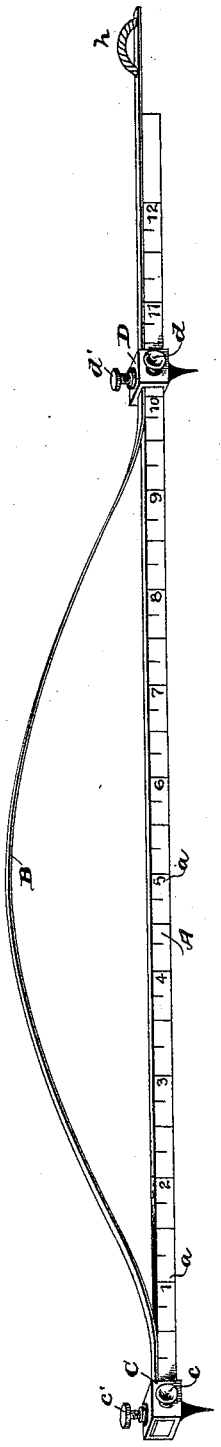
(No Model.)

A. McKENZIE.

CURVE SCRIBER.

No. 419,467. Patented Jan. 14, 1890.



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CURVE-SCRIBER.

SPECIFICATION forming part of Letters Patent No. 419,467, dated January 14, 1890.

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To all whom it may concern:

Be it known that I, ANGUS MCKENZIE, a subject of the Queen of Great Britain, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Rules; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to rules for forming elbow-patterns; and the object of the invention is to provide a rule whereby the size of the sheet and the curvature of the angle of elbows cut from sheet metal may be easily and quickly ascertained. It is well known to those familiar with this art that in forming elbows from sheet metal the angle of the elbow is determined by a curved line extending across the sheet from side to side and having greater or less depth of curvature, according as the angle is to be more or less decided. This curve is not of the form of a true arc of a circle, as seen in the accompanying drawing, and hitherto has been ascertained only by following out certain tedious geometrical rules, fractions, &c., given in books for pattern-cutting, which required a vast amount of careful measurement and consumed a great deal of time to get its location and depth at different points. By my improvement the larger and more difficult parts of these measurements are avoided, and, being advised as to the size of the diameter and the angle of the elevation, the lines upon which a plate is to be cut to form the elbow-sections are quickly and easily made.

To these ends the invention consists in a rule having a series of equal-numbered spaces on its side, numbered consecutively to correspond with corresponding diameters, and an adjustable spring strap or ribbon on said bar adapted to be bent to the curvature of the required angles, all as hereinafter fully described, and fully pointed out in the claims.

In the accompanying drawing the single figure is a perspective view of a pattern-rule and spring-strap ribbon constructed according to my invention.

A denotes the rule-bar, the length of which will depend on the use to which it is to be applied. If large pipes are to be made, this bar may be three feet or more in length, and the spring strap or ribbon B correspondingly heavy; but if small pipes are to be made—say two or three inches in diameter—the bar could be made much shorter and the spring necessarily lighter. Any number and weight of springs can be kept on hand and adapted to a bar of any given length. Obviously, a heavy spring would not be suitable for a very short measurement, yet all springs should have sufficient strength to give and hold the curvature to which they are bent for use. These springs are made of crucible-steel and combine flexibility with the requisite strength and firmness.

On one side the bar A has a series of equal divisions of space lettered *a* in the drawing and numbered 1 2 3, and so on up as high as necessary and according to the length of the bar, and these spaces are subdivided for further convenience of measurement. Each space *a* corresponds to a diameter of pipe equal in inches to the number at the end of the space. For example, figure 1 corresponds to a pipe one inch in diameter, marking the circumference of a one-inch pipe, figure 2 to a pipe two inches in diameter, figure 3 to a pipe three inches in diameter, and thus on to the end of the bar. Then, having learned the diameter the pipe is to be, the sheet is measured to the corresponding width by laying the scale thereon and at once marking off the width for the circumference without other aid than the figures on the bar afford. If you want a four-inch diameter, measure from the inner face of clamp or tram C at the end of the bar to figure 4 on the bar, and this will be exactly the circumference of a four-inch pipe, or pipe with four inches diameter. The sheet is then cut to this size and is ready to be measured for the curvature of the angle.

Each tram or clamp C D is provided with two set-screws—one at the side, as *c d*, respectively, to fasten the trams to the bar, and one each, *c'* and *d'*, to secure the spring B. In use the tram C is tightened on the end of the bar and spring, as shown, and the tram D is adjusted to get the requisite lengths, curva-

tures, and the like. Now, having a plate cut to the required width for circumference and desiring to get the elevation of the angle, say, for a two-section elbow and a four-inch pipe, set the tram D to the scale of the diameter, which on the scale is marked 4, and fasten with screw *d*. If the sheet were cut for any other circumference than four—say five or six or seven—the tram D would be moved accordingly to one or the other of said figures, and the diameter of the pipe would correspond with the figure so chosen.

