

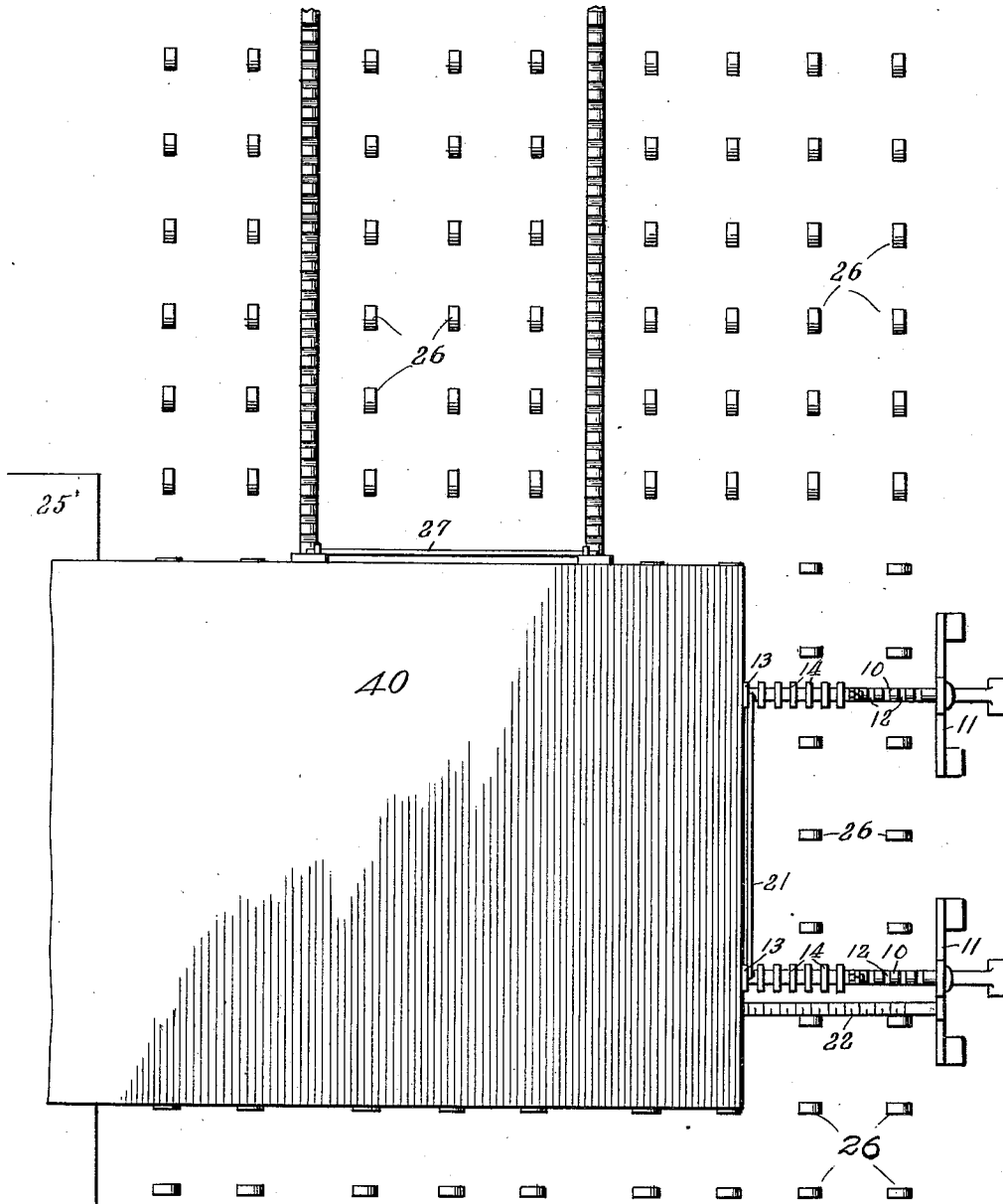
G. H. SHAFFER.
GAGING DEVICE.
APPLICATION FILED NOV. 22, 1911.

1,096,271.

Patented May 12, 1914.

