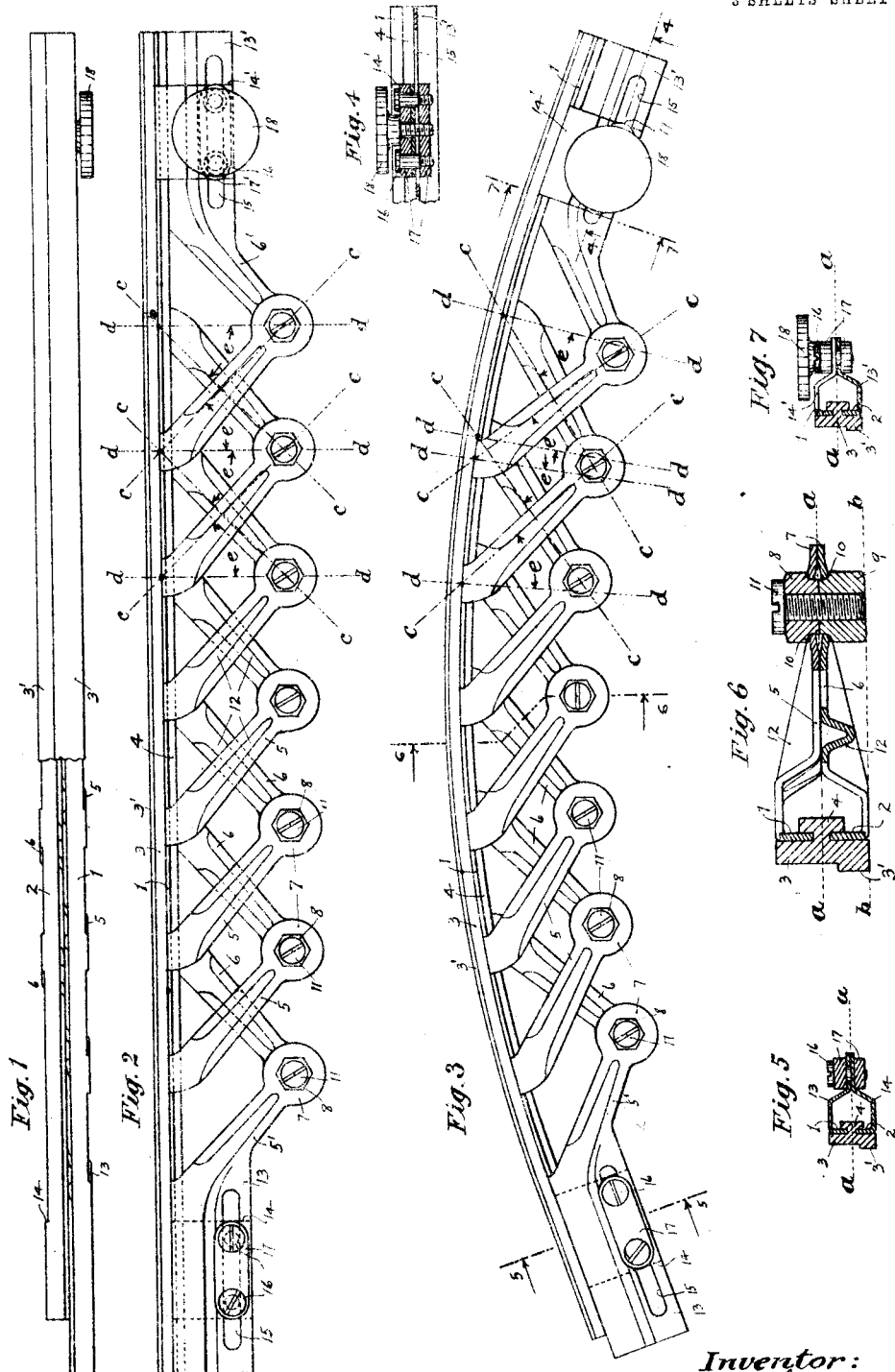


W. S. WESTON.
ADJUSTABLE CURVE SCRIBER.
APPLICATION FILED MAY 13, 1911.

1,061,345.

Patented May 13, 1913.

