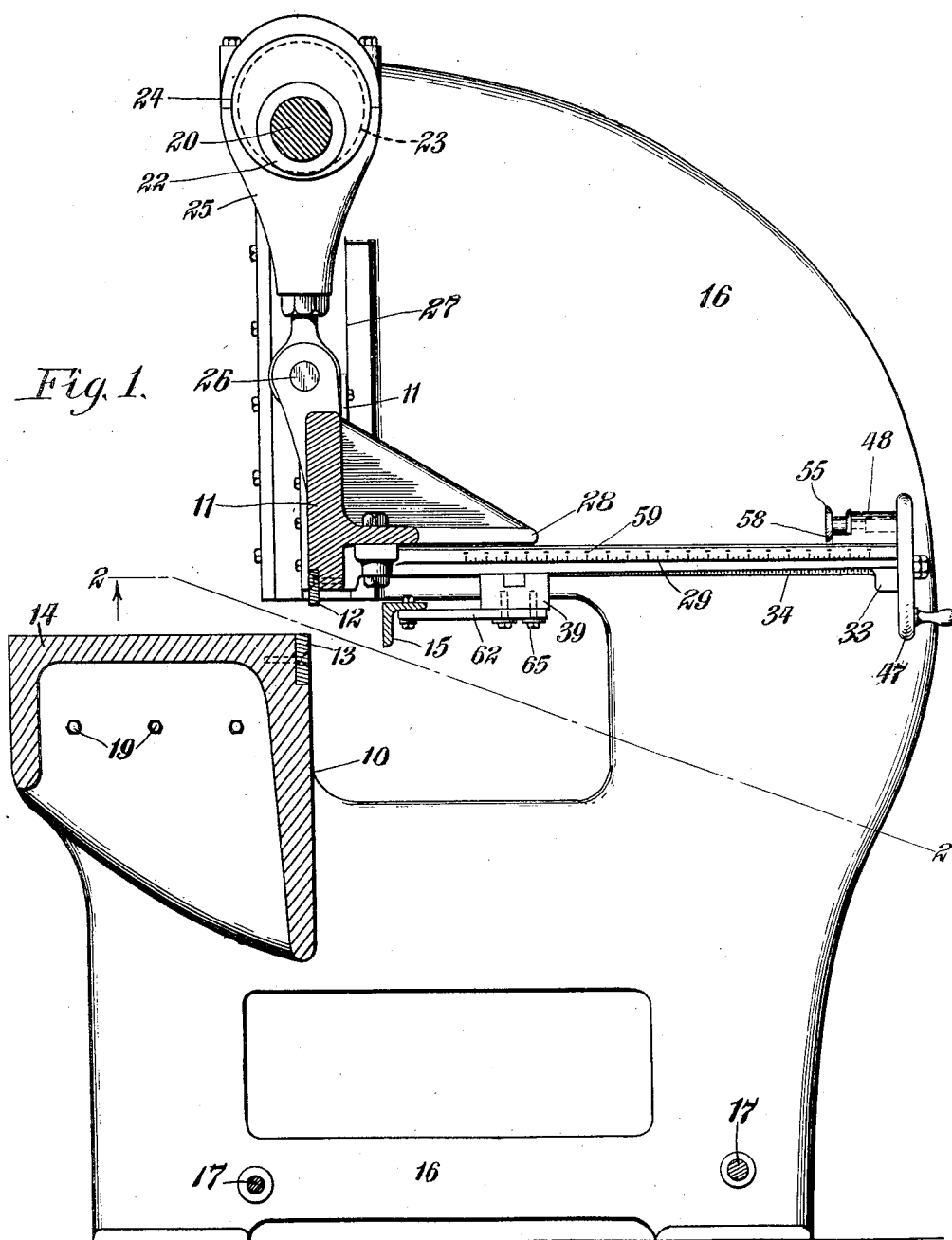


1,366,409.

