

No. 611,845.

Patented Oct. 4, 1898.

D. A. RITCHIE.
MACHINE FOR CUTTING SHEET METAL.

(Application filed June 24, 1897.)

(No Model.)

2 Sheets—Sheet 1.

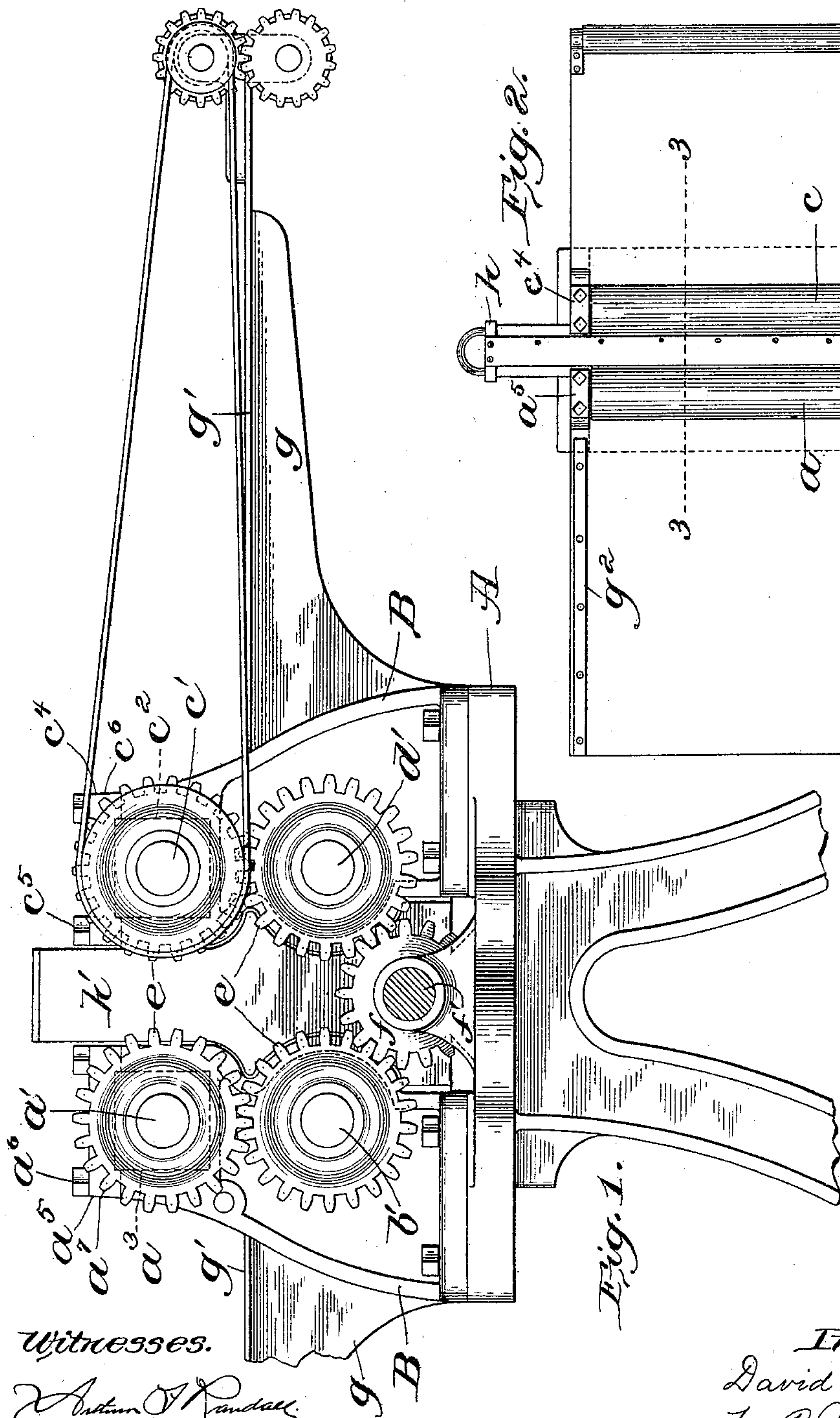


Fig. 1.

