

No. 672,685.

Patented Apr. 23, 1901.

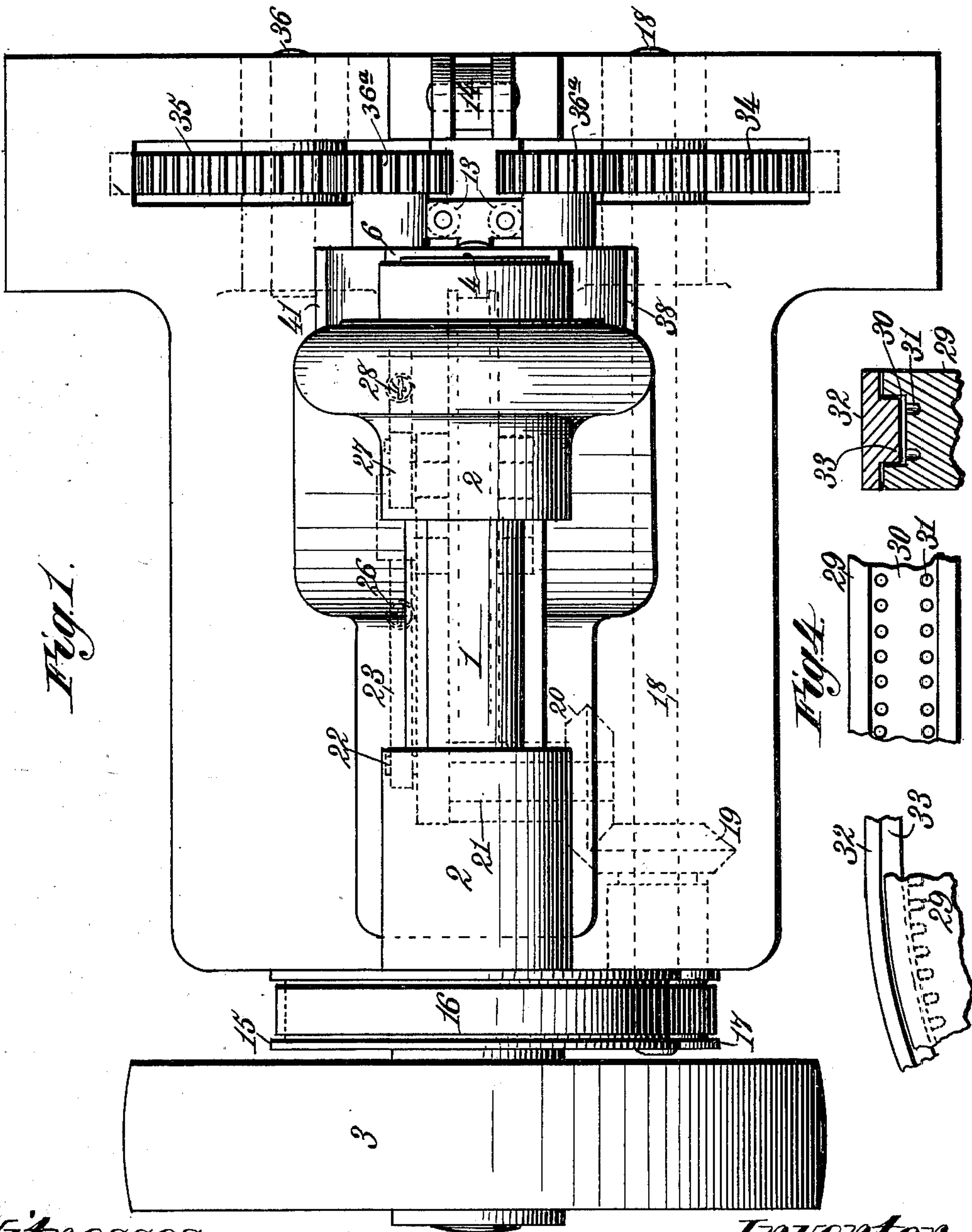
J. S. STOKES.

MACHINE FOR PUNCHING METAL STRIPS.

(Application filed Feb. 14, 1900.)

(No Model.)