4 SHEETS—SHEET 1.



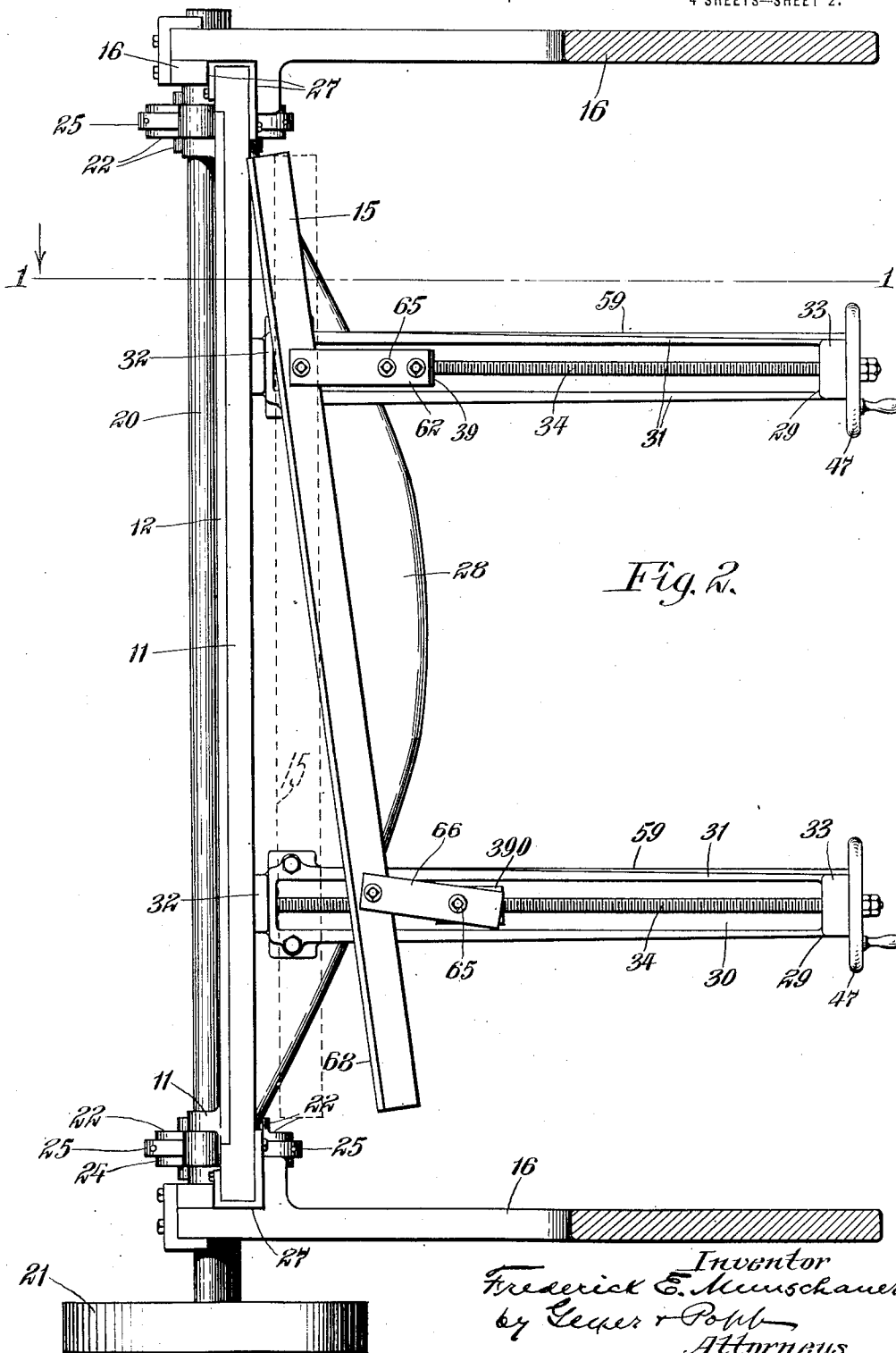
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F. E. MUNSCHAUER.
GAGE FOR SHEET METAL SHEARS, &c.
APPLICATION FILED JUNE 7, 1919.

1,366,409.

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4 SHEETS—SHEET 2.