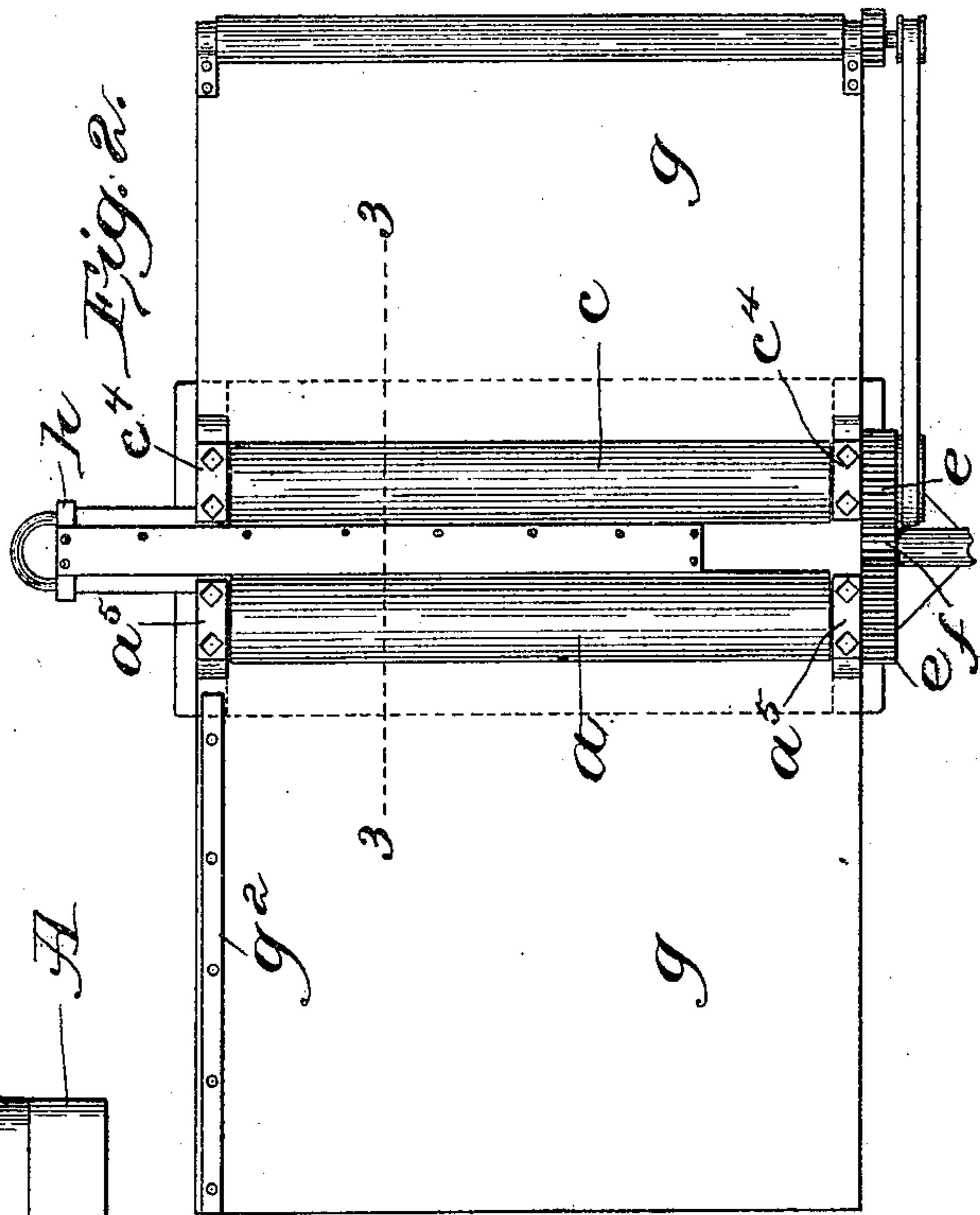


Fig. 2.

Witnesses.

Arthur V. Randall.
May E. Foster.

Inventor:
David A. Ritchie
By B. J. Mayess atty.

