

C. J. BEAUVAIS.  
RANGE FINDER.

(Application filed Oct. 21, 1898.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 6.



Fig. 7.

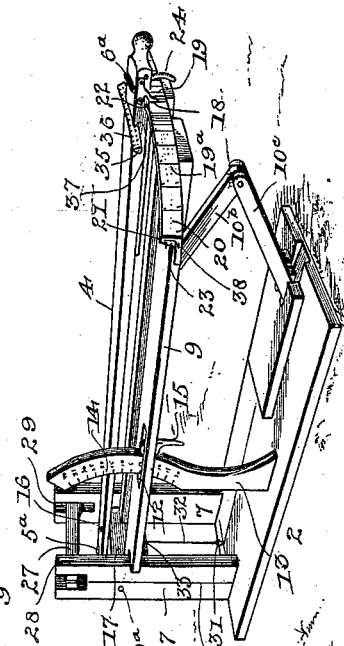
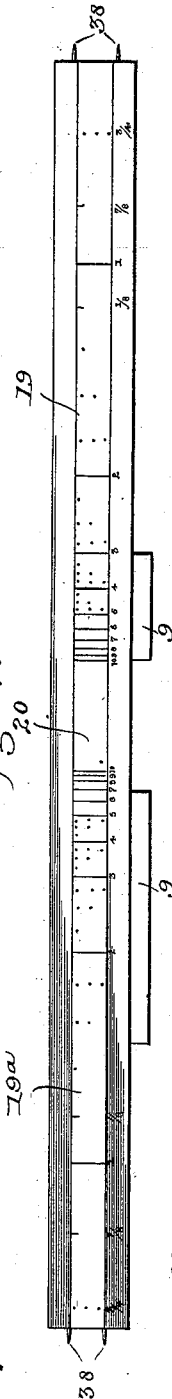
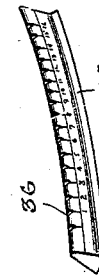


Fig. 1.

Fig. 8.



Witnesses  
E. N. Monroe  
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Crittenden J. Beauvais, Inventor  
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No. 648,377.

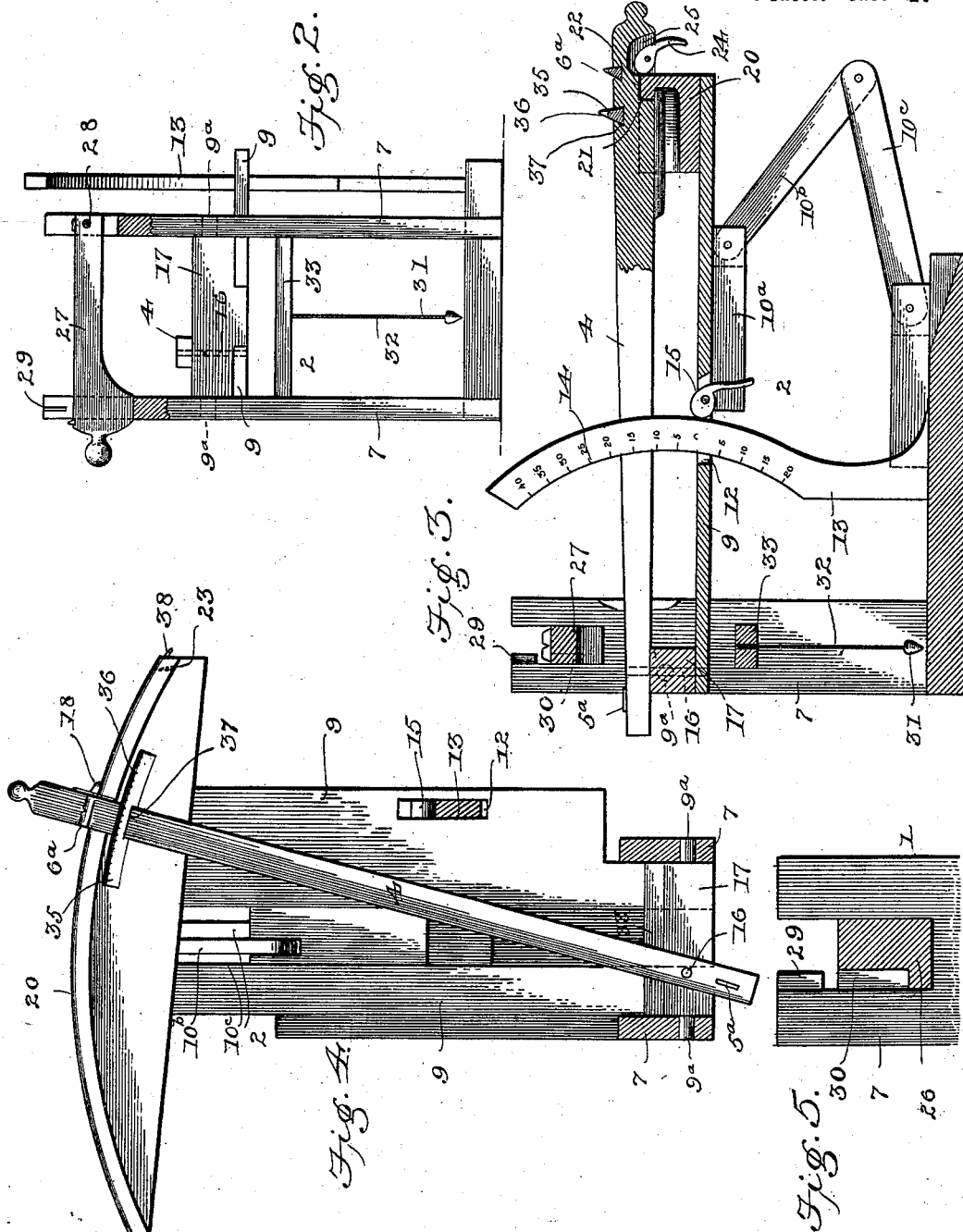
Patented May 1, 1900.