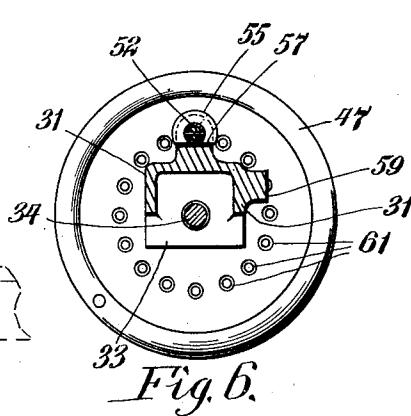
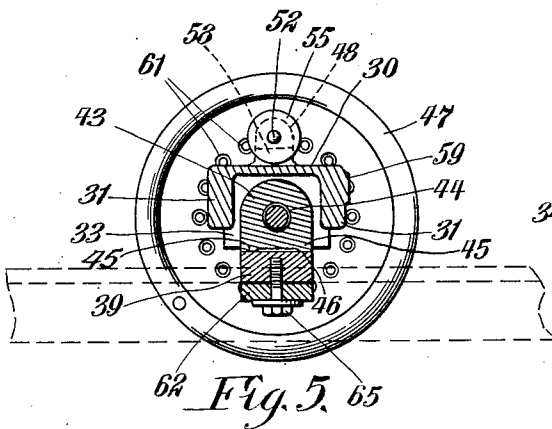
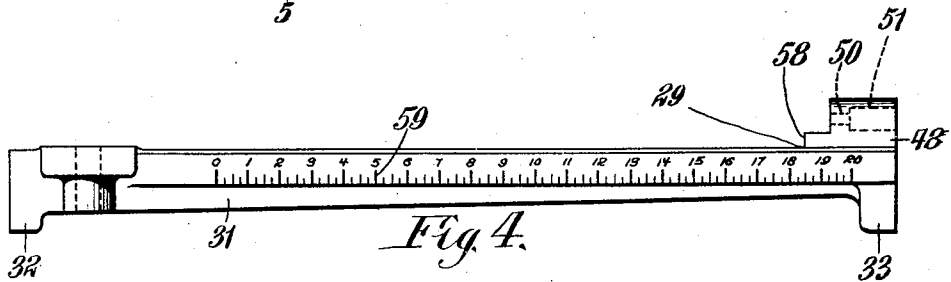
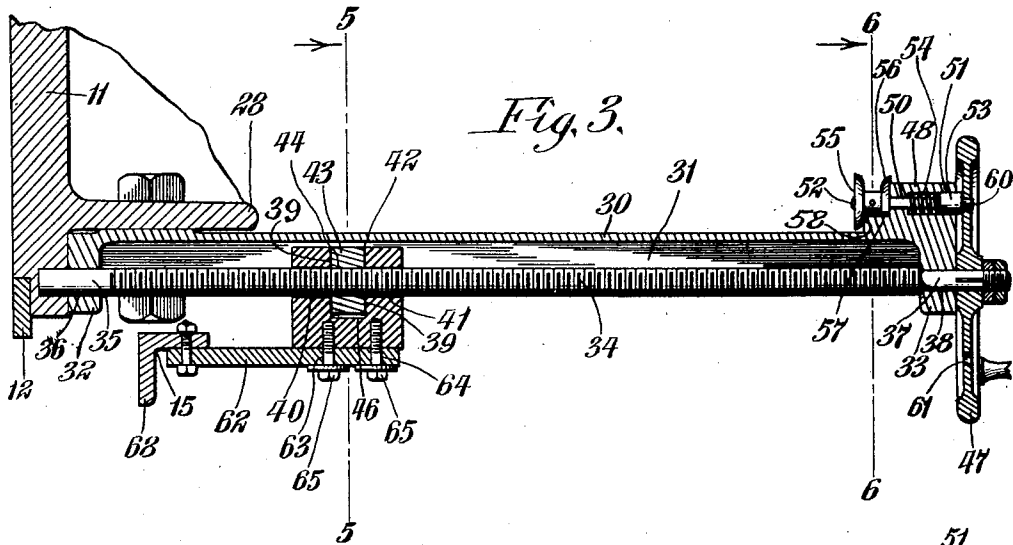


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4 SHEETS—SHEET 3.