3 SHEETS-SHEET 1.



Witnesses:
Eleanor Hagins
Frank H. Brown

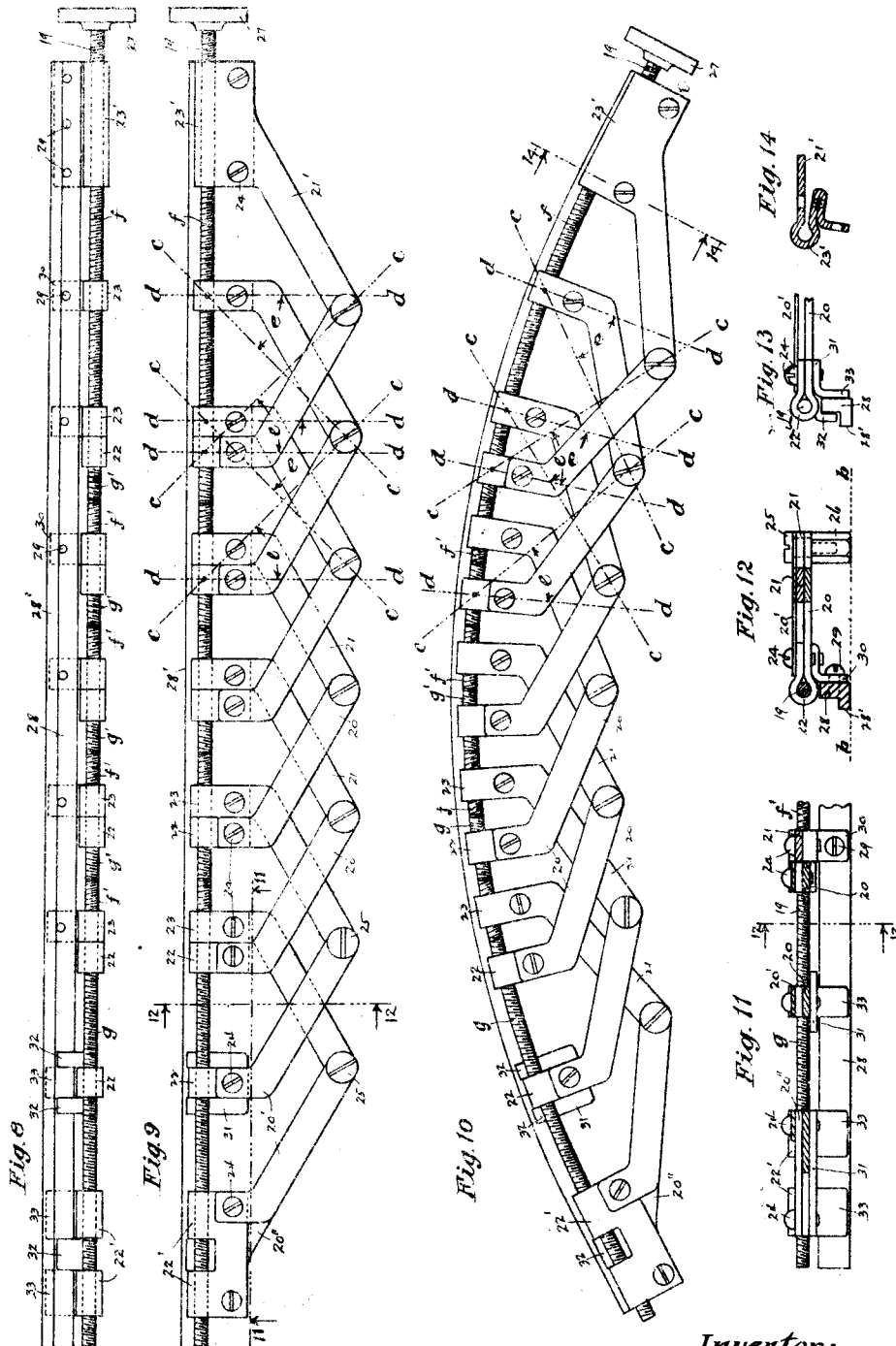
Inventor:
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3 SHEETS-SHEET 2.