C. J. BEAUVAIS.  
RANGE FINDER.

(Application filed Oct. 21, 1898.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses  
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# UNITED STATES PATENT OFFICE.

CRITTENDEN JOHN BEAUVAIS, OF PHOENIX, ARIZONA TERRITORY.

## RANGE-FINDER.

SPECIFICATION forming part of Letters Patent No. 648,377, dated May 1, 1900.

Application filed October 21, 1898. Serial No. 694,193. (No model.)

*To all whom it may concern:*

Be it known that I, CRITTENDEN JOHN BEAUVAIS, a citizen of the United States; residing at Phoenix, in the county of Maricopa and Territory of Arizona, have invented a new and useful Range-Finder, of which the following is a specification.

The invention relates to improvements in range-finders.

One object of the present invention is to improve the construction of range-finders and to provide a simple and comparatively inexpensive one capable of being easily and quickly adjusted and operated and adapted to give the exact distance of an object in miles and fractions of a mile without requiring mathematical calculation on the part of the operator.

A further object of the invention is to provide a range-finder adapted for use on vessels and in the field and to provide means whereby when it is used by an army in the field it may be accurately and quickly arranged in proper position for observation.

Another object of the invention is to provide a range-finder which will enable the speed of ships and other moving objects to be ascertained and which may be employed for finding the elevation or depression of points or places.

Furthermore, the invention has for its object to provide a range-finder which will enable sights of cannon and other firearms to be accurately graduated for firing ahead of a moving object at a great distance, so that the projectile will strike such object.

The invention consists in the construction and novel combination and arrangement of parts, as hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended.

In the drawings, Figure 1 is a perspective view of a range-finder constructed in accordance with this invention. Fig. 2 is a front elevation, partly in section, of the right-hand device. Fig. 3 is a longitudinal sectional view of the same. Fig. 4 is a horizontal sectional view illustrating the manner of adjusting the laterally-movable sight-bar. Fig. 5 is a transverse sectional view of the transverse sight-bar of the left-hand device. Fig. 6 is a detail view of a scale for ascertaining

the speed of vessels. Fig. 7 is a detail view of the transverse scale-bar. Fig. 8 is a detail view of the adjustable sight.

Like numerals of reference designate corresponding parts in all the figures of the drawings.

1 and 2 designate right and left hand devices provided, respectively, with sight-bars 3 and 4, having front and rear sights 5 and 6 and 5<sup>a</sup> and 6<sup>a</sup>, similar to those of a rifle, and they can be constructed in any desired manner to secure the most accurate sighting. Each observation device has a main or supporting frame comprising a horizontal base and vertical standards 7, located at opposite sides of the front end of the base and having oscillating frames 8 and 9 journaled between them on horizontal pivots or trunnions 8<sup>a</sup> and 9<sup>a</sup>, and these oscillating frames are arranged to swing in a vertical plane to elevate and depress the longitudinal sight-bars 3 and 4.