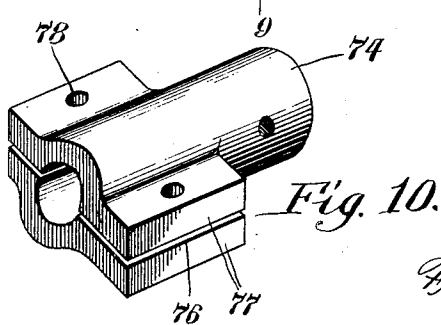
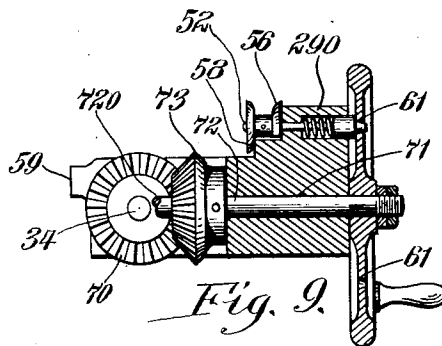
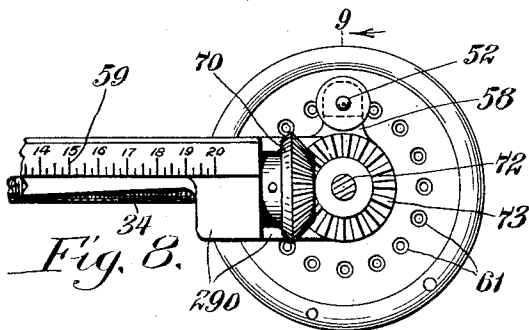
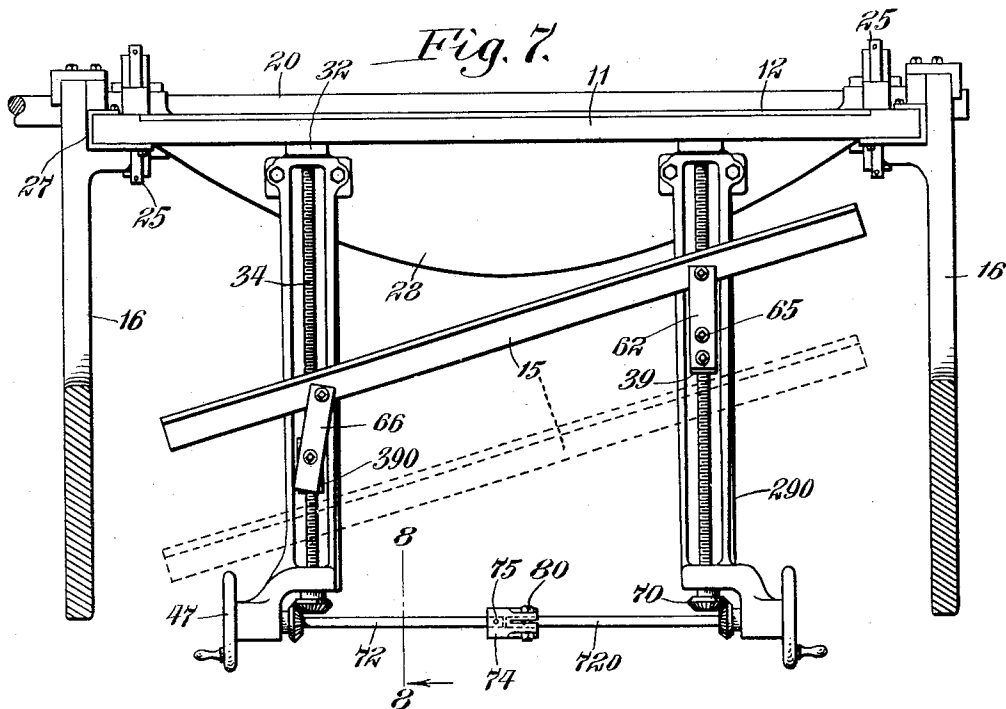
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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GAGE FOR SHEET-METAL SHEARS, &c.

1,366,409.

Specification of Letters Patent.

Patented Jan. 25, 1921.

Application filed June 7, 1919. Serial No. 302,562.

To all whom it may concern:

Be it known that I, FREDERICK E. MUNSCHAUER, a citizen of the United States, residing in Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Gages for Sheet-Metal Shears, &c., of which the following is a specification.

This invention relates to an adjustable back stop or gage for a metal cutting or forming machine, by means of which the blank work piece which is to be operated upon may be placed in proper relation to the metal cutting members of the machine.

One of the objects of the invention is to produce an adjustable screw gage or stop which will enable the work piece to be placed against said gage at any desired angle relatively to the metal cutters. A further object is to provide for very accurate and convenient setting of the gage and yet enable the same to withstand repeated shocks and heavy use without being thrown out of adjustment.

In the accompanying drawings:

Figure 1 is a vertical longitudinal section through a power gap shearing machine equipped with my improved gage. Fig. 2 is a horizontal section thereof looking upwardly, and taken on line 2—2, Fig. 1. Fig. 3 is a vertical longitudinal section through one of the supporting arms. Fig. 4 is a side elevation of said supporting arm detached from the rest of the gage parts. Fig. 5 is a vertical transverse section through one of the supporting arms, taken on line 5—5, Fig. 3. Fig. 6 is a vertical transverse section through the supporting arm taken on line 6—6, Fig. 3. Fig. 7 is a horizontal section looking upwardly and similar to Fig. 2, but showing a modified form of gage adjusting apparatus. Fig. 8 is a vertical longitudinal section taken on line 8—8, Fig. 7. Fig. 9 is a vertical transverse section taken on line 9—9, Fig. 8. Fig. 10 is a perspective of the clamp coupling.

Similar characters of reference indicate corresponding parts throughout the several views.

This improved stop gage may be used in connection with a variety of metal cutting machines but the same is shown in the

drawings as applied to a power driven gap shearing machine.