Witnesses: Elmore Hagelow
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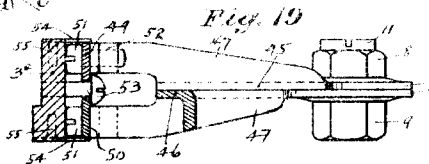
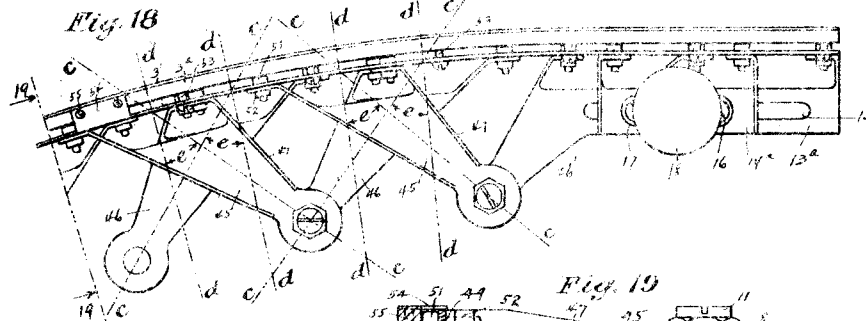
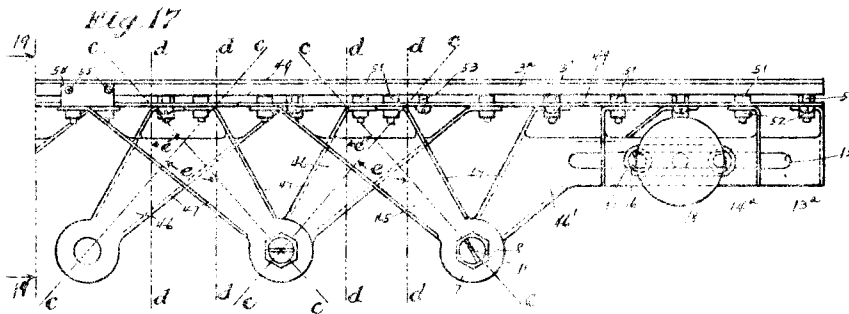
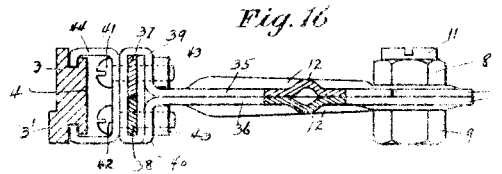
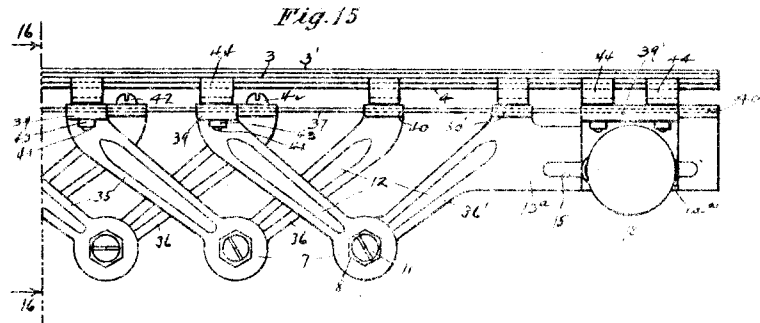
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2 SHEETS-SHEET 3.



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UNITED STATES PATENT OFFICE.

WILLIAM S. WESTON, OF CHICAGO, ILLINOIS.

ADJUSTABLE CURVE-SCRIBER.

1,061,345.

Specification of Letters Patent.

Patented May 13, 1913.

Application filed May 13, 1911. Serial No. 627,036.

To all whom it may concern:

Be it known that I, WILLIAM S. WESTON, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Adjustable Curve-Scribers, of which the following is a full, clear, and exact description.

The invention relates to adjustable curve scribers or rulers and more particularly to adjustable curves for use by draftsmen, model makers and the like for ruling regular curves of large radius.

The invention consists in the features of novelty hereinafter set forth, illustrated in different modified forms in the accompanying drawings and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is an edge view of one form of the improved adjustable curve scriber or ruler with a portion of the flexible ruling member broken away. Fig. 2 is a plan view thereof with its flexible body in straight position. Fig. 3 is a plan view with the flexible body curved for ruling a circular arc. Figs. 4, 5, 6 and 7 are sections on the lines 4—4, 5—5, 6—6 and 7—7, respectively, of Fig. 3, Fig. 6 being shown on an enlarged scale. Figs. 8, 9 and 10 are views similar to Figs. 1, 2 and 3, showing another form of the improved curve scriber. Figs. 11 and 12 are detail sections on the lines 11—11 and 12—12, respectively, of Fig. 9. Fig. 13 is a view of the left-hand end of the ruler shown in Figs. 8, 9 and 10. Fig. 14 is a detail section of a part of the device on line 14—14 of Fig. 10. Fig. 15 is a partial plan view of another form of the invention. Fig. 16 is a section on line 16—16 of Fig. 15 shown upon an enlarged scale. Figs. 17 and 18 are partial plan views of another modified form with the flexible body portion shown respectively in its straight and curved positions. Fig. 19 is a section on an enlarged scale on the lines 19—19 of Figs. 17 and 18.