Each pivoted frame is composed of a pair of longitudinal side bars suitably connected at the front and back. The front connecting-bar 10 of the pivoted frame 8 is of greater thickness than the rear connecting-bar 11, and the sight-bar 3, which is rigidly secured to the connecting-bars 10 and 11, has its sights 5 and 6 arranged in a horizontal plane when the pivoted frame is horizontal. One of the side bars, preferably the left-hand side bar of each pivoted frame, is provided with a slot 12, through which passes an upwardly-extending bar or arm 13, rising from the base and provided with a scale 14, graduated above and below a line indicating when the pivoted frame is in its horizontal position. The central graduation, which indicates when the pivoted frame is in a horizontal position, is designated by O, and the upper and lower graduations indicate the degree of elevation or depression of the sight-bars. The graduations of the scales of the observation devices are exactly the same, in order after the left-hand observation device is adjusted, as hereinafter described, the right-hand observation device may have its pivoted frame arranged in the same plane. Each pivoted frame is locked at the desired adjustment by means of a cam-lever 15, pivoted in the slot 12 and having a depending portion or arm adapted to be readily grasped by the operator to cause the head of the cam-

lever to engage the curved edge of the scale. By this construction the pivoted frames are secured at the desired adjustment.

The sides of the pivoted frames are connected between their ends by plates or portions 10<sup>a</sup>, which are slotted at their rear or outer ends to receive the upper ends of upper links 10<sup>b</sup>, and the latter have their lower ends pivoted between a pair of links 10<sup>c</sup>, pivotally connected with the base. The links 10<sup>b</sup> and 10<sup>c</sup>, which support the pivoted frames against lateral movement, do not interfere with the adjustment of the same, and the lower links or members 10<sup>c</sup> are preferably duplicated, as shown.

In operating the range-finder the left-hand sight-bar is first adjusted and the operator aims the same by means of the front and rear sights at a mast or flagpole of the place the distance of which it is desired to obtain, and in adjusting the sight-bar 3 it is operated similar to an ordinary rifle. After a fair sight has been obtained the pivoted frame is locked and the point or graduation of the scale is noted. The pivoted frame of the right-hand observation device is then set in the same plane as that of the left-hand device, and the sight-bar 4, which is pivoted near its front end by a bolt 16 or other suitable fastening device to the front connecting bar or piece 17 of the frame 9, is adjusted to the right or left and is sighted on the object toward which the sight-bar 3 is aimed. The rear portion of the sight-bar 4 carries a laterally-disposed index-finger or pointer 18, which moves over a transverse scale 19 of a transverse scale-bar 20, which connects the rear ends of the sides of the frame 9. The scale 19, which is located at one-half of the transverse scale or connecting bar, is graduated or divided to designate miles and fractions thereof, the graduations beginning from the right-hand end of the bar 20, and the pointer indicates the distance of the object sighted, the result being in miles and fractions thereof and requiring no mathematical calculation on the part of the operator. The left-hand half of the transverse scale-bar is provided with a reversely-arranged scale 19<sup>a</sup> for sighting the bar 4 in the opposite direction, as hereinafter explained, and then the sight-bar 4 will become the left-hand member. The said sight-bar 4 is provided with front and rear sights 5<sup>a</sup> and 6<sup>a</sup>, similar to those of the sight-bar 3.

The right and left observation devices are designed to be constructed for operation at a given distance apart, and after this distance—say fifty feet—has been determined it remains constant—that is, after the devices have been constructed to be used at that distance apart they must always be arranged at that interval in order to obtain an accurate result. The devices may be operated closer together; but this distance has been found to give very satisfactory results. The distance of course can be increased if desired. The scale is ob-

tained by actual observation by observing an object at the distance of one mile and then indicating the same on the rear connecting-bar 20, and after this mark has been accurately obtained it may be relied on, and in the adjusting of the apparatus when the index-finger or pointer is arranged at the one-mile mark the object is situated one mile from the point of observation. The second, third, and the other mile-marks of the scale are obtained in the same manner by actual observation, and when the scale is completed the devices will be found accurate when sighted on any object within their range. The scale is also divided into fractions of a mile, which division-marks are obtained by actual observation, as before explained.