The main frame 10 of this gap shears comprises two massive end frame members 16, 16 which are tied together by means of the stiffening tie rods 17 and by the channeled-beam bed plate 14 which is secured at its ends by the bolts 19 to said end frame members. Journaled at its opposite ends in the upper part of said end frame members is the driving shaft 20 provided at one end with the driving pulley wheel 21 which is belted to a suitable source of power for driving the machine. Also secured to said drive shaft and arranged inwardly of the end frame members are the two eccentrics 22, 22 which are provided with the customary central annular grooves 23 in their outer circular edges with the annular flanges 24 on each longitudinal side thereof. Riding in the grooves of the eccentrics between the companion retaining flanges 24 thereof are the eccentric straps 25, which are caused to rise and fall as the main driving shaft 20 is rotated. The eccentric straps are pivotally connected at their lower ends by the pivot pins 26 to the cutter bar or shearing head 11 which head is therefore caused to rise and fall in unison with the eccentric collars 22 whose eccentric throws are in line. This shearing head 11 engages slidably at its opposite ends with the vertical guides 27 which are arranged in the end frame members 16 of the machine, suitable provision being made for the necessary adjustment incident to the wear of the sliding parts so as to allow of compensation therefor. Secured to the lower front corner of the shearing head is the upper shear knife or blade 12 of hard tempered steel whose lower front edge is adapted to move downwardly and come in contact with the upper surface of the sheet of metal which is to be sheared. The companion lower shear knife or blade 13 is set into the upper rear corner of the bed plate 14 which is a stationary part of the machine and the upper rear edge of said lower shear blade is adapted to come in contact with the lower face of said sheet of metal the rear face of said lower shear blade being substantially in vertical alinement with the front face of the upper shear blade 12 aforesaid,

Suitable provision, not shown in the drawings, is also usually made for automatically clamping the sheet of metal against the bed plate prior to the shearing operation thereon.

The blank metal sheet which is to be cut is fed in between this upper shear blade 12 and the lower shear blade or knife 13 which latter is set transversely in the rear edge of the bed 14 of the main frame of the machine and the cutting or shearing of the sheet of metal is caused by the downward movement of said upper shear blade 12. The blank sheet of metal is properly positioned in the machine by sliding said sheet rearwardly on the upper flat surface of the bed plate 14 until the rear edge thereof comes in contact with the gage bar 15 which forms part of my improved stop gage. This gage bar may be arranged either parallel to the cutting knives or blades 12 and 13 as shown by dotted lines in Fig. 2, or it may be arranged at any desirable angle relatively thereto as illustrated, for instance, in Fig. 2, and in either case at any desired distance from the cutting blades.

The shearing head 11 is provided at its lower rear part with the rearwardly extending stiffening web 28 and secured against the lower face thereof about a quarter of the way from the ends of said shearing head are two tapered supporting arms 29 which extend a considerable distance rearwardly. Each supporting arm is preferably channel shaped and comprises a horizontal longitudinal top wall 30, two vertical longitudinal depending flanges 31 arranged along each edge of said top wall, and inner and outer vertical transverse walls 32 and 33, respectively. Journaled in the end walls of each supporting arm is a longitudinally disposed adjusting screw 34 provided along its central part with an external screw thread and provided at its forward end with a front journal 35 which rotates in a bearing 36 formed in the front end wall 32 of the respective supporting arm. The rear part of the adjusting screw is preferably of reduced diameter so as to prevent rearward movement thereof and to provide a rear journal 37 which rotates within a rear bearing 38 formed in the rear end wall 33 of the respective supporting arm. Preferably arranged to slide longitudinally on the adjusting screws are bifurcated slide blocks 39 and 390 each of which is provided with a front slide bearing 40 and with a rear slide bearing 41, which bearings are longitudinally and axially in alignment and receive their companion rotatable adjusting screw 34 and to slide back and forth thereon. Formed intermediately in each slide block is a transversely disposed notch 42 which extends downwardly from the top edge of said block and snugly receives a thrust nut 43 between

its vertical flat faces 39. This thrust nut is provided with a longitudinally disposed hole 44 provided with an internal screw thread which meshes with the external screw thread of its companion adjusting screw 34. To prevent the thrust nut from rotating, the same is preferably provided with two depending feet 45, as best shown in Fig. 5, which are formed on the bottom of said nut and are arranged transversely on opposite sides of the axis of the tapped hole 44 thereof and engage with the lower horizontal flat face 46 of the transverse notch 42. Thus as the adjusting screw 34 is rotated one way or the other, the thrust nut is prevented from rotating and causes the slide block to move along on said adjusting screw either forwardly or backwardly.

