetate or similar material with a semi-transparent coating which may be scratched by suitable tools. The light beneath the table top will enable the operator to see through the coated sheet the roads, rivers, shore lines, buildings and other land-marks so that they may be reproduced or represented on the sheet by scratching off portions of the coating on the sheet by appropriate scratching tools. These scratched sheets are then used in the making of the desired map from which reproductions may be made.

One of the tools used for scratching the film or coating on these transparent sheets resembles the "caster" or "contour" pens used by draftsmen in map making. Such devices comprise a pen carrier which may be conveniently grasped by the fingers and which has a three point rolling or sliding contact with the drawing paper, the pen being connected to the carrier or handle by a swivel joint and offset in the manner of an ordinary roller caster. In the prior scratching tools which are similar to these caster penholders, a scratching blade is substituted for the pen on the swiveled arm, the blade being detachably mounted on the arm since many blades having scraping ends of different sizes and shapes must be used. Some of these interchangeable blades have pointed ends for making fine lines but most of them have points with flat ends for making wider scratches, while still others have double points for simultaneously making two equally spaced or parallel scratches. The lengths of the blunt or flat scratching ends or points of these blades vary in thousandths of inches, and the width of a scratched line on the coated sheet has significance in the reading of the map. For example, where the scratched lines represent roads or highways, a line of one width may represent an unpaved country road while a wider line may represent a paved express highway.

In the use of these scratching tools for making scratches to represent for example, a road, it is important that the flat scratching extremity of the blade be parallel with the surface of the sheet so that the scratch or line made will be the full length of that particular blade end which may represent a certain type of road, and also so that all of the coating throughout the width of the scratch will be removed from the acetate sheet. If the flat scraping end of the blade is at an angle to the plane of the sheet, the scratch made will not be of uniform width and depth. In the past when such a blade was clamped or fastened to the swiveled arm and its flat cutting end was at an angle to the top of the sheet when the tool was

positioned on the latter for use, it was necessary to grind off a portion of the flat end so that it would be parallel with the sheet when in use. These scratching blades are made of such hard metal or metal alloy that it requires considerable time and effort to grind them. Further the grinding operation usually changed the length of the flat scratching end so that the blade after being ground would not make a scratch of the desired width and hence the blade could not serve its intended purpose.

One object of the invention is to provide in a scratching tool of the character above indicated, means for quickly and easily positioning the flat scraping end of the blade relative to the support or holder so that it will make the proper scratch in the coating, thus obviating the necessity of any grinding operation.

Another object of the invention is to provide between the blade carrying arm and the vertical pivot or shaft about which the arm swings, adjustable means that will permit the blade to be positioned so that it will make the desired scratch.

Another object is to provide an adjustment of the character above stated which permits the upright blade to be angled in the direction of the length of its flat end, or transversely of such length, or in both directions so that the flat end will squarely engage the sheet.

Another object is to provide improved scratching blades and improved blade mounting means on the swiveled arm which will enable any of the various blades having different kinds of scratching ends or point to be quickly and easily fastened to the arm with their scratching ends uniformly positioned on the arm.

Another object is to provide a caster-type scratching tool with a magnifying lens mounted on the pivot shaft which carries the swinging arm so that the lens will move with the latter as it swings in the use of the tool.

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 a caster-type scratching tool made in accordance with the invention;

Fig. 2 is a bottom plan view;

Fig. 3 is a detail vertical sectional view on an enlarged scale taken on the line 3—3 in Fig. 2;

Fig. 4 is an enlarged detail vertical sectional view taken on the line 4—4 in Fig. 2;

Fig. 5 is a detail vertical sectional view taken on the line 5—5 in Fig. 3; and

Fig. 6 is an enlarged side or face view of one of the scratching blades having a scraping end of different shape from the blade shown in the previous views.