The improved adjustable curve scriber for ruling regular curves of large radius comprises a longitudinally extending flexible body which is preferably formed of two or more members, one at least of which is a strip of steel or like resilient material, and a number of lever arms which are mounted upon the flexible body and maintained at fixed angles thereto. The longitudinal flexible body is provided with a ruling edge and the lever

arms are preferably rigid and are pivotally connected in pairs. The pairs of lever arms are preferably so arranged that the pairs of pivoted arms form the side portions of a series of overlapping triangles of which the bases are formed by the common flexible body of the device. Suitable means are provided for moving the points of mounting of the pairs of pivoted arms together and apart along the flexible body of the ruler to a greater or less extent and, inasmuch as the arms are held at fixed angles to the flexible body, the latter is thereby bent into regular curves of varying radius.

In the form of the invention shown in Figs. 1 to 7, inclusive, the longitudinal, flexible body of the ruler comprises two resilient bands 1 and 2 which are preferably formed of thin sheet steel and a flexible resilient member 3 formed of a strip of hard rubber, celluloid or the like. The resilient metal bands 1 and 2 are arranged edge to edge or in the same plane and slidably engage the grooves in the upper and lower portions of the flexible member 3 and which grooves are preferably formed by a longitudinally extending T-shaped rib or flange 4 on the back of the ruling member. In this form, the two series of lever arms 5 and 6 project laterally from the upper and lower edges, respectively, of the flexible bands 1 and 2 and are preferably formed integral with these bands extending laterally therefrom substantially in planes at right angles to the planes of the bands. The two series of arms 5 and 6 which are thus connected respectively to the flexible resilient bands 1 and 2, are oppositely inclined and overlap, as clearly shown in Figs. 2 and 3. Beyond the T-shaped rib 4 on the inner face of the flexible member 3 the arms 5 and 6 are bent inwardly toward each other, so that they contact along the median plane of the device which is indicated by the line *a—*a** in Fig. 6. Each arm 5 of one series is pivotally connected at its outer end to a companion arm 6 of the other series. These pivot connections may be of any suitable form, but in the preferred form illustrated, the arms are provided with enlarged circular end portions 7 which are oppositely and outwardly dished or concaved and provided with openings for receiving the connecting pivots. In the form shown, these pivots comprise upper and lower sections 8 and 9 which extend through

the openings of the circular end portions 7 of the arms 5 and 6 and which pivot sections are provided with flanges or shoulders 10 that engage the outer faces of the circular end portions 7. Screws 11 extend through the sections of the pivots and secure them together with the shoulders 10 thereof engaging and pressed against the circular end portions 7. The outwardly concaved circular portions 7 are resilient and pressed outwardly against the shoulders 10 of the pivot sections to take up the lost motion of the pivotal connections. To facilitate the assembling of the parts and the tightening of the pivotal connections, the outer portions of the pivot sections 8 and 9 are preferably hexagonal in shape, as shown, so that they may be engaged and held against rotation by wrenches. The arms 5 and 6 should be rigid and for this purpose the main body portions thereof between the inner and outer ends are provided with longitudinal corrugations 12. The flexible member 3 is preferably provided at its lower edge with an offset shoulder 3' forming a convenient ruling edge. The lower faces of this member, of the arms 5 and 6 and of the lower pivot sections 9 are preferably all arranged in the same horizontal plane so that the ruling device will properly engage a flat surface, as indicated by the line *b-b* in Fig. 6. It is to be observed, in this connection, that it is only preferable that the ruling edge shall be carried by the member or section 3 of the flexible body. In the construction illustrated, the primary function of the member 3 with its T-shaped rib 4 is to hold the bands 1 and 2 parallel. At the left-hand end of the ruling device (see Figs. 2, 3 and 5), the resilient bands 1 and 2 are provided with laterally offset flanges 13 and 14, the flange 13 on the upper band 1 merging with the end arm 5'. The flanges 13 and 14 are bent together to contact along the medium plane *a-a* of the device and the flange 13 is provided with a longitudinal slot 15, through which extend a pair of screws 16. These screws extend through holes in the flange 14 and in two reinforcing pieces 17 which abut against the outer faces of the contacting portions of the flanges. A similar sliding connection between the bands is provided at the right-hand end of the ruler in which the short flange 14' is formed upon the upper band 1 and the long slotted flange 13' is formed upon the lower band 2 and merges with the end arm 6' thereon. The flexible resilient bands are not only slidably connected at their ends, but also throughout their entire length by the flexible member 3, so that they can shift relatively to each other, but only in longitudinal direction. The two flexible members or bands 1 and 2 are held in different adjusted