Each adjusting screw is rotated manually by means of a hand wheel 47 which is secured to the rear or outer end of said screw and bears with its forward face against the rear face of the rear end wall 33 of its supporting arm and thereby constrains said adjusting screw against forward motion. As the annular shoulder which is formed at the front end of the reduced journal 37 of the adjusting screw engages the front side of the wall 33, this obviously prevents rearward motion thereof. It is apparent that the adjusting screw while free to rotate is prevented from longitudinal movement in either direction. Formed on the upper rear part of each supporting arm 29 is an integral enlargement 48 which is provided at its inner end with a slide bearing hole 50 of small diameter and at its outer end with an enlarged hole 51, both of said holes being longitudinally disposed and axially in line. A longitudinal locking pin 52 is arranged within the hole 50 so as to slide longitudinally or to rotate therein and is provided on its outer or rear end with a cylindrical head 53 which engages with the enlarged hole 51. Interposed between said head 53 and the shoulder which is formed at the inner end of the enlarged hole 51 is a compression spring 54 that yieldingly forces the locking pin 52 outwardly. For the purpose of holding said locking pin in its retracted or inner position whenever desired, the same has secured thereto on its inner end a spool-shaped head or knob 55 which is provided on one side of its outer end with a transverse stop shoulder 56 and is cut sharply away on the other side of its outer end at 57, as best seen in Figs. 3 and 6. Thus when the locking pin is moved to its extreme inner position and then partially rotated, the said shoulder 56 thereof swings down in front of an inwardly facing retaining abutment 58 which is formed on the enlargement 48 of the supporting arm and thereby holds the locking pin in its retracted position. When it is desired to release the locking pin, the

same is rotated until the cut away portion 57 is in line with the retaining abutment 58 and then the compression spring 54 will be free to force said pin outwardly into the position shown in the drawings. The outer end of the locking pin 52 is preferably tapered outwardly at 60 so as to easily engage with any one of a circular row of micrometer locking holes 61 with which the web of the hand wheel 47 is provided, these holes being preferably tapered outwardly similarly to the conical end 60 of the locking pin. The number of these micrometer locking holes 61 bears a definite relation to the pitch of the screw thread on the adjusting screw 34. Preferably, the micrometer holes are sixteen in number and the pitch of the adjusting screw is four threads per inch, so that a rotation of the hand wheel 47 corresponding to a change from one of its micrometer holes to the one next adjacent will cause the slide block 39 to move longitudinally a distance of one sixty-fourth of an inch. In assembling the parts the slide blocks are preferably mounted approximately in proper positions and gaged by means of a measuring scale 59 which is preferably arranged along one of the vertical sides of each supporting arm and on which the inches or other measuring units are divided into a number of parts equal to the pitch of the adjusting screw. The inches are preferably divided into four parts, as shown, so that one complete turn of the hand wheel will change the position of its slide block one division on the scale 59, which division represents one quarter of an inch of travel of the slide block, so that the micrometer hole measurement of the hand wheel added to the measurement of the scale 59 gives the absolutely accurate position of the slide block without having to count the number of rotations of said hand wheel. It is obvious that suitable proportioning for metric system measurement can be arranged for if desired.

Connected with the slide block 39 against the lower horizontal face thereof is a suspension arm 62 which is provided at its rear end with a bolt hole 63 and also with a retaining hole 64 of like diameter. Bolts 65 pass through said holes into the slide block 39 and thereby rigidly secure the suspension arm 62 to said slide block. The other slide block 390 however, as shown in Fig. 2, has a suspension link 66 pivotally hung against the lower flat face thereof and this suspension link is identical with the suspension arm 62 aforesaid except that the retaining hole 64 of the latter is omitted. Obviously a low manufacturing cost results from this duplicated construction. Pivotally connected to the forward end of both the suspension link and the suspension arm and resting upon the upper faces thereof, is the gage bar

15 which is preferably of angle-iron shape, and provided on its forward edge with a depending vertical flange 68 against the front flat face of which is pressed the blank sheet of metal that is to be operated upon. Inasmuch as each adjusting screw is independently rotatable and as the gage bar is provided with suitable swivel mountings, it is apparent that said gage bar may not only be adjustably positioned parallel to the shearing blades 12 and 13 and at any desired distance therefrom but may also be arranged at any angle relatively thereto and also at any desired distance therefrom. Thus the sheet of metal may be placed in any desired angular relation to the metal cutting or forming members of the machine.