3 Sheets—Sheet 1.



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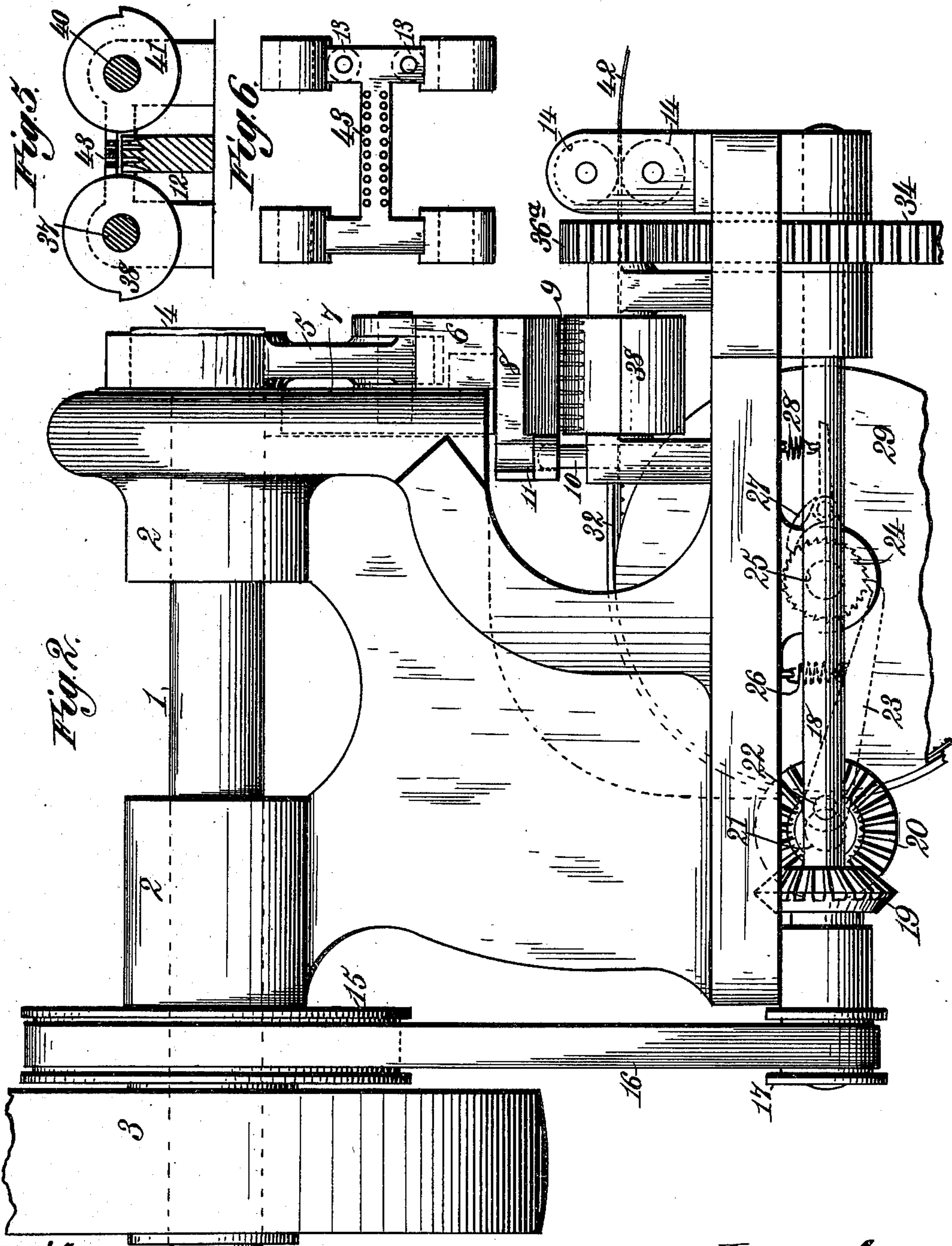
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(No Model.)