The rear connecting or scale bar 20 of the frame 9 is provided with a curved rear face concentric with the pivot 16, and it has a curved flange 21 at its upper edge to engage a transverse recess of the sight-bar 4. The flange 21, which engages the transverse recess 22, extends inward or forward from the scale or connecting bar 20, and it prevents the sight-bar from moving upward or downward independently of the pivoted frame, but permits the same to swing laterally on the pivot 16. One or more stops 23 may be provided for limiting the swing of the sight-bar 4 on the guide-flange 21, and the said sight-bar is locked at any desired adjustment by a cam-lever 24, pivotally mounted in a recess of the rear portion of the sight-bar and having a depending arm adapted to be readily grasped by the operator in sighting the bar 4 and located in a position corresponding to the trigger of a gun.

The devices are designed, primarily, for field-work to enable the distance of fortifications and the like to be ascertained for the use of artillery, and in order to facilitate the placing of the devices in alinement they are provided with transverse sight-bars 26 and 27, which extend across their front portion, as clearly illustrated in Fig. 1 of the accompanying drawings. These transverse sight-bars, which are shaped similar to the other sight-bars, have their front sights at their inner ends, and they point toward each other, being mounted in bifurcations of the upper ends of the standards. The front ends of the transverse sight-bars are mounted on pivots 28, and their rear ends are limited in their upward movement by stops 29, mounted on the standards at the front sides of the off bifurcations and arranged to engage shoulders 30, formed by recessing the adjacent sides of the sight-bars, as clearly illustrated in Fig. 5 of the drawings. The near side of each device is provided with a vertical line 31<sup>a</sup>, on which the opposite transverse sight-bar is sighted, and by means of these transverse sight-bars and their front and rear sights the right and left observation devices may be properly set in parallel planes with their front ends on the same line. Each device is also provided

at its front with a plumb, consisting of a plumb-bob 31, suspended by a plumb-line 32 from a horizontal bar 33, which is mounted on the standards. The base of each device

5 is provided between the standards with suitable lines or marks for indicating when the plumb-line is in a perpendicular position.

In order to ascertain the speed of a moving vessel or other object which is traveling across  
10 the line of sight, a scale 34 is prepared for each mile of the scales 19 and 19<sup>a</sup>—that is, a scale of this character is prepared for use at ten miles, another one for nine miles, another one for eight miles, and so on down to one  
15 mile. It is prepared by sighting the right-hand device at an object a known distance from and in the line of sight of the left-hand device and then sighting it on another object a greater distance from the left-hand device  
20 and in the line of the sight thereof, after which the distance between these two sight-lines of the right-hand device is found at the first object, such distance being measured at right angles to the line of sight of the left-hand device. For example, the right-hand device is  
25 sighted at an object nine miles from the left-hand device and is then sighted at an object ten miles from the said left-hand device. The distance between these two diverging  
30 sight-lines, measured at right angles to the line of sight of the left-hand device, is obtained by actual measurement at the nine-mile point. This distance, which is thirty feet when the devices employed are three hundred feet apart, is taken as a unit of measurement for the nine-mile scale, and the  
35 graduations of the scale, corresponding to this unit of distance, are obtained by marking the distance the pointer or indicator moves in changing the right-hand sight-bar from the  
40 nine-mile object to the ten-mile object. After the scale 34 has been thus obtained the speed of a moving vessel may be readily ascertained by first determining the distance of  
45 the vessel and then using the scale corresponding to such distance, sighting the bar of the right-hand device on the mast of the vessel and keeping a fair sight on the same by gradually swinging the sight-bar horizontally until  
50 the pointer or indicator passes over one or more of the graduations of the scale. This will give the distance traveled by the vessel, and by noting the time taken by the vessel to pass over this distance the speed in miles per  
55 hour may be readily calculated.

To facilitate aiming a gun a predetermined distance in advance of a vessel or other object, so that a shot will strike the vessel properly, a laterally-adjustable sight 35 is employed.  
60 This sight 35 is designed to enable a gunner to allow for the distance traveled by the vessel between the time the projectile leaves the muzzle of the gun and the time it arrives at the object, and it is located a short distance  
65 in advance of the rear sight of the bar 4 and is curved, being provided at its upper edge with sight-notches 36, arranged at intervals