2 SHEETS-SHEET 1.

Fig 1



Inventor

George H. Shaffer

By

Horace C. Seitz

Attorney

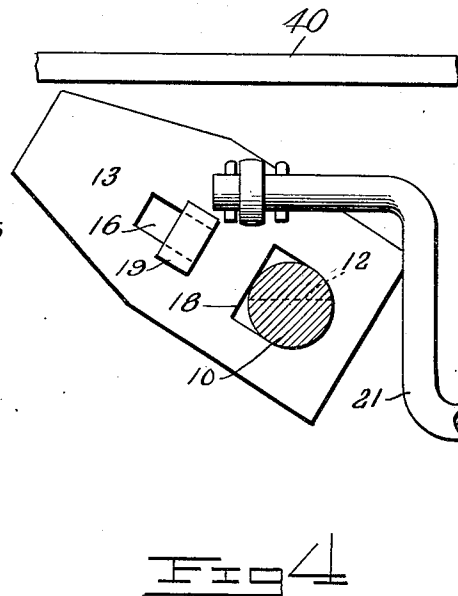
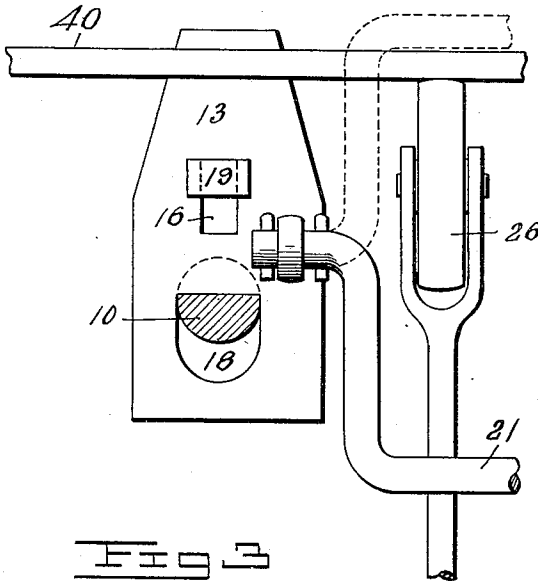
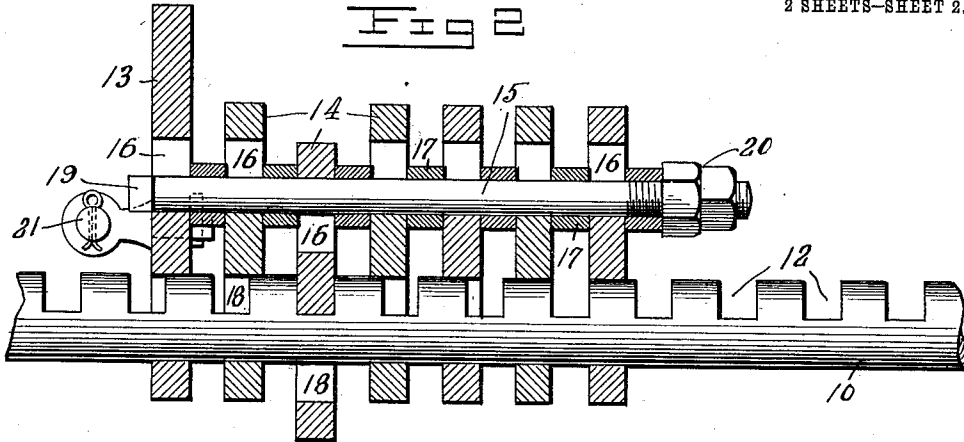
Witnesses
H. C. Polinette
C. J. Brinton.

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2 SHEETS—SHEET 2.



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Inventor
George H. Shaffer
By Horace F. Seitz
Attorney

UNITED STATES PATENT OFFICE.

GEORGE H. SHAFFER, OF HOMESTEAD, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO
CHARLES L. BRINTON, OF PITTSBURGH, PENNSYLVANIA.

GAGING DEVICE.

1,096,271.

Specification of Letters Patent.

Patented May 12, 1914.

Application filed November 22, 1911. Serial No. 661,776.

To all whom it may concern:

Be it known that I, GEORGE H. SHAFFER, a citizen of the United States, residing at Homestead, in the county of Allegheny, State of Pennsylvania, have invented a new and useful Improvement in Gaging Devices, of which the following is a specification.