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 scraping or engraving blade on the outer end of the arm. The body of the support or holder 10 may be of any suitable form to be grasped by the fingers and moved over the coated sheet, but as shown, it comprises a flat generally triangular base 14 with an upright plate or rib 15 extending in a forward and rearward direction and having its front end 16 extending beyond the base. In this extension is a vertical bore lined with a bushing 17 in which the shaft 11 rotates. The holder 10 has a three point support on the coated sheet by means of the blade 13 and two legs 18 which extend downwardly from the rear corners of the base 14 and are equally spaced from the longitudinal center of the device and from the axis 11 about which the arm swings. The legs 18 slide over the

surface of the coating and preferably have at their lower ends balls **19** for rolling contact with the coating. Thus the body of the holder may have a slight rocking or tilting movement on the transversely alined balls to permit the fingers to apply a downward pressure on the engraving or scraping end of the blade.

All the interchangeable blades usable on the arm **12** are of the same construction except for the size and shape of their lower engraving or scraping ends, their construction being such that when each blade is clamped on the arm, its flat scraping end or ends will be the same distance below the arm and will be parallel with the length of the arm. The blades **13** are small pieces of very hard and thin sheet steel or other suitable metal. They are of generally rectangular shape with their lower ends downwardly tapered and formed with a scraping extremity of the desired size and shape. The upper portions **20** of the bodies of the blades are also reduced in size to provide intermediate laterally projecting wings **21** forming upwardly facing shoulders **22**. The blade shown in Figs. 1 through 5 has a flat scraping extremity **23** which has a predetermined length and which is in a plane at right angles to the vertical plane of the blade and centered between the parallel planes of the edges of the upper portion **20**. Other blades are of the same construction but have scraping ends or extremities **23** varying in length in thousandths of an inch. The scraping extremities of the blades may also vary in shape and in Fig. 6 the blade **13a** has two flat longitudinally spaced and alined cutting extremities **23a** for making two scratches which are equally spaced or parallel.

In order to clamp the interchangeable blades on the arm **12** so that each will be in the same relative position, the outer portion **24** of the arm is of rectangular shape and formed with a central inwardly extending vertical slot **25** to provide two parallel rectangular side portions **26**. The outer end portion of the arm is thus forked, and in the opposed inner faces of the two branches **26** are formed vertical grooves **27** of a width to snugly receive the upright edges of the body portion **20** of the blade. That portion is slid upwardly into the transverse alined grooves until the shoulders **22** engage the flat bottom faces of the branches **26**. All blades are thus uniformly positioned on the arm in a plane at right angles to its length so that their flat scraping ends **23** will be the same distance below the longitudinal axis of the arm and will also be at right angles to that axis. The arm is made of metal and in order to securely fasten the blade a headed screw **29** may be used to spring the branches **26** sufficiently to clamp the portion **20** in the grooves. The screw is transversely disposed in the intermediate portions of the branches, passing through an opening in one branch and engaging a threaded hole in the other, as will be understood upon reference to Fig. 2.

For the purpose of overcoming the past frequent necessity of grinding off a portion of the flat scraping end of the blade so that said end will be parallel with the coated surface of the sheet, there is provided between the blade and the support an adjustable means for angling the blade. That is preferably done by providing between the arm and its shaft, means which will permit the arm to be angled laterally and also tilted verticallly. That arm adjusting means may include a transverse pivot **30** on which the arm may swing vertically and which is carried by a coupling member **31** which in turn is mounted on a pivot **32** carried by the lower end of the shaft **11**, the pivot **32** extending in the direction of the length of the arm so that when the member **31** swings on its pivot the arm will be tilted sidewise or laterally. The pivots **30** and **31** are not only disposed at right angles to each other but also intersect the longitudinal axis of the shaft **11**, as seen in Fig. 3. The coupling **31** which may be cylindrical in form, has in its bottom a diametrically extending channel **33** and in its top a similar channel **34**, the two channels being at right angles to and partially intersecting each other. The rear or inner portion **35** of the arm **12** is reduced and of rectangular shape to be received in the lower channel **33** and to have a limited swinging movement on the pivot pin **30**. The upper channel **34** similarly receives a rectangular cross-head **36** formed on the lower end of the shaft **11** and transversely apertured to receive the pivot pin **32** so that the coupling has a limited swinging movement on the cross-head. To control these swinging movements of the coupling and the arm, and hence to adjust the flat scraping end or ends of the blade, two adjusting screws **37** are threaded through the end portions of the cross-head **36** so that their extremities will thrust against the bottom of the channel **34** on opposite sides of the pivot **32**, and two similar screws **38** are threaded through the arm portion **35** on opposite sides of the pivot **30** so that their extremities will thrust against the bottom of the channel **33**. It will thus be seen that by adjusting the screws **37** the arm **12** may be laterally tilted to permit the length of the flat scraping end of the blade to be positioned parallel with the sheet to be scratched and that by adjusting the screws **38**, the outer end of the arm may be raised or lowered to permit the entire area of the flat scraping end to contact with the sheet.