No. 611,845.

Patented Oct. 4, 1898.

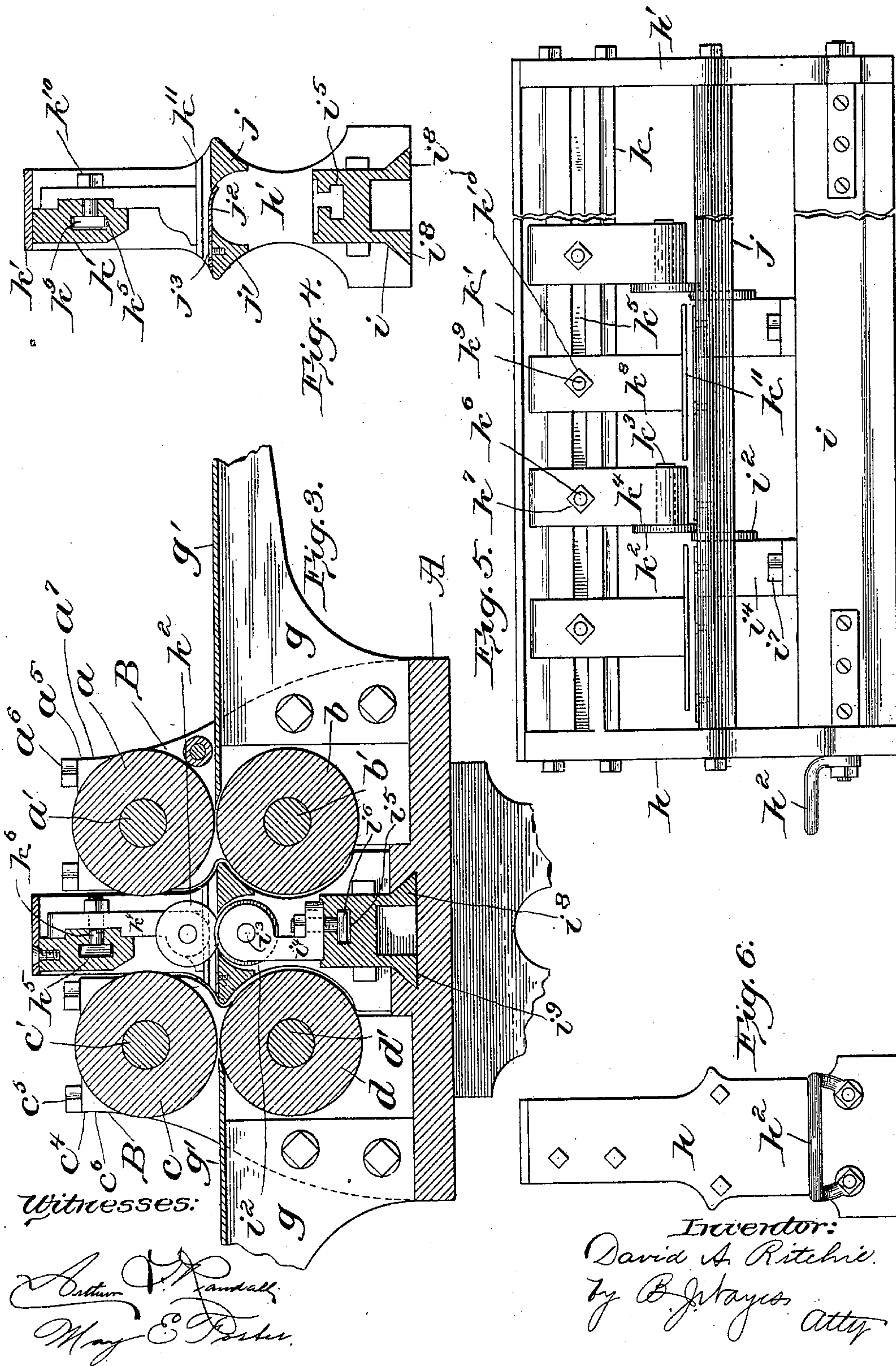
D. A. RITCHIE.