This improved gage is not, of course, confined to the type of machine shown in the drawings, as it may for instance be desired to form a row of punched holes in a sheet of metal at a certain angle with one of the edges, or perhaps a milled groove or a slot or a bead is to be cut at an angle with one of the edges of the sheet. And it is evident that in the positioning of the sheet of metal, these cutting operations may be adjusted with micrometer accuracy inasmuch as either one of the hand wheels need be only sufficiently turned as to move one end of the gage bar a sixty-fourth of an inch and then may be securely locked in position by means of the locking pin 52. Furthermore very hard usage or vibration of this improved gage will not throw the same out of adjustment, because of this positive locking provision of said locking pin together with the fact that the whole gage is constructed to resist very heavy strains and does not rely on friction for retaining its adjusted position. Furthermore, the construction permits of judicious use of different metals having different characteristics notably in the case of the thrust nut and the slide block.

On Sheet No. 4 is shown a modified and somewhat more expensive form of adjustable gage which not only performs all the functions of the type of gage hitherto described but has when desired, the additional feature of simultaneous movement of both slide blocks at the same time. This means that whether the stop gage is either positioned parallel to or at an angle with the shear blades, said stop gage may be moved toward or away from the shear blades and yet constantly maintain the same angle with respect thereto. The construction whereby this parallel adjustability may be obtained, when desired, is as follows:

Secured to the movable shearing head of the shearing machine, so as to rise and fall therewith, are two rearwardly extending modified supporting arms 290 which are analogous to the previously-described supporting arms 29. Secured to the rearmost

end of each adjusting screw 34, which is journaled in the companion supporting arm is a driven bevel gear 70. Journaled horizontally and transversely in suitable bearings 71 at the outer ends of said modified supporting arms 290 are hand wheel shafts 72 and 720, and secured to the inner ends thereof are driving bevel gears 73 which mesh with the driven bevel gears 70 aforesaid. Thus a rotation of said hand wheel shafts 72 and 720, causes a rotation of adjusting screws 34. At the inner end of one of said hand wheel shafts, as for instance 72, is arranged a clamp coupling 74, which is secured thereto by means of a pin 75. The opposite end of said clamp coupling 74 is longitudinally split at 76 for a distance of about half the length of said coupling and clamping ears 77 are arranged adjacent to said split. In each of the four clamping ears is formed a clamping hole 78 and passing therethrough are clamping bolts 80. When these clamping bolts 80 are loosened, the hand wheel shafts 72 and 720 may be turned independently of each other, but on the other hand, when said clamping bolts 80 are tightened, then the split end of the clamp coupling is pinched inwardly so as to grip the inner end of the shaft 720, and the two shafts 72 and 720 thereby are caused to rotate together. When such is the case, the gage bar 15 is movable toward or away from the shear blades of the machine at a constant angle, quite irrespective of what this angle may be. When the clamping bolts 80 are loosened, then the operation of this modified form of gage is just like that of the gage shown in Figs. 1-6, inclusive, in which either one of the adjusting screws 34 may be adjustably moved independently of the other adjusting screw. This independent movement of each hand wheel shaft is accomplished as follows:

At the outer ends of said hand wheel shafts 72 and 720, are secured the hand wheels 47 which are provided with the micrometer adjusting holes 61 and adapted to engage with or be disengaged from any one of said holes is the longitudinal locking pin 52 as described in detail in connection with the gage shown in Sheets 1, 2 and 3. When it is desired to turn either of the hand wheels, its companion locking pin 52 is retracted and the wheel rotated, as desired, the distance between each micrometer hole corresponding preferably to a longitudinal travel by its companion slide block of one sixty-fourth of an inch. If it is desired to considerably rotate the hand wheel, the locking pin may be held in its retracted position by quarter turning the same, so that the shoulder 56 is dropped below the upper inner edge of the retaining abutment 58. When, however, the locking pin is engaging with one of the micrometer adjusting holes

61, it is practically impossible to throw the gage out of adjustment. When the clamp coupling 74 has been loosened, either hand wheel may be micrometrically turned so as to correspondingly move its end of the gage bar. When the coupling 74 is tightened, the entire gage bar 15 moves parallelly by the operation of either hand wheel and with the same micrometric adjustment of either wheel as before. It should be noticed that this micrometric adjustment does not involve the use of a hair lined vernier with a magnifying glass attachment or another similar delicate mechanism. The accuracy is none the less real, but the actual operation of altering the position of the gage bar one sixty-fourth of an inch involves the crude movement of one or the other of the hand wheels an eighth of a revolution which corresponds to the distance between two adjacent micrometer holes.

The gage is manifestly simple in operation and construction and is conveniently manipulated, it does not require frequent repairing, it can be readily detached entirely from the machine when desired, and can be manufactured at very low cost.