My invention relates to improvements in gage devices, and has particular relation to devices employed in the cutting of sheet material.

In many of the arts, and especially in the metal workers' art, the material to be cut is of such a character and thickness as to render it an exceedingly difficult matter to employ gage structures for the purpose of fixing the position in which the sheet is to be placed to provide the cutting at a predetermined point. As an example, of the difficulties encountered, I would refer to the cutting of steel plates from the sheet resulting from the rolling and straightening operations in the process of reducing the steel ingot to the commercial product. At the present time, the sheet, after it has passed the straightening rolls, and generally of a thickness in excess of one-fourth inch and at a high heat, is laid off into the desired sizes by the "marking gang" who make the measurements while the sheet is traveling and provide the necessary markings on the upper face of the sheet. This "gang" contains at least four workmen (generally more) additional to those required to manipulate the sheet to bring it to proper position beneath the shears. After this marking is provided, the sheet is passed between the shear blades where one of the workmen directs the positioning of the mark on the line of cut, this positioning depending upon the eyesight of the workman. When the sheet is positioned as accurately as the sight will permit, the shear is operated and the cut made. Owing to the pressure placed on the sheet during the cutting operation, there is provided a heavy pressure toward the advancing portion of the sheet, and this latter pressure tends to gradually shift the sheet so as to carry the mark from the line of cut, so that even where the original sighting was perfect, there is no surety that the line of cut will coincide with the mark. Inasmuch, however, as the sighting must depend upon the correctness of the eye in covering a distance ranging up to ten and twelve feet (the

width of the sheet), there is no claim of accuracy made in the size of the plates produced, an allowance generally being made to cover the errors of sighting and the results of the pressure during this operation.

Among the many difficulties encountered in attempting to remedy the system indicated, is the fact that the plates are cut to odd sizes including fractions of an inch, the lowest being one-fourth. To provide for variations of this small size would require the use of gages operated on the threading principle or the provision of rack bars or their equivalent structures with teeth spaced to provide such distances. In either case, however, gages capable of providing the small measurements and operating on these principles, where the type of gages of the present day are employed, could not be used in the cutting of sheets of steel, such as above referred to, owing to the fact that the rearward pressure during the cutting operation is so great as to destroy the gage because of the insufficient resistance which could be provided by the material supporting the gage. These facts have heretofore prevented the employment of gages for this purpose and have required the use of the "marking gangs" (with the consequent large expense) without obtaining accuracy in output excepting by accident.

The present invention aims to overcome these difficulties, and therefore has for its objects—(1) The provision of a gage device capable of adjustment to fractions of an inch and of a form to resist the rearward pressure provided by the cutting operation. (2) To eliminate the requirement of a pre-marking of the sheets. (3) To provide a gage structure which can be adjusted with rapidity and which will insure an accurate positioning on the desired line of cut. (4) To provide a gage structure located in the path of the advancing sheet, and which will permit the gage to be moved into gaging position or out of such position to permit the sheet to pass the gage, at will. (5) To provide a gage structure having a main gage member and a plurality of auxiliary members coöperating therewith to provide adjustments intermediate those which the main gage can provide individually. (6) To provide a gage structure having a plurality of gage members spaced substantially equidistant, and a rack-bar having spaced depres-

sions of greater distance than the distance between the gage members. (7) To provide a gage structure having a plurality of main gages connected to move in unison and arranged in spaced relationship with their forward faces in a common plane, said gages being movable in directions toward and from the line of cut, the plane of the gage faces being parallel with the line of cut throughout such movements. (8) To provide a gage structure with a supporting bar notched at spaced distances greater than the length of gage distance-variations, and a co-operating structure also of greater distance spacing differing from the spacing of the bar, the parts coöperating to provide the proper gage distance variations.

Other and further objects of the invention are to provide a device of this character which is simple and efficient in operation, durable in construction, readily repaired, which will provide accurate adjustments, and which can be manufactured and installed at a relatively low cost.