agreeing with the graduations of the scale 34. The sight-bar 4 is provided with a dove-tailed recess 37 to receive the laterally-ad-  
70 justable sight-bar, which conforms to the configuration of the recess, and by sighting through one of the notches of the sight-bar and the front sight of the bar 4 the latter may be aimed in advance of a vessel. The ad-  
75 justable sight-bar 35, which is designed to be provided on cannon and other firearms, may be graduated for any known distance and for any given speed, and a number of such sight-bars may be provided, so that when  
80 the distance of a vessel or other moving object is ascertained and its rate of speed determined the proper sight-bar may be used to enable the cannon to be accurately aimed the desired distance in advance of such object.  
85 These sight-bars are laterally adjustable to enable the first notch to be accurately aligned with the ordinary front and rear sights of a gun, and they are detachable to enable them to be readily changed. After the sight-bar  
90 35 is properly adjusted any one of the notches may be used without further adjustment. The scale 34 is preferably arranged on a strip of flexible material, which is applied to the rear face of the curved scale-bar by engaging  
95 its ends with projections 38, arranged in pairs and extending from the ends of the bar 20. The elevation or depression of an object may be ascertained in a manner corresponding to finding the distance traveled by a vessel in a  
100 given time—that is to say, suitable scales are provided for indicating the distances at a given point—say nine or ten miles—corresponding to the movement of the rear end of the pivoted frame vertically. Each graduation  
105 of the scale may represent fifty feet or any other unit of distance, and by ascertaining the number of graduations on such a scale between the position of the pivoted frame when the sight-bar is in a horizontal position  
110 and when it is sighted on the object the distance such object is above or below the horizontal plane of the device may be readily determined. The device may also be advantageously employed for accurately graduating  
115 the sights of heavy guns and firearms of all descriptions for shooting at moving objects at great distances.

The pivot 16 of the sight-bar is located the same distance from the rear sight as the scales  
120 19 and 19<sup>a</sup> are from the pivots or trunnions of the pivoted frame, and the fractional parts of miles on the scales 19 and 19<sup>a</sup> are preferably indicated by dots, as shown, one dot indicating one-quarter, two dots a half, and  
125 three dots three-quarters of a mile. Between the graduations at the beginning of the scales 19 and 19<sup>a</sup> short lines or dashes are employed for indicating eighths of a mile.

The invention has the following advantages: The devices, which are exceedingly  
130 simple and inexpensive in construction, are easily manipulated and are capable of finding the range of an object, of ascertaining

the speed of ships and other moving things, and of determining the height of points or places or the depression of the same. The devices can be employed for accurately graduating sights for enabling cannon and other firearms to be accurately aimed a given distance in advance of a vessel or other moving object when the distance and the rate of speed are known, so that the projectiles will be properly timed to strike such objects.

Changes in the form, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

What is claimed is—

1. A range-finder comprising a pair of observation devices provided with pivotally-mounted longitudinal sight-bars arranged to swing vertically, one of the sight-bars being capable of swinging laterally, and a pair of pivotally-mounted transverse sight-bars arranged to operate independently of the longitudinal sight-bars, substantially as described.

2. A range-finder comprising a pair of observation devices provided with longitudinal sight-bars pivoted at their front ends and arranged to swing vertically, one of the longitudinal sight-bars being capable of swinging laterally, and a pair of transverse sight-bars mounted independently of the longitudinal sight-bars, said transverse sight-bars being pivoted at their front ends and arranged to swing vertically, substantially as described.

3. A range-finder comprising a pair of observation devices provided with longitudinal sight-bars pivotally mounted and arranged to swing vertically, one of the sight-bars being capable of swinging laterally, a pair of transverse sight-bars mounted independently of the longitudinal sight-bars and arranged to swing vertically, graduated guide-arms fixed to the said devices and extending upward therefrom, and means for locking the longitudinal sight-bars at any point on the guide-arms, substantially as described.

4. A range-finder comprising a pair of observation devices provided with pivotally-mounted longitudinal sight-bars, arranged to swing vertically, one of the sight-bars being capable of swinging laterally, a pair of transverse sight-bars mounted independently of the longitudinal sight-bars and arranged to swing vertically, and the links arranged in pairs and connected with the bases of the devices and with the longitudinal sight-bars, substantially as described.

5. A range-finder comprising a pair of observation devices provided with longitudinal sight-bars pivotally mounted and arranged to swing vertically, one of the sight-bars being arranged to swing laterally, a pair of transverse sight-bars mounted independently of the longitudinal sight-bars and arranged to swing vertically, links arranged in pairs and pivotally connected with the sight-bars and with the bases of the devices, upwardly-

extending guide-arms, and means for securing the longitudinal sight-bars at any point on the said guide-arms, substantially as described.

6. A device of the class described comprising a supporting-frame, a transverse scale-bar provided at its ends with projections, a pivoted sight-bar, and a flexible scale arranged on the sight-bar and having its ends detachably engaging the said projections, whereby the scale may be quickly changed, substantially as described.