3 Sheets—Sheet 2.



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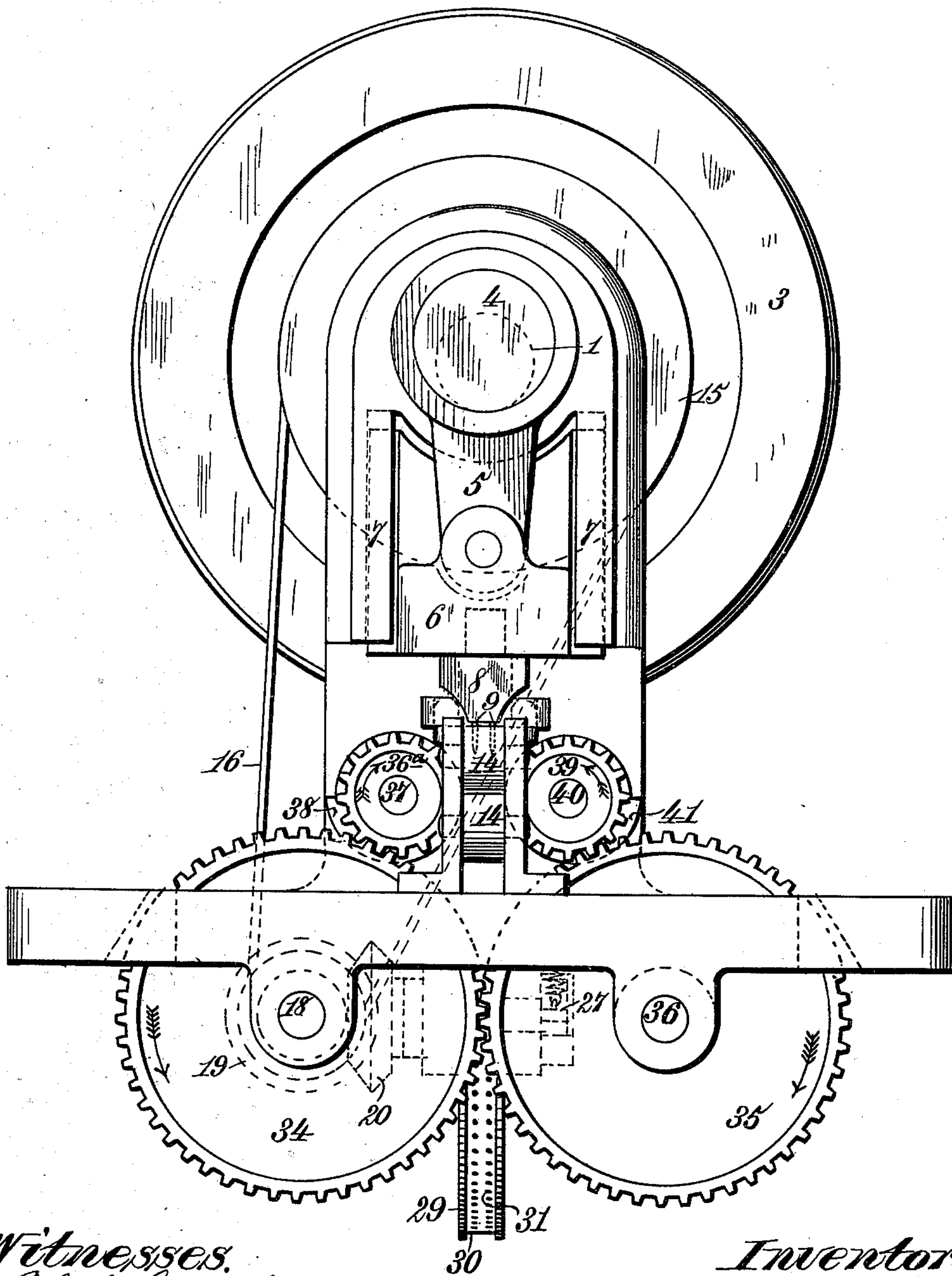
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3 Sheets—Sheet 3.

*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

JOHN S. STOKES, OF MOORESTOWN, NEW JERSEY.

## MACHINE FOR PUNCHING METAL STRIPS.

SPECIFICATION forming part of Letters Patent No. 672,685, dated April 23, 1901.

Application filed February 14, 1900. Serial No. 5,175. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN S. STOKES, a citizen of the United States, residing at Moorestown, in the county of Burlington and State of New Jersey, have invented certain new and useful Improvements in Machines for Punching Metal Strips, of which the following is a specification.