To these and other ends, the nature of which will be readily understood as the invention is hereinafter disclosed, my invention consists in the improved construction and combination of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the accompanying drawings, in which similar reference characters indicate similar parts in each of the views—Figure 1, is a diagrammatic view illustrating one way in which my device may be installed in connection with a shear structure in a steel mill. Fig. 2 is a fragmentary sectional view taken through a gage unit and its supporting bar, the latter being shown in elevation. Fig. 3 is a sectional view of the supporting bar taken at right angles to the showing of Fig. 2, and showing the main gage member seated in one of the notches or recesses of the supporting bar. Fig. 4 is a view somewhat similar to Fig. 3, showing the gage unit moved out of the path of movement of the sheet of material.

The device forming my present invention comprises a plurality of units each mounted on a supporting bar, the several units being connected together to operate in unison. As the units are substantial duplicates, a detailed description of one will suffice.

10 designates a supporting bar having its direction of length extending preferably at direct right angles to the line of cut, said bar being of any desired length and supported at its ends by suitable frame members indicated at 11. The member or bar 10 is of suitable configuration in cross-section, that disclosed in the drawings being circular, this form being preferable. The upper portion of the bar is provided with a plurality of

equally-spaced depressions or notches 12 arranged at spaced intervals of greater length than the distance between the fractional-inch variations which the gage is intended to provide, this arrangement being provided to enable the presence of sufficient material in rear of the depressions to form a support for the gage member against the rearward pressure during the cutting operation. For example, where the device is intended for use in connection with the cutting of sheets of steel of the usual thickness (from one-eighth to one-half inch), I preferably form the depressions or notches three-fourths inch in length and position them so as to provide a normal bar-configuration one inch in length between successive notches, the latter being of a suitable depth and having the bottom of each notch extending in a plane coincident with or parallel to a diametrical plane extending horizontally of the bar. This proportion in the sizes of the parts permits of the use of gage members having a thickness of three-fourths inch, a size sufficient to withstand the pressures which may be placed thereon.

A gage unit is formed of a main gage member 13 and a plurality of auxiliary members 14, the latter being located in spaced succession in rear of the main member, said members being carried by a rod 15 which passes through an elongated opening 16 formed in each of the members, the openings 16 being of a length which will permit a member to move vertically a distance preferably not less than the depth of the notches. Said members are substantially equal in thickness to the length of a notch (three-fourths inch in the example referred to) so that when seated in a notch a member will be held fixedly against material movement longitudinally of the bar 10, the relative proportions, however, permitting the member to freely enter the notch. The members are separated by spacing members, such as washers 17, the latter being of an axial length less than the distance between successive notches, those shown being three-fourths inch in length, so that while the notches are spaced one inch apart, the members are spaced one-fourth inch less, resulting in a relative arrangement such as will prevent more than a single member of the unit passing to its seating position at any one time, the remaining members resting on the upper surface of the bar 10.

To support the members on the bar 10, each member is provided with an opening 18 of a vertical length preferably not less than the vertical thickness of the bar 10, the upper wall of the opening extending in a horizontal plane and forming a seat for the member when located in a notch; the bottom wall of the opening corresponds in contour with the contour of the bottom of the bar,

the side walls of the opening extending vertically to provide for the vertical movement of the member on the bar. The openings 16 and 18 are relatively positioned so that when the upper wall of the opening 18 is in contact with the upper face of the bar, the rod 15 will be positioned at the bottom of the opening 16, while the seating of the member within a notch will locate said rod 15 in the upper portion of the opening 16.

To retain the members on the rod 15, the latter may have a head 19 at one end, and have its opposite end formed to permit the members to be properly assembled on the rod and held sufficiently close to provide the accurate spacing without, however, preventing individual members from having independent movement. One form of retaining the members in position is shown in the drawings, in which the end of the rod 15 is screw-threaded and adapted to receive lock nuts 20, a washer being preferably interposed between the rear member and the nuts. The particular manner in which this securing is provided, however, is immaterial, since I may employ other forms of securing devices, such as cotter pins, wedges, etc., such securing devices being well-known in the arts and being equivalent to the form shown. This enables a unit to be readily taken apart for repairs, such for instance, as the replacing of worn parts. By this relative arrangement of parts, it will be readily understood that by the use of six auxiliary members, where the spacing of the bar 10 is as indicated in the above example, the member 13 may be adjusted to variations of one-fourth inch. For instance, in Fig. 2, the second auxiliary member is shown as seated; if it be desired to move the unit one-fourth inch to the left, the seated member is raised and the unit moved in the proper direction, resulting in seating the first auxiliary member in the preceding notch; an additional movement in the same direction to seat the main member will again vary the distance one-fourth inch, while a movement in the opposite direction will cause an equal variation, a different member entering a notch. By the particular arrangement shown, the preceding member in the desired direction, will become active with each movement of one-fourth inch.