MACHINE FOR CUTTING SHEET METAL.

(Application filed June 24, 1897.)

(No Model.)

2 Sheets—Sheet 2.



UNITED STATES PATENT OFFICE.

DAVID A. RITCHIE, OF CAMBRIDGE, MASSACHUSETTS.

MACHINE FOR CUTTING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 611,845, dated October 4, 1898.

Application filed June 24, 1897. Serial No. 642,018. (No model.)

To all whom it may concern:

Be it known that I, DAVID A. RITCHIE, of Cambridge, county of Middlesex, and State of Massachusetts, have invented an Improvement in Machines for Cutting Sheet Metal, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 This invention is an improvement upon the machine for cutting sheet metal shown in my United States Patent No. 467,646, dated January 26, 1892; and it has for its object to improve the construction of the machine whereby
15 the idle cutting-rolls may be easily removed for the purpose of grinding or for any other reason and thereafter replaced, or they may be readily and accurately adjusted so as to occupy different relative positions, yet securely held, and also to enable the feeding
20 and drawing devices to be located very close to said idle cutting-rolls and to iron and smooth the severed material as it leaves the cutting-rolls, and also to provide upper and
25 under guard-plates between the idle cutting-rolls, which are detachable in order that guard-plates of different lengths or sizes may be substituted.

30 In accordance with this invention the feeding device consists of a pair of long rolls having cylindrical surfaces, and the drawing-rolls are likewise made as a pair of long rolls having cylindrical surfaces, and the idle cutting-rolls are located between said feeding
35 and drawing rolls. The drawing-rolls engage the sheet of metal and draw it from the idle cutting-rolls and at the same time iron and smooth the sheet of metal. The idle cutting-rolls, of which there will be one or more pairs,
40 are mounted loosely upon removable brackets or hangers which are adjustably secured to an independent frame which is placed between the feeding and drawing rolls, and the rolls of each pair are set so as to coact in
45 severing the sheet of metal, and in order that easy access may be had to said idle cutting-rolls for the purpose of removal or adjustment the said independent frame, bearing one or more pairs of coacting cutting-rolls, is
50 constructed and arranged to be moved relatively to the feeding and drawing rolls, so as

to carry the cutting-rolls borne by it outside of or beyond the limits of said feeding and drawing rolls—as, for instance, said frame may be endwise movable, enabling it to be
55 drawn out from between the feeding and drawing rolls to such an extent that said idle cutting-rolls are carried beyond the ends of said feeding and drawing rolls, and when in such position said idle cutting-rolls are ac-
60 cessible and may be removed or adjusted, as desired. Upper and under guard-plates are supported by said independent cutter-carrying frame, which are detachably connected thereto, so that guard-plates of different
65 lengths may be provided as may be desired, said plates being disposed between the several pairs of cutting-rolls carried by the frame.

Figure 1 shows in side elevation a machine for cutting sheet metal embodying this inven-
70 tion. Fig. 2 is a plan view of the machine shown in Fig. 1 on a reduced scale. Fig. 3 is a vertical section of a portion of the machine shown in Fig. 2, taken on the dotted line 3 3; Figs. 4, 5, and 6, details of the in-
75 dependent cutter-carrying frame, showing the cutters and guard-plates carried by it.

The main frame A of the machine is formed or provided at each side thereof with uprights B B, which support a pair of feeding-rolls and
80 a pair of drawing-rolls located a short distance apart, and said main frame supports an independent frame carrying idle cutting-rolls and guard-plates. The feeding-rolls *a* and *b* are both formed with cylindrical sur-
85 faces and extend substantially the entire width of the machine, and said rolls are fixed, respectively, upon shafts *a'* *b'*.

The shaft *b'*, carrying the lower feeding-roll, is journaled in the uprights B, and the
90 shaft *a'*, carrying the upper feeding roll, is journaled at the ends in plumber-blocks *a*³, (see dotted lines, Fig. 1,) mounted in vertical slots formed in the uprights B.