I claim as my invention:

1. A gage for sheet metal shears, etc., comprising a gage bar, slide blocks pivotally connected with said bar, and adjusting screws for actuating said blocks. 95
2. A gage for sheet metal shears, etc., comprising a gage bar, adjusting screws, slide blocks actuated by said screws, and suspension members connecting said bar with said slide blocks. 100
3. A gage for sheet metal shears, etc., comprising a gage bar, two suspension members pivoted to said bar, slide blocks movable parallel but independently of each other, and rotatable adjusting screws for actuating said slide blocks. 105
4. A gage for sheet metal shears, etc., comprising a gage bar, an adjusting screw, a slide block slidably mounted on said screw, and a thrust nut actuated by said adjusting screw and operating to move said block along said screw. 110
5. A gage for sheet metal shears, etc., comprising a gage bar, an adjusting screw, a slide block movable parallel to said screw and connected with said bar, and a thrust nut engaging with the threads of said adjusting screw and operating to move said block in one direction or the other, said adjusting screw passing completely through and engaging with the internal threads of said nut. 115
6. A gage for sheet metal shears, etc., comprising a gage bar, an adjusting screw, a thrust nut arranged upon said screw, which latter passes entirely through said nut and engages with the internal threads thereof, and a slide block slidably mounted on said 125

screw and straddling said thrust nut and bearing against opposite sides of the same.

7. A gage for sheet metal shears, etc., comprising a gage bar, adjusting screws operatively connected to opposite ends of said gage bar and either moved in unison with each other or independently movable, and measuring scales arranged adjacent to each adjusting screw.

8. A gage for sheet metal shears, etc., comprising a gage bar, adjusting screws operatively connected to opposite ends of said gage bar and independently movable, and mechanical means for holding either or both of said screws in either their locked or unlocked positions.

9. A gage for sheet metal shears, etc., comprising a gage bar, a supporting arm, an adjusting screw journaled in said arm, a hand wheel associated with said screw, and a locking pin journaled and slidably mounted on said supporting arm and adapted to engage with said hand wheel to prevent rotation thereof and provided with a stop shoulder adapted to hold said pin in its retracted position.

10. A gage for sheet metal shears, etc., comprising a frame, a gage bar, supporting arms secured to said frame and provided with abutments, parallel adjusting screws journaled in said supporting arms and arranged at either end of said gage bar, slide blocks arranged on said screws and connected with said gage bar, hand wheels operatively associated with said screws and provided with a plurality of micrometer locking holes, locking pins journaled and slidably mounted in said supporting arms and adapted to engage with adjacent locking holes and provided with stop shoulders which are adapted to bear against said abutments and yielding means for moving said pins longitudinally.

11. A gage for sheet metal shears, etc., comprising a gage bar, supporting arms, parallel adjusting screws independently movable and journaled in said supporting arms and each provided with a screw thread of measured pitch, a hand wheel associated with each screw and provided with a circular row of micrometer locking holes whose number is correlated to the pitch of the ad-

justing screw threads, and locking pins each adapted to engage with any of said micrometer locking holes in one of said wheels.

12. A gage for sheet metal shears, etc., comprising a gage bar, supporting arms, parallel adjusting screws journaled in said arms and independently rotatable, slide blocks carried on said screws, a suspension link connected to one end of said gage bar and to one of said slide blocks, and a suspension arm secured to the other end of said gage bar and to the other slide block.

13. A gage for sheet metal shears, etc., comprising adjusting screws, a gage bar connected at its opposite ends to said screws so as to be moved thereby, and means whereby either of said screws may be moved independently or operatively locked together so that a movement of either one causes a movement of the other.

14. A gage for sheet metal shears, etc., comprising adjusting screws, a hand wheel shaft geared to each of the adjusting screws, a coupling whereby the hand wheel shafts may be coupled or uncoupled, and a gage bar operatively connected to said adjusting screws.

15. A gage for sheet metal shears, etc., comprising hand wheel shafts, a gage bar operatively connected at different points to said hand wheel shafts, means for turning one of said shafts, and means for uncoupling or coupling said shafts together.

16. A gage bar for sheet metal shears, etc., comprising longitudinally arranged adjusting screws, a gage bar operatively connected thereto, transversely arranged hand wheel shafts axially in line with each other and individually connected operatively with said adjusting screws, and means for coupling said hand wheel shafts together.

17. A gage for sheet metal shears, etc., comprising a gage bar, suspension links pivoted thereto, slide blocks connected to said links, adjusting screws arranged to longitudinally move said slide blocks, transverse hand wheel shafts geared independently to said adjusting screws, means for rotating either of said hand wheel shafts, and means for coupling the same so as to rotate together.

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