Where it is desired to move the unit a distance greater than the length of one variation, the members may be held raised in any suitable manner, thus permitting the unit to move freely longitudinally of the bar 10; this can be done by placing a suitable implement below the members to prevent either of them from dropping into a notch. Another way of operating the parts for this purpose is to move the members pivotally, with the bar 10 as the axis, to the position shown in Fig. 4, freeing the seated member and per-

mitting all of the members to be moved longitudinally of the bar 10.

As heretofore pointed out, I preferably employ a plurality of units, and these are connected together in suitable manner, as by a connecting member 21 having a swiveled connection with each unit, this construction permitting the units to be moved in unison either pivotally or longitudinally of the supporting bars 10. In order to prevent the member 21 from striking against the casters (forming the table on which the sheet travels) during the gage-shifting movements, I preferably form the member similar to a bell-crank, a pivotal movement of which will cause the member to pass to a position where its path of movement will be out of the planes of the casters.

For the purpose of permitting the workman manipulating the gage to its desired position, I preferably employ a measuring bar having the proper graduations thereon, this bar being mounted at a suitable point where it may be readily seen and positioned so as to permit the workman setting the main gage to the proper graduation of the bar. This may be provided by placing the measuring bar on the supporting frame members 11 (as shown at 22 in Fig. 1), but it is to be understood that the particular position shown is not arbitrary as it may be placed at any desired point.

The position of the gaging device relative to the line of cut will depend upon the work to be performed by the shearing apparatus. Where the shears are intended to provide a cross-cutting of the sheet, it may be preferred to place the gage in rear of the shears, thereby permitting the sheet to be moved past the cutting edge (if a true edge has been cut on the end of the sheet), the true edge being placed in contact with the face of the main gage (the units having been placed at the proper position). The cut is then made, the resulting plate removed and the sheet again moved into contact with the main gage member (the units being moved to proper position if a different length of plate is to be cut). This arrangement permits the gage to be employed regardless of the length of the sheet. Where the line of cut is to be longitudinal of the plate (which has been previously cut into its proper length), the device is preferably located in front of the shears, the position shown in Fig. 1. In view of the fact that the general practice is to provide different shearing apparatus for providing these different cuts, it will be readily understood that an arrangement of the gage devices, such as above indicated, will permit the rolled sheet to be cut into the desired sizes without necessitating little, if any, marking of sizes thereon, the sizes to be cut being known to the workman in charge of the gage device, the

latter being adjusted to meet individual requirements.

In Fig. 1 I have shown the general arrangement of the parts relative to the cutting edge of the shears, the latter being represented diagrammatically at 25. The casters forming the table on which the sheet or plate is being carried are indicated diagrammatically at 26. In this view I have shown an additional gage device 27 used for the purpose of a guide at the side of the sheet. In practice, the edge of the sheet is first cut to provide the true edge, after which the sheet (indicated in the drawings at 40) travels past the gage members of the device 27 in being fed to the shears. As the gage device 27 has its working face at direct right angles to the similar face of the gage device above described, it will be readily understood that the plates cut by the use of the present invention will be provided with perfect angles at the corners, with the adjacent edges also extending at direct right angles.

As seen in Fig. 3 the units are arranged so that only the main gage member projects above the top plane of the table; this gage therefore forms, in each instance, the member against which the edge is placed. As will be readily understood, whenever it is desired to move the sheet over the gage device, it is necessary only to move the units pivotally to carry them below the plane of the table and permit the sheet or plate to travel freely; in this respect it is preferred to have the gage device 27 arranged to operate in the same manner.

As will be readily seen, the device of the present invention can operate without the gage device 27, since it will be necessary only to have a true edge which, since the main gage members are spaced apart, can be positioned in contact with the faces of the gage members with a surety that the edges will be parallel.