The plumber-blocks *a*³ are held in such po-
95 sition that the rolls may properly engage the sheet of metal by means of plates *a*⁵, which are adjustably secured in position over the openings of the vertical slots by means of bolts *a*⁶. Blocks of rubber or other suitable yield-
100 ing material may be interposed as usual between said plates *a*⁵ and the plumber-blocks

a^3 , which permit of the upper feeding-roll yielding to a slight extent as the sheet of metal passes beneath it. The drawing-rolls c d likewise extend substantially the entire width of the machine and are fixed, respectively, to shafts c' d' .

The shaft d' , carrying the lower drawing-roll d , is journaled in the uprights B, and the shaft c' , carrying the upper drawing-roll c , is journaled at the ends in plumber-blocks c^2 . (See dotted lines, Fig. 1.) The plumber-blocks c^2 are likewise mounted in vertical slots formed in the uprights B, and said plumber-blocks are held in position and the rolls c and d caused to properly engage the sheet of metal by means of plates c^4 , which are adjustably secured in position over the openings of said vertical slots by means of bolts c^5 . Blocks of rubber or other suitable material will be interposed between said plates c^4 and the plumber-blocks, which serve to press the upper drawing-roll downward with considerable force, yet so as to permit of its yielding to a slight extent as the sheet of metal passes beneath it.

By employing cylindrical drawing-rolls extending substantially the entire width of the machine I obviate the necessity of adjusting the drawing devices whenever the arrangement of the cutting devices is altered, as has been necessary heretofore, particularly where a number of pairs of drawing-wheels have been employed, and, moreover, the cylindrical rolls embodied in this invention perform the additional function of ironing or laying down all upturned edges or fins formed along the edges of the severed strips by the cutting-rolls and of otherwise smoothing said strips.

For the purpose of actuating the pairs of cylindrical feeding and drawing rolls the shafts of all of said rolls have mounted thereon at one side of the machine gears e , and the gears e of each pair of rolls intermesh, and the lower gear of each pair engages a driving-gear f . The driving-gear f is herein shown as fixed to a shaft f' , journaled upon the frame A, and said shaft may be driven in any suitable manner—as, for example, by a belt passing around a pulley fixed thereon.

To the uprights B are secured brackets g , which support a table g' , upon which the sheet of metal to be cut rests as it is fed along. Upon the top of the table g' , at one side thereof, a guide g^2 is provided, which is located in proximity to one end of the pair of feeding-rolls and extends substantially at right angles thereto, and the sheet of metal is guided by this guide g^2 as it is fed along.

The cutting devices, which are herein represented as rolls arranged in pairs, are carried by an independent frame, which is located between the pairs of feeding and drawing rollers, and said cutter-carrying frame is adapted to be moved into and out of operative position or removed entirely from the machine, such movement of the frame relatively to the feeding and drawing rolls being neces-

sary in order that the cutting-rolls may be accessible for the purpose of removal or adjustment.

The movable cutter-carrying frame, as herein shown, comprises, essentially, end pieces h h' , connected by cross-bars i , j j' , and k k' , which may be secured to or formed integral with said end pieces h and h' , the cross-bar i being located at the lower end or base of the frame, the cross-bars j j' being located midway the height of the frame, and the cross-bars k k' being located near the top of the frame. The frame is made quite narrow, so as to occupy a position between the pairs of feeding and drawing rolls, and the lower end or base i^8 of said frame is formed a dovetailed shape and enters and slides freely in and out in a correspondingly-shaped recess i^9 , provided in the machine-frame. The cutter-carrying frame is thus constructed and arranged to slide in and out relatively to the feeding and drawing rolls any desired distance, or it may be entirely removed, yet when in place between said rolls said frame will be rigidly held as against movement in the direction of the feed of the machine.

For convenience of manipulation of the sliding frame the end piece h is provided with a handle h^2 , adapted to be grasped by the operator, and by means of which he may draw the sliding frame out or remove it entirely from the machine in order that it may be placed upon a table or other support and the cutting devices carried by it conveniently and quickly adjusted or removed, after which said frame may be returned to its operative position. In Fig. 2 the sliding frame is shown as partly withdrawn from the machine.