positions by a clamp screw 18 which extends through the reinforcing pieces 17' at the right-hand end of the ruling device. The pairs of rigid lever arms 5 and 6 constitute the side portions of a number of triangles of which the base portions are formed by the flexible body of the ruling device, which in the construction shown in Figs. 5 to 7, inclusive, comprises the flexible, resilient steel bands 1 and 2 and the flexible ruling member 3. The triangles thus formed preferably overlap, as shown, to render the ruling device rigid when the flexible members 1 and 2 are secured by the screw 18 in adjusted position and preferably, also, as shown, the companion arms 5 and 6 of each pair are oppositely inclined. The arms 5 and 6 are rigidly connected to the flexible members or bands 1 and 2, so that, as the latter are relatively shifted in longitudinal direction, the arms will be maintained at fixed angles to the bands and to the flexible body of the ruling device and its ruling edge. This relation of the arms to the flexible body and its ruling edge is indicated in Figs. 2 and 3 by two series of lines *c-c* and *d-d*. The lines *d-d*, in both figures, are drawn at right angles to the flexible body and its ruling edge through the points of connection of the arms with the flexible body and the lines *c-c* are the effective lines of the arms. Since the lever arms are rigidly connected to the flexible body of the scriber, the angles *e* between each line *c-c* and the corresponding line *d-d* remains the same in all of the different adjusted positions of the relatively shiftable, flexible members or bands 1 and 2. In consequence of this arrangement, the flexible body of the curve scriber and its ruling edge will be bent to form a regular curve when the flexible members or bands 1 and 2 are relatively shifted in longitudinal direction to move the inner ends of each pair of pivoted arms together or apart, and, inasmuch as the arrangement of the arms is preferably uniform, throughout, the curve will be the true arc of a circle. If the bands are adjusted to move the inner ends of the pivoted pairs of arms apart, as shown in Fig. 3, the flexible body of the ruling device will be bent to form a convex arc, and if the flexible members or bands 1 and 2 are adjusted to move the inner ends of the pairs of arms together, the flexible body of the band is bent to form a concave arc. The curve scriber can be readily and quickly set to form an arc of desired radius, and when once set, can be held in position by the clamp screw 18. The tendency of the resilient metal bands 1 and 2 and of the member 3 is to spring back to straight line position and this resiliency of the parts takes up all lost motion in the construction, so that the ruling device is ac-

curately held in the arc to which it is adjusted. The flexible member 3 which, as stated, is provided with an offset shoulder 3' at its lower edge, if desired, may be provided with a similar shoulder at its upper edge, so that the ruling device can be used with either side uppermost. In the forms shown in Figs. 1 to 7 it is essential that the flexible ruling member 3 shall be slidably connected to at least one of the flexible members or bands 1 and 2, but preferably, as shown, it is slidably connected to both, so that it may be removed and another similar ruling member substituted therefor. In this way a number of ruling members having different scales thereon may be conveniently employed in connection with the improved curve scriber.

The improved device is well adapted for use by draftsmen in laying out railway track structures and obviates the necessity of using a large number of arc shaped rulers of different curvature. It may also be used to advantage by other draftsmen and by model makers for laying out circular arcs.

In the form of the invention shown in Figs. 8 to 14, inclusive, the flexible body of the device, instead of having two, longitudinally shiftable, flexible members or bands for moving the pivoted arms together and apart, has a single longitudinal, flexible rod 19, for performing this function. One end of this rod is provided with right-hand screw threads and the other with left-hand threads and the intermediate portion of the rod comprises a number of alternately arranged and oppositely threaded short sections. That is to say, the end portion *f* and the short sections *f'* are provided with right-hand threads and the opposite end *g* and the short sections *g'* are provided with left hand threads, the sections *f'* and *g'* alternating, as clearly indicated in Figs. 8, 9 and 10. The two series of lever arms 20 and 21 are preferably oppositely inclined and overlapped, as shown. These arms are formed of flat metal strips which are provided at their inner ends with angularly offset portions that are bent back upon themselves to form eyes 22 and 23, through which the flexible screw rod 19 extends. The inner ends of the lower set of arms 20 are bent upwardly around the rod to form the eyes 22, as most clearly shown in Fig. 12, and the inner ends of the arms 21 of the uppermost series are bent downwardly around the screw rod to form the eyes 23, as most clearly shown in Fig. 14. The eyes 23 on the arms 21 engage the right-hand threaded sections *f* and *f'* of the flexible screw rod and the eyes 22 of the arms 20 engage the left-hand threaded sections *g* and *g'*, the eyes being provided with suitable interior threads for engaging the right and left-hand threads of the rod. In order that the arms may be