7. In a device of the class described, the combination of a suitable support, and a transversely-disposed sight detachably and adjustably mounted on the support and provided with a scale and having a series of sight-notches located at its upper edge and corresponding with the graduations of the scale, substantially as and for the purpose described.

8. A range-finder comprising a pair of separate supporting-frames, pivoted frames mounted on the supporting-frames and arranged to swing vertically, a sight-bar fixed to one of the pivoted frames and extending longitudinally thereof, a pivoted sight-bar mounted on the other pivoted frame and arranged to swing laterally thereof, the transverse sight-bars mounted independently of the said sight-bar and adapted to be raised and lowered, the transverse sight-bar of one device being arranged to sight on the other device and means for securing the pivoted frames at the desired adjustment, substantially as described.

9. In a device of the class described, the combination of a supporting-frame provided with standards, a movable frame pivotally mounted at its front end between the standards and adapted to be raised and lowered, said movable frame having an opening in rear of the standards, a sight-bar mounted on the movable frame, an arm or bar fixed to and extending upward from the supporting-frame, passing through the opening of the movable frame and provided with a scale, and a locking device mounted on the movable frame and engaging the arm or bar, substantially as described.

10. In a device of the class described, the combination of a supporting-frame provided with standards, a movable frame pivotally mounted between the standards at its front end and adapted to be raised and lowered, a curved guide carried by the movable frame and arranged transversely of the rear end thereof and having a scale, means for securing the movable frame at the desired adjustment, and a sight-bar pivotally mounted on the movable frame, supported by the guide and operating in conjunction with the said scale, substantially as described.

11. In a device of the class described, the combination with a supporting-frame provided with standards, a movable frame pivotally mounted at its front end between the

standards and provided at its rear end with a transversely-disposed curved guide, a pivoted sight-bar mounted on the movable frame and interlocked with the curved guide, and a locking device carried by the sight-bar and arranged to engage the movable frame at different points on the said guide, substantially as described.

12. In a device of the class described, the combination of a supporting-frame, a movable frame pivotally mounted at its front end on the supporting-frame and provided at its rear end with a transversely-disposed curved guide, a sight-bar pivoted to the movable frame and adapted to swing laterally thereof, said sight-bar being interlocked with the guide, a cam-lever fulcrumed in a recess of the sight-bar, depending therefrom and adapted to engage the guide to secure the sight-bar at the desired adjustment, stops for limiting the movement of the sight-bar, and an index-finger or pointer extending from the sight-bar and adapted to operate in conjunction with a suitable scale, substantially as described.

13. In a device of the class described, the combination with a supporting-frame provided with standards, of a movable frame pivotally mounted between the standards and adapted to swing vertically, a longitudinal sight-bar carried by the movable frame, and a transverse sight-bar pivotally mounted on the standards, substantially as described.

14. In a device of the class described, the combination of a supporting-frame provided with standards, bifurcated at their upper ends, a movable frame pivotally mounted between the standards, a longitudinal sight-bar mounted on the movable frame, and a transverse sight-bar arranged in the bifurcations of the standards and pivoted to one of them, substantially as described.

15. In a device of the class described, the combination of a supporting-frame having

vertical standards, a movable frame pivotally mounted between the standards, a sight-bar carried by the movable frame, a horizontal bar connecting the standards, a plumb suspended from the horizontal bar, and a transverse sight-bar pivotally mounted on one of the standards and guided on the other, substantially as described.

16. A range-finder comprising the frames 1 and 2 provided with standards, the movable frames 8 and 9 pivoted between the standards and adapted to be raised and lowered, the frame 9 being provided with a curved guide and having a scale, the sight-bar 3 fixed to the frame 8, the sight-bar 4 pivoted to the frame 9 and supported by the said guide, adjacent to the scale, the arms extending upward from the frames 1 and 2, passing through the movable frames and having graduations, locking devices mounted on the movable frames and engaging the arms, transverse sight-bars mounted on the standards, and plumbs arranged at the fronts of the frames 1 and 2, substantially as described.

17. A range-finder comprising a pair of observation devices provided with pivoted longitudinal sight-bars, arranged to swing vertically, one of the sight-bars being capable of swinging laterally, the fixed upwardly-extending guide-arms, means for securing the longitudinal sight-bars at any point on the guide-arms, and links arranged in pairs and connected with the sight-bars and with the bases of the devices, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CRITTENDEN JOHN BEAUVAIS.

Witnesses:

W. W. EDWARDS,  
I. N. BELL.