The sheet of metal is cut by passing it between one or more pairs of coacting idle cutting-rolls mounted on said removable frame, and each pair comprises an upper and a lower cutting-roll, which are disposed so as to overlap each other and coact to sever the sheet.

Each upper cutting-roll k^2 is fixed to a spindle k^3 , (see Figs. 3 and 5,) that is loosely journaled in the lower end of a bracket or hanger k^4 , mounted upon the cross-bar k , which serves as a support for it, and for the purpose of detachably securing said bracket or hanger and also for providing for its adjustment laterally the said cross-bar k or support is herein shown as formed with a T-slot k^5 , which is adapted to receive the head of a bolt k^6 , the shank of which passes through a hole formed in the bracket or hanger k^4 , and said shank projects a short distance beyond the bracket or hanger, and its projecting end is threaded and receives upon it a nut k^7 . By tightening the nut k^7 the bracket or hanger may be secured to the cross-bar k , and by loosening said nut said bracket or hanger may be adjusted along the cross-bar, and by removing said nut said bracket or hanger may be removed.

Each lower cutting-roll i^2 is fixed to a spindle i^3 , (see Figs. 3 and 5,) that is loosely jour-

naled in the upper end of a bracket i^4 , which, like the bracket k^4 , is also detachably secured and adjustable laterally along on its support. For the purpose of detachably securing the bracket i^4 and also for providing for its lateral adjustment the cross-bar i is herein shown as formed with a T-slot i^5 , which receives the head of a bolt i^6 , the shank of which passes through a hole formed in the bracket i^4 and projects therefrom, and its projecting end is threaded and receives upon it a nut i^7 . By tightening the nut i^7 the bracket is secured to the cross-bar, by loosening said nut said bracket may be adjusted along on the bar, and by removing said nut said bracket may be removed.

When the sliding frame is in operative position between the feeding and drawing rolls, the cross-bars $j j'$, which are located substantially midway the height of the frame, lie in substantially the same horizontal plane with the table g' , and consequently in a plane with the bights of the feeding and drawing rolls, and serve to support and guide the stock at that point as it is fed forward between the cutters, and when the frame is so disposed relatively to the feeding and drawing rolls it will be seen that the upper cutting-roll is supported by the frame above the plane of the table and that the lower cutting-roll is supported by the frame below the plane of the table. For the purpose of preventing the stock from curling or passing downwardly between the said cross-bars $j j'$ as it is fed along guard-plates j^2 are provided, which are secured to one of said cross-bars, as by means of screws j^3 , and said guard-plates are adapted to extend over and close the openings existing between said cross-bars $j j'$ between the different pairs of cutters. The guard-plates j^2 are made of suitable dimensions to fill the spaces between the pairs of cutters and are movable, so that whenever the distance between the pairs of cutters is varied guard-plates of the proper dimensions may be substituted.

To the cross-bar k are or may be secured one or more brackets k^3 , adjustably secured in position thereon by means of bolts k^9 . The heads of said bolts k^9 are fitted into the slot k^5 , and the extremities of the shanks thereof are threaded and have fitted thereon nuts k^{10} , by means of which said brackets are clamped in position. The lower end of each bracket k^3 is formed or provided with a plate k^{11} , which is held at a suitable elevation above the cross-bars $j j'$ and guard-plates j^2 to allow the stock to pass along, and said guard-plates k^{11} prevent upward displacement of the said stock as it is passing through the cutters. The plates k^{11} , which thus serve as guard-plates, are made of a length to substantially fill the space between the pairs of cutters. The brackets are removable, and a number of brackets having plates k^{11} of different sizes will be furnished, so that when the distance between the pairs of cutters is varied brack-

ets carrying plates of the proper dimensions may be substituted.

It will be seen that by providing rollers for drawing the stock from the cutters and for ironing the same said cutters may be adjusted along their supports, and regardless of their position the stock will be drawn therefrom and ironed.

I claim—

1. In a machine for cutting sheet metal, a pair of feeding-rolls, a pair of coacting idle cutting-rolls, and a frame supporting said idle cutting-rolls constructed and arranged to be moved relatively to said feeding-rolls to carry said cutting-rolls outside of or beyond the limits of said feeding-rolls, substantially as described.