readily assembled, they are placed on the rod with the eyes thereof somewhat open, as shown in Fig. 14, and the eyes are then clamped upon the rod by screws 24 extending through the overlapped sections thereof. Each arm 20 of one series is pivotally connected at its outer end to the outer end of a companion arm 21 of the other series by a pivot screw 25 having a nut 26 threaded on its lower end. To more securely hold the overlapped arms in engagement, thin metal strips 20' extend longitudinally over the arms 20 and are secured at its ends to the opposite ends of these arms by the screws 24 and pivot screws 25, as most clearly shown in Fig. 12. These strips 20' are spaced apart from the arms 20 and the arms 21 fit between the arms 20 and the overlapping strips 20'. The arm 20' at the left-hand end of the ruler is provided with an enlarged inner end which forms an enlarged double eye 22'. Similarly, the arm 21 at the right-hand end of the device is provided with an enlarged inner end which forms a long eye 23'. The right-hand end of the screw rod 19 is provided with a finger piece 27 by which the rod can be rotated to move the inner face of each pair of pivoted arms 20 and 21 together or apart and, inasmuch as the lever arms are held at fixed angles to the flexible screw rod, the latter is thus bent to form arcs of greater or less radius in accordance with the extent to which the inner ends of the arms are adjusted along the screw rod. A longitudinal flexible member 28 of hard rubber, celluloid or the like, forms part of the longitudinal flexible body of the ruler and is preferably arranged beneath the flexible screw rod 19. This flexible member is secured to the set of arms 21 by means of screws 29 which extend through downturned lugs 30 on the inner ends of the arms 21. At the left-hand end of the device the flexible ruling member 28 is slidably connected to the end arm 20' and the adjacent arm 20 by pieces 31, secured to the under side of these arms at their inner ends by the screws 24 and having downturned lugs 32 and 33, which are spaced apart to engage the inner and outer faces of the flexible member 28, as shown in Figs. 8 and 13. The lower portion of the flexible member is preferably provided with a longitudinally extended, projecting shoulder 28' which forms a convenient ruling edge. The lower face of the flexible ruling member 28 lies in the same horizontal plane with the lower ends of the nuts 26, so that the device is conveniently and properly supported upon a flat surface, such as indicated by the line *b-b* in Fig. 12. In this form, as in that previously described, the rigid lever arms are maintained at fixed angles to the flexible body of the curve scriber and to the ruling edge thereof, as indicated by the lines *c-c* and *d-d* in Figs. 14

9 and 10, so that as the inner ends of the lever arms are moved together and apart, the flexible member and its ruling edge is bent to regular curves or arcs which vary in accordance with the extent to which the inner ends of the pairs of pivoted arms are adjusted. In the form shown in Figs. 8, 9 and 10, the inner ends of the arms about in the straight line position of the ruling device, so that this particular arrangement could only be used for drawing convex arcs.

In the forms shown in Figs. 15 to 19, inclusive, like that shown in Figs. 1 to 7, inclusive, the longitudinal flexible body of the device comprises two steel bands and a flexible member of hard rubber celluloid or the like, but in these modifications the lever arms are not formed integral with the steel bands.

In the form shown in Figs. 15 and 16, the arms 35 and 36 are provided with corrugations 12 and connecting pivots similar to that shown in Fig. 6. The resilient steel bands 37 and 38 are preferably arranged in the same plane, as shown, and these bands extend through and are slidably connected by a series of loops 39 and 40 formed upon the inner ends of the arms 35 and 36. The loops 39 on the arms 35 are rigidly connected to the band 37 by screws 41 and the loops 40 are rigidly connected to the band 38 by screws 42, these screws being preferably provided with nuts 43, as shown. The loops 39 and 40 on both sets of arms surround both of the bands 37 and 38, but, as stated, the loops 39 of the arms 35 are only rigidly connected to the band 37, while the loops 40 of the arms 36 are only rigidly connected to the band 38. The flexible member of celluloid, rubber or the like, is similar to that shown in Figs. 1 to 7, inclusive, but instead of directly engaging the bands, the grooves in its upper and lower edges are arranged to engage the intumed ends of a series of U-shaped holders 44, which are mounted upon some of the loops 39 and 40 and are secured thereto by the screws 41 and 42 respectively. The end arm 36' is provided with a flange 13^a and a loop 40'. A loop 39', secured to the band 37 is provided with a flange 14^a, and these flanges are provided with a slidable connection and a clamping screw 18, similar to that shown in Figs. 2, 3 and 7.