Since a magnifying glass is usually used when these scratching tools are employed, such a glass may be mounted on the upper end of the shaft **11** so as to move with the arm when it swings horizontally. As shown a magnifying lens **40** is mounted in a frame **41** with a laterally projecting arm or shank **42** apertured to receive a reduced and screw threaded portion **43** at the upper end of the shaft **11**. When the frame **41** is made of plastic, the aperture is in a metal sleeve or bushing **44** moulded in the shank. An internal shoulder **45** is formed in the sleeve engaging a shoulder on the shaft formed by reducing the upper end **43**. A milled nut **46** is threaded on the end **43** to rigidly clamp the sleeve against the shoulder and adjustably fasten the frame to the shaft. The parts are so dimensioned that when the nut is tight the shaft **11** will be rotatably held in the bushing or bearing **17** without any binding of the ends of the latter with either the sleeve **44** or the crosshead **36**. When the lens is not desired, a washer similar to the sleeve **44** may be used, or the shoulder on the shaft may be lowered so that an ordinary washer may engage the shoulder and prevent endwise movement of the shaft.

The use and operation of the tool has been fully set forth in the foregoing detailed description of the preferred construction; and it will be apparent that the tool may be effectively used in making curved and crooked scratches.

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. In an engraving instrument of the character set forth, the combination of a support slidable on a flat coated surface, a lateral arm carried by said support and swingable about an upright axis, an upright scratching tool movable with said arm and having a scraping end extending transversely of said arm, said arm having means for removably holding said tool, adjustable means to angle said tool and dispose its transversely extending scraping end in a plane parallel to the coated surface over which the instrument is moved, said support being elongated in a forward and rearward direction and having laterally spaced legs at its rear, said axis for the arm being a shaft rotatable in the front of said support and having said arm on its lower end, said adjustable means being interposed between said tool and the axis of said swinging

arm and comprising a cross-head carried by the lower end of said shaft, a coupling member, a pivot connecting said cross-head to said coupling member, a second pivot connecting said arm to said coupling member, the two pivots being disposed at right angles to each other with one extending in the direction of said arm and the other extending transversely of said arm, screws in said cross-head on opposite sides of the first mentioned pivot to engage fixed portions of said coupling member, and other screws in said arm on opposite sides of said second pivot to engage fixed portions of said coupling member.

2. The structure of claim 1 together with a magnifying glass fixed to the upper end of said shaft and disposed over said tool holding means to swing with said arm.

3. The structure of claim 1 in which said tool is a flat blade having parallel side edges with lateral shoulders, and in which said tool holding means comprises laterally spaced branches at the free end of said arm formed with opposed upright grooves to slidably receive the edges of said blade, said shoulders being engaged with fixed portions of said branches to limit the sliding movement of the blades in said grooves.