2. In a machine for cutting sheet metal, the combination of feeding-rolls, a sliding cutter-carrying frame disposed adjacent thereto, and a pair of coacting cutting-rolls mounted thereon, substantially as described.

3. In a machine for cutting sheet metal, the combination of a pair of feeding-rolls, a removable cutter-carrying frame disposed adjacent thereto, and a pair of coacting idle cutting-rolls mounted thereon, substantially as described.

4. In a machine for cutting sheet metal, the combination of feeding-rolls, an independent cutter-carrying frame and a pair of coacting cutters mounted thereon, said frame being constructed and arranged to be moved endwise to carry said cutting-rolls outside of or beyond the ends of said feeding-rolls, substantially as described.

5. In a machine for cutting sheet metal, the combination of a pair of feeding-rolls, a frame movable relatively thereto having supports above and below the bight of said rolls, and one or more pairs of coacting idle cutting-rolls, and means for detachably securing them to said supports and for permitting lateral adjustment thereof on said supports, substantially as described.

6. In a machine for cutting sheet metal, the combination of a pair of coacting idle cutting-rolls and a supporting-frame therefor, a pair of feeding-rolls and a pair of drawing-rolls located at opposite sides of said pair of cutting-rolls and in close proximity thereto, said supporting-frame being movable relatively to said feeding and drawing rolls to carry said pair of cutting-rolls outside of or beyond the limits of said feeding and drawing rolls, substantially as described.

7. In a machine for cutting sheet metal, the combination of a pair of positively-driven feeding-rolls and a pair of positively-driven drawing-rolls, located a short distance apart, a cutter-carrying frame located between said pairs of feeding-rolls and drawing-rolls and movable relatively thereto, and one or more pairs of laterally-adjustable coacting cutting-rolls supported by said movable frame, substantially as described.

8. In a machine for cutting sheet metal, the

combination of a pair of positively-driven feeding-rolls and a pair of positively-driven drawing-rolls, said pairs of rolls being located a short distance apart, one or more pairs of coacting idle cutting-rolls disposed between said pairs of feeding and drawing rolls, and a frame detachably supporting said idle cutting-rolls, movable relatively to said feeding and drawing rolls, to expose said cutting-rolls, substantially as described.

9. In a machine for cutting sheet metal, a pair of positively-driven feeding-rolls having cylindrical surfaces, a pair of positively-driven drawing and ironing rolls likewise having cylindrical surfaces, said two pairs of rolls being located close together, one or more pairs of coacting idle cutting-rolls interposed between said two pairs of rolls, brackets bearing them, supports above and below the bights of said two pairs of rolls to which said brackets are secured, substantially as described.

10. In a machine for cutting sheet metal, a pair of positively-driven feeding-rolls having cylindrical surfaces, a pair of positively-driven drawing and ironing rolls likewise having cylindrical surfaces, said two pairs of rolls being located close together, one or more pairs of coacting idle cutting-rolls interposed between said two pairs of rolls, brackets bearing them, supports above and below the bights of said two pairs of rolls to which said brackets are secured, and a frame bearing said supports movable relatively to said two pairs of rolls, substantially as described.

11. In a machine for cutting sheet metal, the combination of one or more pairs of cutters, an independent bracket to the lower end of which each upper cutter is journaled, and an independent bracket to the upper end of which each lower cutter is journaled, supports for said brackets, and means for adjustably securing said brackets to said supports, a pair of feeding-rolls at one side of said cutters and a pair of drawing and ironing rolls at the opposite side thereof, said rolls being made substantially as long as the supports to which said brackets are adjustably secured, substantially as described.

12. In a machine for cutting sheet metal, a frame having longitudinal T-slots formed therein, bolts the heads and shanks of which enter and move along in said slots, brackets carrying cutting-rolls detachably secured to the frame by said bolts and adjustable laterally, substantially as described.