In the form shown in Figs. 17 to 19, inclusive, the lever arms of the device indicated by the numerals 45 and 46 are provided with circular outer ends connected by pivots similar to those shown in Fig. 6. These arms are wider at their inner ends than at their outer ends, are formed of sheet metal and are provided with outturned edge flanges 47. The body or web portions of these arms terminate short of their inner ends, but the flanges extend beyond the body or web portions thereof and are pro-

vided with offset inner ends which are connected respectively to the two flexible members or bands 49 and 50, which extend longitudinally of the ruler, the extended flanges or feet at the inner ends of the arms being secured to the respective bands by screws 51 having nuts 52 thereon. The flanges 13^a and 14^a are similarly respectively connected to the bands and these flanges are provided with a clamp screw 18 similar to that shown in Figs. 2, 3, 4 and 7. In this form, the flexible member 3^a is provided with a series of screws 53 which project from the rear central portion thereof. The shanks of these screws extend between the inner adjacent ends of the bands 49 and 50, and the heads thereof engage the inner faces of the bands. The rear face of the flexible member abuts against the outer ends of the screws 51 and clips 54 connected by screws 55 to the edges of the flexible member, extend inwardly and engage the edges of the bands to strengthen the structure and prevent the bands from separating. In this latter form, the central lines of the arms are always maintained at fixed angles to the flexible body of the ruler or at fixed angles to lines drawn at right angles to the ruling edge of the device, as indicated by the lines *c-c* and *d-d* in Figs. 17 and 18.

It is obvious that the improved adjustable curve scriber may be embodied in various forms without departure from the essentials of the invention as defined in the claims. While the inner ends of the pairs of pivoted arms are preferably moved together and apart by two longitudinal, slidably connected, flexible members, one at least of which is formed of resilient material, other means may be employed for this purpose, such, for example, as the screw rod of the form illustrated in Figs. 8 to 14, inclusive. It is only essential that the arms be maintained at fixed angles to the flexible body of the ruling device. It is also obvious that the arrangement of the parts may be modified, without departure from the essentials of the invention as defined in the claims.

I claim as my invention:—

1. An adjustable curve scriber comprising a longitudinal flexible body and two series of lever arms mounted on said flexible body at fixed angles thereto, each arm of one series being pivotally connected to the companion arm of the other series, the arms of each series being mounted on said flexible body independently of the arms of the other series and said separate series of arms being relatively shiftable together and apart.

2. An adjustable curve scriber comprising a longitudinal flexible body and two series of oppositely inclined, overlapping rigid arms mounted at their inner ends on said flexible body at fixed angles thereto, each arm of one series being pivotally connected

at its outer end to the corresponding end of a companion arm of the other series and said arms forming the side portions of a series of overlapping triangles of which the base portions are formed by the common flexible body, one series of arms being shiftable relatively to the other series.

3. An adjustable curve ruler having a flexible body provided with a ruling edge, two series of lever arms mounted on said flexible body, each arm of one series being pivotally connected to the companion arm of the other series, said arms being maintained at fixed angles to said flexible body and said body comprising suitable means for shifting one series of arms relatively to the other series.

4. An adjustable curve scribe having a flexible body and two series of rigid lever arms mounted at their inner ends on said flexible body at fixed angles thereto, each arm of one series being pivotally connected at its outer end to the companion arm of the opposite series, the inner ends of the arms of one series being shiftable relatively to the inner ends of the arms of the other series, and said flexible body having suitable means connecting the inner ends of the arms of each series.

5. An adjustable curve scribe comprising a longitudinal, flexible body having a ruling edge and a number of pairs of uniform, oppositely inclined, rigid arms mounted on said flexible body at uniform fixed angles thereto, and pivotal connections between the outer ends of the arms of each pair, said flexible body comprising suitable means for relatively shifting the points of mounting of said arms to increase or decrease the angles between the pivoted arms of each pair.

6. An adjustable curve scribe comprising two series of rigid arms, each arm of one series being pivotally connected to a companion arm in the other series and the arms of each pivotally connected pair being oppositely inclined, and a longitudinal flexible body comprising means for shifting the arms of one series to and from the arms of the other series, said arms being maintained at fixed angles to said flexible body.

7. An adjustable curve scribe comprising two longitudinal, slidably connected, flexible members arranged adjacent each other, a number of rigid arms connected at their inner ends to one of said flexible members at fixed angles thereto, and connections between the outer ends of said arms and the other of said flexible members, said arms and said connections being arranged upon the same side of both of said members and said connections being pivoted at their outer ends to the outer ends of said arms.

8. An adjustable curve scribe comprising two longitudinal, slidably connected, flexible members, and a number of arms pivot-

ally connected in pairs, the arms of each pair being rigidly connected respectively one to each of said flexible members.

9. An adjustable curve scribe comprising two longitudinal, slidably connected, flexible members, a number of pairs of rigid lever arms mounted at fixed angles to said flexible members with the arms of each pair pivoted together and connected respectively one to each of said members and means for holding said relatively slidable, flexible members in different adjusted positions.