My invention relates to machines for punching sheet-metal strips of unlimited length to be used in securing together the meeting ends of the sides of pasteboard boxes. These strips in their completed condition are provided with burs on the under side thereof formed by punching holes through the strip and bending down the metal around said holes. It is important that the holes by which the burs are formed shall be located at equal distances apart and that the side edges of the strip be uniform throughout in order that the punched strip may be properly handled in the machine which affixes the same to the boxes. The punching of the holes, however, causes a spreading of the edges of the strip adjacent to said holes and tends to cause a buckling of the sheet metal of which the strip is made.

The object of my invention is to avoid the objections above noted and to provide a machine in which the completed strip issuing therefrom will have its side edges uniform throughout and will have the holes and burs at equal distances apart therein and in parallel rows.

To accomplish this, the invention consists of a reciprocating punch for the strip and rotary cutters for the side edges thereof actuated simultaneously with or just after the punch.

The invention also consists of a rotary feed for the strip provided with means for engaging the latter adapted to maintain the strip taut during the punching operation and constructed and arranged to move the strip forwardly a distance corresponding exactly with the length of strip operated upon by the punch at one stroke thereof.

The invention also consists in certain features and details of construction and combinations of parts, which will be hereinafter more fully described and claimed.

In the drawings forming part of this specification, Figure 1 is a plan view of a punch-

ing-machine embodying my improvements. Fig. 2 is a side elevation of the same. Fig. 3 is a front elevation. Fig. 4 represents details of the feeding-wheel. Fig. 5 is a vertical sectional view of the bed of the machine and the stripper, showing the rotary cutters cooperating therewith; and Fig. 6 is a plan view of the same with the cutters removed.

Like reference-numerals indicate like parts in the different views.

One embodiment of my invention is illustrated in the drawings; but I wish it to be understood that I do not limit myself to the particular construction or arrangement of parts therein shown, as numerous modifications may be made therein without departing from the nature or spirit of my invention.

As shown, a main shaft 1 is mounted in suitable bearings in the frame 2 of the machine and has a fly-wheel 3 on one end thereof, through which power is transmitted from any suitable source to rotate said shaft. The said shaft 1 extends centrally and longitudinally of the machine and is provided with an eccentric 4 on the end opposite the fly-wheel 3, which through the eccentric-rod 5 serves to reciprocate the cross-head 6, to which said connecting-rod is pivoted. Said cross-head fits and moves within guides 7 and carries upon its lower end a die 8, having a series of punches 9 thereon, which are arranged in two parallel rows at equal distances one from the other. The die 8 is further guided in its reciprocating movements by the pins 10, secured to the main frame 2 and fitting within corresponding openings 11 in said die. Beneath the die 8 is a bed-plate 12, having openings therein corresponding with the punches 9 on said die and adapted to receive said punches when the die is in its lowermost position. The said bed-plate also cooperates with a pair of rotary cutters, to be described later, and is of a width and contour corresponding with that of the completed punched strip. Just in front of the bed-plate 12 are two horizontally-disposed guide-wheels 13 13, and adjacent to said guide-wheels are two vertically-disposed brake-rollers 14 14. The said brake-rollers are constructed of rubber or other like material and are designed to resist the forward movement of the blank from the storage-reel through the machine.



Secured to the shaft 1, adjacent to the fly-wheel 3, is a flanged pulley 15, around which passes a belt 16. The said belt also passes around a flanged pulley 17 on a counter-shaft 5 18, parallel to the shaft 1 and extending from one end of the machine to the other, as clearly shown. Secured to the shaft 18 is a bevel-pinion 19, meshing with a corresponding pin-  
 10 shaft 21 carries a wrist-pin 22, to which is pivoted a feeding-pawl 23, adapted to engage a ratchet-wheel 24 on a transverse shaft 25 and normally held in contact therewith by a spring 26. A dog 27 also engages the ratchet-  
 15 wheel 24 for preventing rearward movement of the same, the said dog being held in contact therewith by a spring 28. Secured to the shaft 25, on which the ratchet-wheel 24 is mounted, is a feed-wheel 29, having a pe-  
 20 ripheral groove 30 therein and provided with a series of sockets or recesses 31, adapted to receive the burs punched on the under side of the metal strip operated upon. Leading from a point adjacent to the bed-plate 12 rear-  
 25 wardly and partly around the feeding-wheel 29 is a fixed guide or concave 32, having a rib 33 on its under side, which is received by the groove 30 in the wheel 29.