4. A tool adjusting means for an engraving instrument of the type for scratching a coating on a flat sheet and having a horizontally elongated body to be grasped by the fingers and moved over a flat sheet, the body carrying an upright scratching tool at its front and means at its rear to support the body for sliding and tilting movement on a flat sheet, said tool adjusting means comprising in combination an upright shaft, means rotatably mounting the shaft at the front of the body of the instrument, a tool carrying arm of rigid material disposed horizontally in a plane below the lower end of said shaft and extending laterally from the axis of said shaft, upright scraping tool means at the outer end of said arm and having a scratching edge portion which extends in a direction transversely of the longitudinal plane of said arm, and a universal joint connection between the inner end of said arm and said shaft, whereby said transverse scratching edge portion may be tilted both longitudinally and transversely.

5. The structure of claim 4 in which said universal joint connection comprises a cross head carried by the lower end of said shaft, a coupling member, a pivot connecting said cross-head to said coupling member, a second pivot connecting said arm to said coupling member, the two pivots being disposed at right angles to each other with one extending in the direction of said arm and the other extending transversely of said arm, screws in said cross-head on opposite sides of the first mentioned pivot to engage fixed portions of said coupling member, and other screws in said arm on oppsite sides of said second pivot to engage fixed portions of said coupling member.

6. A tool adjusting means for an engraving instrument of the type for scratching a coating on a flat sheet and having a horizontally elongated body to be grasped by the fingers and moved over a flat sheet, the body carrying an upright scratching tool at its front and means at its rear to support the body for sliding and tilting movement on a flat sheet, said tool adjusting means comprising in combination an upright shaft, means rotatably mounting the shaft at the front of the body of the instrument, a tool carrying arm of rigid material disposed horizontally in a plane below the lower end of said shaft and extending

laterally from the axis of said shaft, the outer end of said arm being bifurcated to provide two branches yieldable toward each other, an upright scratching tool plate set transversely between said branches, screw means between said branches to clamp the tool plate, said tool plate having at its lower end a scratching portion which extends in a direction transversely of the longitudinal plane of said arm, and a universal joint connection between the inner end of said arm and said shaft comprising a cross head carried by the lower end of said shaft, a coupling member, a pivot connecting said cross head to said coupling member, a second pivot connecting said arm to said coupling member, the two pivots being disposed at right angles to each other with one extending in the direction of said arm and the other extending transversely of said arm, screws in said cross-head on opposite sides of the first mentioned pivot to engage fixed portions of said coupling member, and other screws in said arm on opposite sides of said second pivot to engage fixed portions of said coupling member.

7. A tool adjusting means for an engraving instrument of the type for scratching a coating on a flat sheet and having a horizontally elongated body to be grasped by the fingers and moved over a flat sheet, the body carrying an upright scratching tool at its front and means at its rear to support the body for sliding and tilting movement on a flat sheet, said tool adjusting means comprising in combination an upright shaft, means rotatably mounting the shaft at the front of the body of the instrument, a tool carrying arm of rigid material disposed horizontally in a plane below the lower end of said shaft and extending laterally from the axis of said shaft, upright scraping tool means at the outer end of said arm and a universal joint connection between the inner end of said arm and said shaft comprising a cross-head rigid with the lower end of said shaft and extending transversely thereof, a coupling member, a pivot connecting said cross-head to said coupling member, a second pivot connecting said arm to said coupling member, the two pivots being disposed at right angles to each other with one extending in the direction of said arm and the other extending transversely of said arm, screws in said cross-head on opposite sides of the first mentioned pivot to engage fixed portions of said coupling member, and other screws in said arm on opposite sides of said second pivot to engage fixed portions of said coupling member.

8. The structure of claim 7 in which said shaft projects above the top of the instrument body and has a reduced screw threaded end forming a shoulder, a magnifying glass disposed above the outer end of said arm and mounted in a frame, a sleeve on said frame telescoped over the upper end of said shaft and engaged with said shoulder, and a nut on the threaded end of said shaft to clamp said frame on the shaft and cause the magnifying glass to swing with said arm.

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