By this construction and arrangement of parts, I provide a construction in which the necessary adjustments may be provided without presenting a weakened structure, all of the parts being sufficiently strong and rigid to withstand any pressure that may be placed thereon, the additional or auxiliary gages aiding to produce this result by reason of the extended bearing on the upper surface of the supporting bar to withstand any tendency of the units to tilt. In addition, the structure will insure a cutting of the sheets or plates to accurate sizes without the requirement of a preliminary marking or a dependence upon visual positioning of the sheet on the line of cut; these facts insure a better product and a more rapid operation, and at the same time provide for labor saving in that the services of the "marking gang" are not required.

While the device herein disclosed is intended more particularly for use in the cutting of large and heavy material, it will be readily understood that it may be employed for the cutting of other materials, its use not being confined to heavy work. It will also be understood that the device is not limited for use in cutting sheets or plates, since it may be employed with equal facility in the punching of such sheets or plates, its use being possible in connection with all devices where it is required to perform work at a given point spaced from an edge of the sheet or plate. It will also be understood that where the distance variations are other than those indicated in the above indicated example, the number and arrangement of members may be changed accordingly, the main gage member, however, preferably acting as the gage against which the material is placed, the auxiliary members acting to provide adjustments between those which would be provided by the main gage member alone, the purpose being to provide for adjustments to distances which are fractional with respect to the distances which the main gage member will provide individually.

While I have herein described one or more ways in which my invention may be provided and employed, it will be understood that changes and modifications therein may be found necessary or desirable to meet the varying conditions of service and use, and I desire it to be understood that I reserve the right to make any and all such changes and modifications that may be required or desired, in so far as they may fall within the spirit and scope of the invention as expressed in the accompanying claims.

Having thus described my invention, what I claim as new is:

1. In combination, a work-performing device having a fixed work-performing position, a table over which the material to be operated upon is passed, and a pressure-resisting gage device for controlling the position of the material relative to said work-performing position, said device extending above the plane of the table and being adjustable toward and from said work-performing position, said device including inter-engageable members.

2. In combination, a work-performing device having a fixed work-performing position, a table over which the material to be operated upon is passed, and a gage device for controlling the position of the material relative to said work-performing position, said device having a gage extending above the plane of the table and adjustable toward and from said work-performing position, said device being also movable at will to carry the gage below the top plane of the table.

3. A gage device comprising a supporting bar, and a gage unit mounted on and movable longitudinally of said bar, said bar and said unit being complementally formed to provide gage adjustments by mutual engagement at predetermined fixed points in the direction of length of the bar, the amount of engagement being limited to a fractional length of the unit.
4. A gage device comprising a supporting bar, and a gage unit mounted on and movable longitudinally of said bar, said bar and said unit being complementally formed to provide gage adjustments by mutual engagement at predetermined fixed points in the direction of length of the bar, the amount of engagement being limited to a fractional length of the unit, the distance between successive points being of equal length.
5. A gage device comprising a supporting bar, having a plurality of equally-spaced depressions, and a gage unit mounted on and movable longitudinally of said bar said unit having a plurality of independently movable members three of which are positioned to provide a gage distance equal to the distance between successive bar depressions or to a fractional part of such distance.
6. A gage device comprising a supporting bar having a plurality of equally-spaced depressions, and a gage unit mounted on and movable longitudinally of the bar said unit having a plurality of independently movable members cooperating with bar depressions to provide a gage distance equal to the distance between successive bar depressions or to fractional parts of such distance.
7. A gage device comprising a supporting bar having a plurality of equally-spaced depressions, and a gage unit mounted on and movable longitudinally of the bar said unit having a plurality of independently movable members cooperating with bar depressions to provide a gage distance equal to the distance between successive bar depressions or to fractional parts of such distance, said fractional distances being of equal length.
8. A gage device comprising a supporting bar, and a gage unit mounted on and movable longitudinally of the bar, said unit comprising a plurality of equally-spaced members positioned in succession longitudinally of the bar and cooperating with the bar to provide gage adjustments of equal distances longitudinally of the bar.
9. A gage device comprising a supporting member having spaced-apart depressions, and a gage unit movable longitudinally of the member and its depressions, and including a plurality of spaced-apart members seatable in said depressions, the spacing of said members relative to the depressions preventing adjacent members from simultaneously seating in depressions.
10. A gage device comprising a supporting member, and a gage unit movable longitudinally of the member and its depressions and including a plurality of spaced-apart members, said supporting member and unit members being complementally formed to provide variable gage positions of the unit at predetermined points on said member, the spacing of said members relative to the distance between said points preventing simultaneous engagement of adjacent unit members with the supporting member.
11. A gage device comprising a supporting element, and a gage unit movable longitudinally of the member and its depressions and including a plurality of spaced-apart members, said element and members being complementally formed to provide temporary engagement therebetween at spaced intervals in directions corresponding to the direction of length of the unit, the distance between engagement points of the element relative to the spacing of the members preventing simultaneous engagement of adjacent members.
12. A gage device comprising a supporting element having spaced-apart depressions, and a gage unit including a plurality of spaced-apart members independently movable into and out of depressions and collectively movable longitudinally of the element.
13. A gage device comprising a supporting element having spaced-apart depressions, and a gage unit including a plurality of spaced-apart members independently movable into and out of depressions and collectively movable longitudinally of the element or at an angle thereto.
14. A gage device comprising a supporting element having spaced-apart depressions, and a gage unit movable longitudinally of the element and including a plurality of spaced-apart members and means for connecting said members in successive arrangement to permit movement into and out of the depressions.
15. A gage device comprising a supporting element having spaced-apart depressions, and a gage unit, movable longitudinally of the element and said unit embodying a plurality of spaced-apart members, and a connecting member, said spaced-apart members being independently movable into and out of depressions.
16. In combination, a plurality of gage units supported to move toward and from a work-performing point in parallel planes and co-acting to position the work relative to said work-performing point, means for providing variable gage positions at predetermined spaced-apart points in such directions of movement, and means for connecting said devices to operate in unison.
17. In combination, a plurality of gage units supported to move in parallel planes