Near the forward end of the shaft 18 and  
 30 secured thereto is a gear-wheel 34, meshing with a corresponding gear-wheel 35, mounted on a shaft 36, as clearly shown in Figs. 1 and 3 of the drawings. The gear-wheels 34 and 35 are of equal diameter, and the rotation of  
 35 the former through the gearing described from the shaft 1 will cause the rotation of the latter in the opposite direction at the same speed. The gear 34 meshes with a pinion 36<sup>a</sup>, secured to a shaft 37, carrying a rotary cut-  
 40 ter or trimming-wheel 38. The gear 35 meshes with a corresponding pinion 39 on a shaft 40, which carries a rotary cutter or trimming-wheel 41, as clearly shown. The cutters 38 and 41 are both of the same size and shape  
 45 and are located on opposite sides of the bed-plate 12. The active faces of said cutters correspond with the side edges of the bed-plate 12 and cooperate with said bed-plate for the purpose of trimming the side edges of the  
 50 strip operated upon. These edges may be either straight, fluted, or of any other desired configuration. A stripper 43 for the purpose of removing the punched strip from the punches 9 is interposed between the up-  
 55 per side of said strip and the lower side of said die.

The operation of the machine is as follows: A blank strip 42, of sheet metal, being passed  
 60 through the frictional brake-wheels 14 between the guide-wheels 13, over the bed-plate 12, and onto the feeding-wheel 29 and between the latter and the guide 32 power is applied to the shaft 1, and the die 8, carrying the punches 9, is reciprocated through  
 65 the action of the eccentric 4, connected to the said die through the rod 5 and cross-head 6. Simultaneously the shaft 18 is rotated by

means of the belt 16, which connects the pul-  
 ley 15 on the shaft 1 with the pulley 17 on  
 the shaft 18. The rotation of the latter shaft 70  
 also causes the rotation of the transverse  
 shaft 21 through the pinions 19 and 20. The  
 latter shaft being connected through the wrist-  
 pin 22 with the feed-pawl 23 causes an intermit-  
 tent rotation of the feeding-wheel 29 through 75  
 the ratchet-wheel 24 and shaft 25, to the lat-  
 ter of which said feeding-wheel is secured. It  
 will be understood, of course, that the eccen-  
 tric 4 and the wrist-pin 22 are so arranged  
 with respect to each other that the feeding- 80  
 wheel 29 will be rotated during the upward  
 movement of the die 8 and that said feeding-  
 wheel 29 will be stationary during the punch-  
 ing operation of said die. The degree of ro- 85  
 tation also of the feeding-wheel 29 is such that  
 it will advance the strip 42 after the punch-  
 ing operation a distance corresponding ex-  
 actly with the length of said strip which is op-  
 erated upon by the punches at a single stroke  
 thereof. In this way the feeding-wheel, co- 90  
 operating with the brake-wheels 14, serves to  
 maintain the strip taut opposite the die 8, so  
 that buckling of the strip during the punching  
 operation is effectually prevented. This ar-  
 rangement of the parts also provides for the 95  
 formation of the holes and burs on the strip  
 42 at exactly the same distance apart through  
 the successive operations of the punches. During  
 the rotation of the shaft 18 the cut-  
 ters 38 41 are also rotated through the gear 100  
 34, pinion 36<sup>a</sup>, shaft 37, and through the gear  
 35, pinion 39, and shaft 40. These cutters  
 cooperate with the bed-plate 12 and are so ar-  
 ranged on the shafts 37 and 40, respectively,  
 that the active faces thereof will come into 105  
 engagement with the projecting edges of the  
 strip 42 simultaneously with or just after the  
 operation of the punches. In this way any  
 irregularity in the strip caused by the punches  
 passing through the same will be taken off 110  
 or trimmed down by said cutters.