We will now further assume that we are making our pattern, as usual, for a right-angled elbow and in two sections. Measuring off, say, four inches, more or less, at the bottom of the sheet for the throat, the curve of the angle will run between the sides of the sheet with this line as the base. As there are to be but two sections of the elbow, the angle of the cut will come at forty-five degrees to the plane of the sides or a miter cut, and this requires that the spring be set just four inches from the base in the center. The spring is therefore thrust inward by taking hold of its handle *h* until the desired depth of curve is reached, when it is fastened and held by set-screw *d'*. A mark or scribe traced along this spring on the sheet will tell exactly where to cut to get the desired angle. Nothing will then remain to be done but to divide the sheet on the line so made, and thus a two-section elbow will be formed. A two-section six-inch, eight-inch, or any other diameter of elbow would be made in the same way, with the difference that in each case the depth of curve would be set to correspond to the diameter of the pipe, whatever that might be; but the angle in each case would be the same. Obviously, if the elbow were made in three, four, five, or six parts or sections, the depth of angle or curvature would be modified according to the number of pieces used. Thus if a three-piece elbow be wanted for a four-inch pipe the center of the curve would have one and ten-sixteenths inch elevation; if a four-piece elbow, one and one-sixteenth inch elevation; if a five-piece elbow, twelve-sixteenths of an inch elevation, and if a six-piece elbow, nine-sixteenths of an inch elevation. The same angle of elevation would prevail for all greater or less diameters of pipe having the same number of parts in the elbow; but the elevation of the curve would rise with the rise in diameter. Thus for a three-part elbow in a six-inch pipe the elevation of the curve would be two and seven-sixteenths inches; in an eight-inch pipe, three and four-sixteenths inches, and so on. This rise in the curve does not, however, change the angle thereof, for the reason that the difference is compensated by the greater size of the pipe. To further illustrate this principle, let us suppose that we have before us a chart having a horizontal base-line corresponding to the rule shown in the drawing and similarly marked off in divisions of space and numbered 1 2 3, &c., up to 12. Each subdivision, of course, would be equal to a corresponding diameter of pipe, so that in this case we would have provision made for pipes ranging from one inch to twelve inches in diameter. From each subdivision a perpendicular line is drawn, graduated in length from, say, one inch at figure 1 to six and a half inches at figure 12, which is at the end of the base or horizontal line. These perpendicular lines are intersected by nine diagonal lines having their focus at the left-hand end of the base-line, marked, say, by 0, and radiating therefrom to the perpendicular line 12, which they touch at different elevations on a range of something less than five inches from near the top of said line downward. Along the perpendicular line 12 the several diagonal lines are numbered 1 2 3, and so on from the bottom to the top. Now suppose that accompanying this chart we have directions for use which say that the perpendicular lines denote the diameter of the pipe and the diagonal lines the elevation of the curve according to the number of pieces used—as, for example, having a six-inch pipe and wanting an elbow in six parts, we refer to perpendicular line 6 and the intersection of diagonal line 1, and this gives the elevation of the center of the curve to which the spring should be set to get the desired angle of each part. If the pipe be of any other given diameter between 1 and 12, we follow the same diagonal for the same number of pieced elbow and set the spring accordingly.

Number 2 diagonal line is drawn to cut for a five-piece elbow, number 3 for a four-piece elbow, and so on to the last or upper line, and in each case in any given diameter of pipe it is only necessary to go up on the said diameter line till a diagonal of any desired number of parts is reached, and, as before stated, the same diagonal will give the angle for the same number of parts for any diameter of pipe. This example serves to show that the angle of the cut is dependent on the number of parts in the elbow and is the same for any size of pipe, and that beyond this the elevation of the spring to get the desired angle increases exactly in proportion to increase in the size of the pipe. It further serves to show that a chart can be provided to go with the rule, which is simple and easy to understand, and which provides for such a large and varied range of angles that nothing further is necessary to ascertain any measurement probable in ordinary shop-work. The saving of time and labor in the simplest measurements is very considerable, and the great number of patterns heretofore required and hung about shop-walls are dispensed with as useless.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a pattern-rule, a straight rule-bar having a flat side, a thin metallic spring-strap

lying flat upon the bar, and a clamp on the bar constructed to slide thereon and to lock the strap to the bar after the strap has been bent, substantially as set forth.

2. In a pattern-rule, a rule-bar, a spring-strap lying flat upon the bar, and a clamp provided with means to lock the clamp on the bar and separate means on the clamp to lock the strap on the bar, substantially as set forth.

3. In a pattern-rule, a rule-bar having subdivisions of space on its side—as inches and fractions thereof—and a spring-strap secured to said bar at or near its end by a clamp which fastens the two parts firmly together, in combination with a movable clamp through which said strap passes, said clamp provided with separate means for fastening the clamp to the rule-bar and for fastening the spring-strap, whereby the said strap may be adjusted while the said clamp is locked on the rule-bar, substantially as set forth.

4. In a pattern-rule, a flat rule-bar having subdivisions of space on its side, in combination with a spring-metal strap adapted to lie flat upon said bar and two clamps for securing said strap in position, each clamp provided with two screws, one locking the clamp on the bar and the other locking the spring-strap, substantially as set forth.

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