13. In a machine for cutting sheet metal, a pair of feeding-rolls, one or more pairs of cutting-rolls, and a cross-bar *j*, located between said feeding and cutting rolls and guard-plates at the sides of said cutting-rolls, the top surfaces of said cross-bar and guard-plates occupying planes substantially on a level with the bights of said rolls, and a frame bearing said cutting-rolls, cross-bar and guard-plates, movable relatively to the feeding-rolls, substantially as described.

14. In a machine for cutting sheet metal, a pair of feeding-rolls, one or more pairs of cutting-rolls, a cross-bar *j*, located between said feeding and cutting rolls, and guard-plates at the sides of said cutting-rolls, the top surfaces of said cross-bar and guard-plates being substantially on a level with the bights of said rolls, and other guard-plates at the sides of said cutting-rolls located a short distance above the aforesaid guard-plates, and a frame bearing said cutting-rolls, cross-bar and both sets of guard-plates, movable relatively to the feeding-rolls, substantially as described.

15. In a machine for cutting sheet metal, a pair of feeding-rolls, a pair of drawing-rolls, and one or more pairs of idle cutting-rolls between them, a cross-bar, *j*, located between said feeding-rolls and cutting-rolls and a cross-bar, *j'*, located between said cutting-rolls and drawing-rolls, the top surfaces of said cross-bars occupying a plane substantially on a level with the bights of said rolls, and a frame bearing said cross-bars and cutting-rolls movable relatively to the feeding and drawing rolls, substantially as described.

16. In a machine for cutting sheet metal, a pair of feeding-rolls, a pair of drawing-rolls, and one or more pairs of idle cutting-rolls between them, a cross-bar, *j*, located between said feeding-rolls and cutting-rolls and a cross-bar, *j'*, located between said cutting-rolls and drawing-rolls, the top surfaces of said cross-bars occupying a plane substantially on a level with the bights of said rolls and guard-plates at the sides of the cutting-rolls, secured to said cross-bar *j'*, substantially as described.

17. In a machine for cutting sheet metal, a pair of feeding-rolls, a pair of drawing-rolls, and one or more pairs of idle cutting-rolls between them, a cross-bar, *j*, located between said feeding-rolls and cutting-rolls and a cross-bar *j'*, located between said cutting-rolls and drawing-rolls, the top surfaces of said cross-bars occupying a plane substantially on a level with the bights of said rolls and upper and under guard-plates at the sides of the cutting-rolls, substantially as described.

18. In a machine for cutting sheet metal, a pair of feeding-rolls, a pair of drawing-rolls, and one or more pairs of idle cutting-rolls between them, a cross-bar, *j*, located between said feeding-rolls and cutting-rolls and a cross-bar *j'*, located between said cutting-rolls and drawing-rolls, the top surfaces of said cross-bars occupying a plane substantially on a level with the bights of said rolls and upper and under guard-plates at the sides of the cutting-rolls, and a frame bearing said cutting-rolls, cross-bars, and upper and under guard-plates, movable relatively to the feeding and drawing rolls, substantially as described.

19. In a machine for cutting sheet metal, the combination of a pair of feeding-rolls, one or more pairs of cutting-rolls, a frame carrying said cutting-rolls, movable relatively to the feeding-rolls, and upper and under guard-plates removably attached to said frame at

the sides of said pairs of cutting-rolls, substantially as described.

20. In a machine for cutting sheet metal, the combination of feeding and drawing rolls
5 located a short distance apart, a movable frame located between them, one or more pairs of laterally-adjustable cutting-rolls mounted on said frame, and guard-plates intermediate said pairs of cutting-rolls detachably connect-
10 ed to said frame, substantially as described.

21. In a machine for cutting sheet metal, the combination of a frame carrying one or more pairs of cutting-rolls, T-slots formed in

said frame, bolts having their heads and shanks in said slots, brackets removably 15 clamped to said frame by said bolts, and guard-plates mounted on said brackets at the sides of the cutting-rolls, substantially as described.

In testimony whereof I have signed my 20 name to this specification in the presence of two subscribing witnesses.

DAVID A. RITCHIE.

Witnesses:

B. J. NOYES,
ARTHUR F. RANDALL.