I have shown the rotary feeding-wheel 29  
 as located beneath the strip 42 which is op-  
 erated upon and as provided with sockets or  
 recesses 31 for receiving the burs on the un- 115  
 der side of said strip. It is of course obvious  
 that any other disposition of the wheel 29  
 with respect to the strip 42 may be made and  
 that other engaging means between the wheel  
 and strip may be employed. It is important, 120  
 however, that the engaging means on the  
 wheel cooperate with the burs or openings  
 in the strip in order that the rotation of the  
 wheel 29 through a certain arc will cause an  
 equal movement of the strip 42. 125

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

1. In a punching-machine, the combination  
 of punching mechanism for forming burred 130  
 openings, and mechanism coacting solely with  
 said burs for feeding the material to the  
 punching mechanism.

2. In a machine for punching metal strips,



the combination with reciprocating punching mechanism for forming burred openings, and mechanism coacting solely with said burs for feeding the strip to the punching mechanism.

3. In a machine for punching metal strips, the combination of punching mechanism for forming burred openings, and rotating mechanism coacting solely with the burs for feeding the strip to the punching mechanism.

4. In a machine for punching metal strips, the combination with punching mechanism for forming burred openings, of rotating mechanism intermittently operated and coacting with the burs for feeding the strip to the punching mechanism intermittently.

5. In a machine for punching metal strips, the combination with punching mechanism for forming burred openings, of a rotary feeding-wheel having means coacting with said burs for feeding the strip to the punching mechanism.

6. In a machine for punching metal strips, the combination with punching mechanism for forming burred openings, of a rotary feeding-wheel having spaces or recesses coacting with said burs for feeding the strip to the punching mechanism.

7. In a machine for punching metal strips, the combination with punching mechanism for forming burred openings, of a rotary feeding-wheel having spaces or recesses coacting with said burs for feeding the strip to the punching mechanism, and means for temporarily retaining said burs in said spaces or recesses.

8. In a machine for punching metal strips, the combination of punching mechanism for forming burred openings, and mechanism, independent of the punching mechanism and coacting solely with said burs for feeding the strip to said punching mechanism.

9. In a machine for punching metal strips, the combination with punching mechanism for forming burred openings, of a rotary feeding-wheel independent of the punching mechanism and having means coacting with said burs for feeding the strip to the punching mechanism.

10. In a machine for punching metal strips, the combination with punching mechanism for forming burred openings, of a rotary feeding-wheel independent of the punching mechanism and having spaces or recesses coacting with said burs for feeding the strip to the punching mechanism.

11. In a machine for punching metal strips, the combination with punching mechanism, of a rotary feeding-wheel for the strip, positive engaging means on the wheel for said strip, and a fixed part cooperating with said wheel for holding the strip in contact therewith.

12. In a machine for punching metal strips, the combination with punching mechanism for forming burred openings, of mechanism coacting with said burs for feeding the ma-

terial to the punching mechanism, and means for maintaining said material taut during the punching operation.

13. In a machine for punching metal strips, the combination with punching mechanism for forming burred openings, of mechanism coacting with said burs for feeding the strip to said punching mechanism, and retarding mechanism in opposition to said feeding mechanism for maintaining said strip taut during the punching operation, said feeding and retarding mechanism being located on opposite sides of the punching mechanism.

14. In a machine for punching metal strips, the combination with punching mechanism for forming burred openings, of mechanism coacting with said burs for feeding the material to the punching mechanism, and a brake device for maintaining said material taut during the punching operation, said mechanism and brake device being located and operating on opposite sides of the punching mechanism.

15. In a machine for punching metal strips, the combination with punching mechanism for forming burred openings, of a rotary feeding-wheel coacting with said burs for feeding the strip to said punching mechanism, and a brake device operating in opposition to said feeding mechanism for maintaining said strip taut during the punching operation, said feeding-wheel and brake device being located on opposite sides of the punching mechanism.

16. In a machine for punching metal strips, the combination with punching mechanism, of a rotary feeding-wheel for the strip having sockets or recesses therein coacting with the burs on one side of said strip, to feed the strip, and means for imparting an intermittent movement to said wheel.