and each formed of a plurality of members in spaced-apart relation, and means for connecting corresponding members to cause the units to move in unison.

5 18. The combination with a work-performing device for operating upon material of relatively high resisting strength and in which the operation of the device provides pressure on the material in the direction of
10 gage position, of a gage device for controlling the position of the work during such operation and serving additionally to retain the material in the gaged position against such material-pressure, said device
15 including inter-engageable members.

19. The combination with a shear for cutting metal plates, of a gage device movable toward and from and adapted to be positioned relatively to the shear line to provide
20 an abutment extending parallel to said line, said abutment being supported to retain the gaged sheet portion against pressure provided by the shearing operation, said device including inter-engageable members.

20. The combination with a shear for cutting metal plates, and a table over which the plate travels, of a gage device movable toward and from and adapted to be positioned relatively to the shear line to provide
30 an abutment extending parallel to said line, said abutment being supported to retain the gaged sheet portion against pressure provided by the shearing operation, said device being movable at will to carry
35 the gage below the plane of the table.

21. The combination with a shear for cutting metal sheets, and casters forming a table over which the sheet travels, of a gage device mounted between casters and adapt-

ed to extend thereabove in gaging position, 40 said device being movable toward and from and adapted to be positioned relatively to the shear line to provide an abutment extending parallel to said line, said abutment being supported to retain the gaged sheet 45 portion against pressure provided by the shearing operation, said device being movable at will to carry the gage below the plane of the table.

22. The combination with a shear for cutting metal sheets, and casters over which the sheet travels, of a gage device located between casters and movable toward and from the shear line, said device having a gage portion adapted to extend above or 55 below the top plane of the casters at will.

23. In a gage device, a supporting member, and a gage unit movable longitudinally thereof as a unit and having a plurality of members each independently adapted to co- 60 operate with the supporting member to provide an adjustable positioning of one of said members relatively to a fixed point.

24. In a gage device, a supporting member, and a gage unit having a gage member and an auxiliary member movable in unison 65 toward and from a fixed point, said members independently cooperating with the supporting member to provide an adjustable positioning of the gage member relative to 70 the fixed point.

Signed at Homestead, in the county of Allegheny, and State of Pennsylvania, this 31st day of October, 1911.

GEORGE H. SHAFFER.

In presence of—

J. C. SHAFFER,

ERWIN HARELBIATT.