10. An adjustable curve scribe comprising two flexible, resilient bands relatively shiftable in longitudinal direction, a series of inclined arms connected to one of said bands at fixed angles thereto, a second series of inclined arms overlapping the first series and connected to the other of said bands at fixed angles thereto and pivotal connections between one arm of each series and a companion arm of the other series.

11. An adjustable curve scribe comprising two, flexible, longitudinal members relatively shiftable in longitudinal direction, a number of pairs of rigid lever arms mounted at fixed angles to said flexible members with the arms of each pair pivotally connected together and rigidly connected respectively one to each of said flexible members, and a third flexible member having a ruling edge removably connected to said first mentioned flexible members.

12. An adjustable curve scribe comprising two flexible, slidably connected, resilient bands, two series of oppositely inclined, overlapping, lever arms mounted respectively on said bands at fixed angles thereto, pivotal connections between the ends of the companion arms of the two series, and means for holding said bands in different relative positions.

13. An adjustable curve scribe, comprising two resilient, metal bands relatively shiftable in longitudinal direction, a number of pairs of rigid lever arms, the arms of each pair being pivotally connected at their outer ends and rigidly connected at their inner ends one to each of said bands, and means for holding said bands in different adjusted positions.

14. An adjustable curve scribe comprising two resilient, metal bands relatively shiftable in longitudinal direction, a number of pairs of rigid lever arms, the arms of each pair being pivotally connected at their outer ends and rigidly connected at their inner ends one to each of said bands, and a flexible member having a ruling edge removably connected to said bands and longitudinally shiftable thereon.

15. An adjustable curve scribe comprising two, resilient, slidably connected metal bands arranged edge to edge and relatively shiftable in longitudinal direction, two series

of oppositely inclined, overlapping arms rigidly connected respectively to said bands, pivotal connections between each arm of one series and a companion arm of the other series and means for holding said bands in different adjusted positions.

16. An adjustable curve scriber comprising two, flexible, resilient bands relatively shiftable in longitudinal direction, a number of pairs of oppositely inclined, rigid, lever arms, the arms of each pair being pivotally connected at their outer ends and rigidly connected at their inner divergent ends one to each of said bands, means for holding said bands in different adjusted positions, and a longitudinal flexible member having a ruling edge mounted on said bands.

17. An adjustable curve scriber comprising two slidably connected, flexible members, a number of pairs of arms formed of sheet metal, the arms of each pair being rigidly connected at their inner ends one to each of said members, and having oppositely concaved, overlapping outer end portions and flanged pivots extending through said concaved outer end portions.

18. An adjustable curve scriber comprising two slidably connected, resilient metal bands, a number of pairs of rigid lever arms formed of corrugated sheet metal, the arms of each pair being rigidly connected at their inner ends one to each of said bands and having circular, oppositely concaved, overlapping outer ends, and flanged pivots extending through the concaved outer ends of said pairs of arms.

19. An adjustable curve scriber comprising two, flexible, resilient bands relatively shiftable in longitudinal direction, a number of pairs of oppositely inclined rigid lever arms, the arms of each pair being pivotally connected at their outer ends and rigidly connected at their inner divergent ends one to each of said bands, and a flexible ruling member having grooved upper and lower edges slidably mounted on said bands.

20. An adjustable curve scriber comprising two, slidably connected, resilient bands formed of sheet metal and each having a

series of arms integral therewith and arranged in a plane at right angles thereto, pivots connecting the arms of one series with companion arms of the other series, and means for holding said bands in different adjusted positions.

21. An adjustable curve scriber comprising two resilient sheet metal bands each having a series of inclined arms integral therewith and arranged in a plane at right angles thereto, pivots connecting the arms of one series with companion arms of the other series, and a flexible ruling member having grooves in its upper and lower edges for receiving the inner adjacent edges of said bands, the latter being relatively shiftable along said flexible member, and means for holding said bands in different adjusted positions.

22. An adjustable curve scriber comprising a body portion formed of two, parallel flexible members arranged closely adjacent each other and relatively shiftable in longitudinal direction only, and a series of jointed arms connected to said members and arranged on one side thereof in planes substantially at right angles to the axes of curvature of said body portion, the jointed arms connected to at least one of said flexible members being held at fixed angles thereto.

23. A curve scriber adapted to be adjusted to different degrees of curvature, comprising two parallel, flexible, resilient bands relatively adjustable in longitudinal direction, a clamp for holding the bands in adjusted position, a series of arms attached to one of said bands, a second series of arms attached to the other band, and pivotal connections between the ends of the arms of one series and the ends of the companion arms of the other series, all of said arms extending from said bands on the same side thereof and substantially at right angles to the axes of curvature.

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