17. In a machine for punching metal strips, the combination with punching mechanism, of a rotary feeding-wheel for the strip having engaging means for the strip on the periphery thereof, a fixed guide extending from the punching mechanism partly around said wheel, and means for imparting an intermittent movement to said wheel.

18. In a machine for punching metal strips, the combination with punching mechanism, of a rotary feeding-wheel having sockets or recesses therein for receiving the burs on the under side of said strip, a fixed guide extending from the punching mechanism partly around said wheel, and means for imparting an intermittent movement to said wheel.

19. In a machine for punching metal strips, the combination with punching mechanism, of a rotary feeding-wheel for the strip, having a groove in its periphery and sockets or recesses in said groove for receiving the burs on the under side of said strip, and a fixed guide extending from the punching mechanism partly around said wheel and provided with a rib which fits within said groove.

20. In a machine for punching metal strips,



the combination with punching mechanism, of a rotary shaft having an eccentric-pin thereon, a rotary feeding-wheel for the strip, a ratchet-wheel secured to the shaft on which  
 5 said wheel is mounted, a feeding-pawl pivoted to said eccentric-pin and engaging said ratchet-wheel, and means for imparting continuous movement to said rotary shaft, whereby an intermittent rotary movement is trans-  
 10 mitted to said wheel.

21. In a machine for punching metal strips, the combination with punching mechanism, of a rotary shaft having an eccentric-pin thereon, a rotary feeding-wheel for the strip,  
 15 a ratchet-wheel secured to the shaft on which said wheel is mounted, a feeding-pawl pivoted to said pin, a spring for holding the free end of said pawl in engagement with said ratchet-wheel, a dog engaging said ratchet-  
 20 wheel for preventing rearward movement of said feeding-wheel, and a spring for holding said dog in contact with said ratchet-wheel.

22. In a machine for punching metal strips, the combination of punching mechanism and  
 25 feeding mechanism operating alternately, and edge-trimming mechanism operating between the succeeding movements of the punching and feeding mechanisms.

23. In a machine for punching metal strips,  
 30 the combination with punching and feeding mechanism for the strip, of rotary cutters independent of said punching and feeding mechanism for trimming the edges thereof.

24. In a machine for punching metal strips,  
 35 the combination with punching and feeding mechanism for the strip, of rotary cutters for trimming the edges thereof, the said cutters being mounted on axes parallel to the direction of feed of said strip.

25. In a machine for punching metal strips,  
 40 the combination with punching and feeding mechanism, of rotary cutters for trimming the edges of the strip, the said cutters being thrown into operation before the strip is  
 45 moved from the position in which it is punched.

26. In a machine for punching metal strips, the combination with reciprocating punching mechanism, of a rotary feeding-wheel for the strip and rotary cutting-wheels for trimming  
 50 the edges thereof.

27. In a machine for punching metal strips, the combination with reciprocating punching mechanism, of a rotary feeding-wheel for the strip, and rotary cutters on opposite sides of  
 55 the punches for trimming the edges of the strip, the said cutters being thrown into operation before the punches are removed from the strip.

28. In a machine for punching metal strips,  
 60 the combination with reciprocating punching mechanism, a rotary feeding-wheel for the strip, rotary cutters for trimming the edges of the strip, and means for operating said punching mechanism, said feeding-wheel and  
 65 said cutters in time movements to cause the feeding of the strip upon the removal of the punching mechanism therefrom and to cause the operation of the cutters before the punching mechanism is removed therefrom.  
 70

29. In a machine for punching metal strips, the combination with punching mechanism, of a bed-plate cooperating therewith, a rotary feeding-wheel for the strip, and rotary cut-  
 75 ters for trimming the side edges thereof, the said cutters cooperating with said bed-plate, as and for the purpose set forth.

30. In a machine for punching metal strips, the combination with punching mechanism, of a bed-plate cooperating therewith, feeding  
 80 mechanism for the strip, and rotary cutters for trimming the side edges thereof, the said cutters cooperating with said bed-plate, as and for the purpose set forth.

In testimony whereof I have hereunto set  
 85 my hand in presence of two subscribing witnesses.

JOHN S. STOKES.

Witnesses:

A. P. RUTHERFORD,  
 JAMES L. GOOD.