6 Sheets—Sheet 1.

G. H. PERKINS.

MACHINE FOR SHEARING SHEET METAL.

No. 260,779. Patented July 11, 1882.

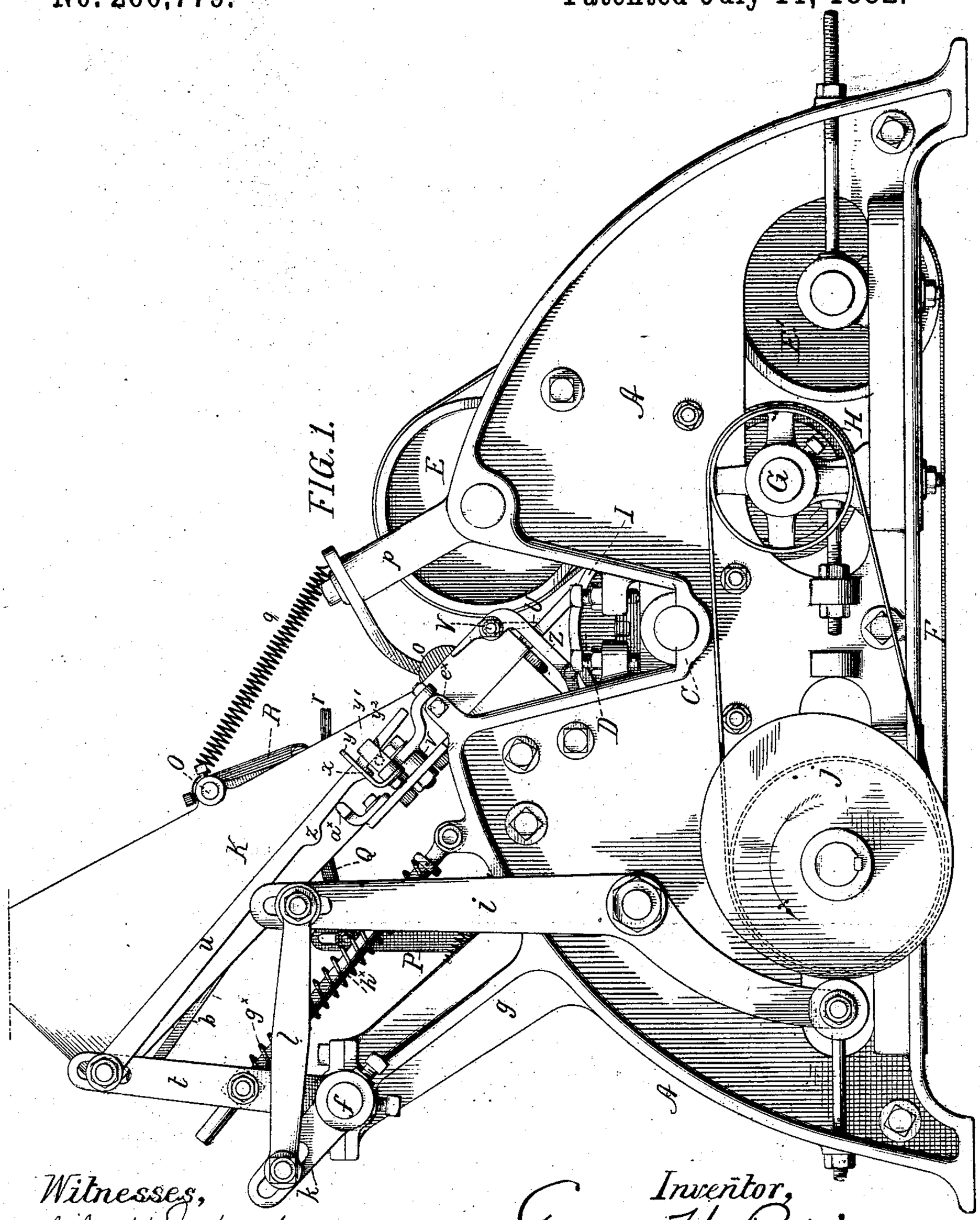


FIG. 1.

Witnesses,
John K. Lupertus.
John Dolley Jr.

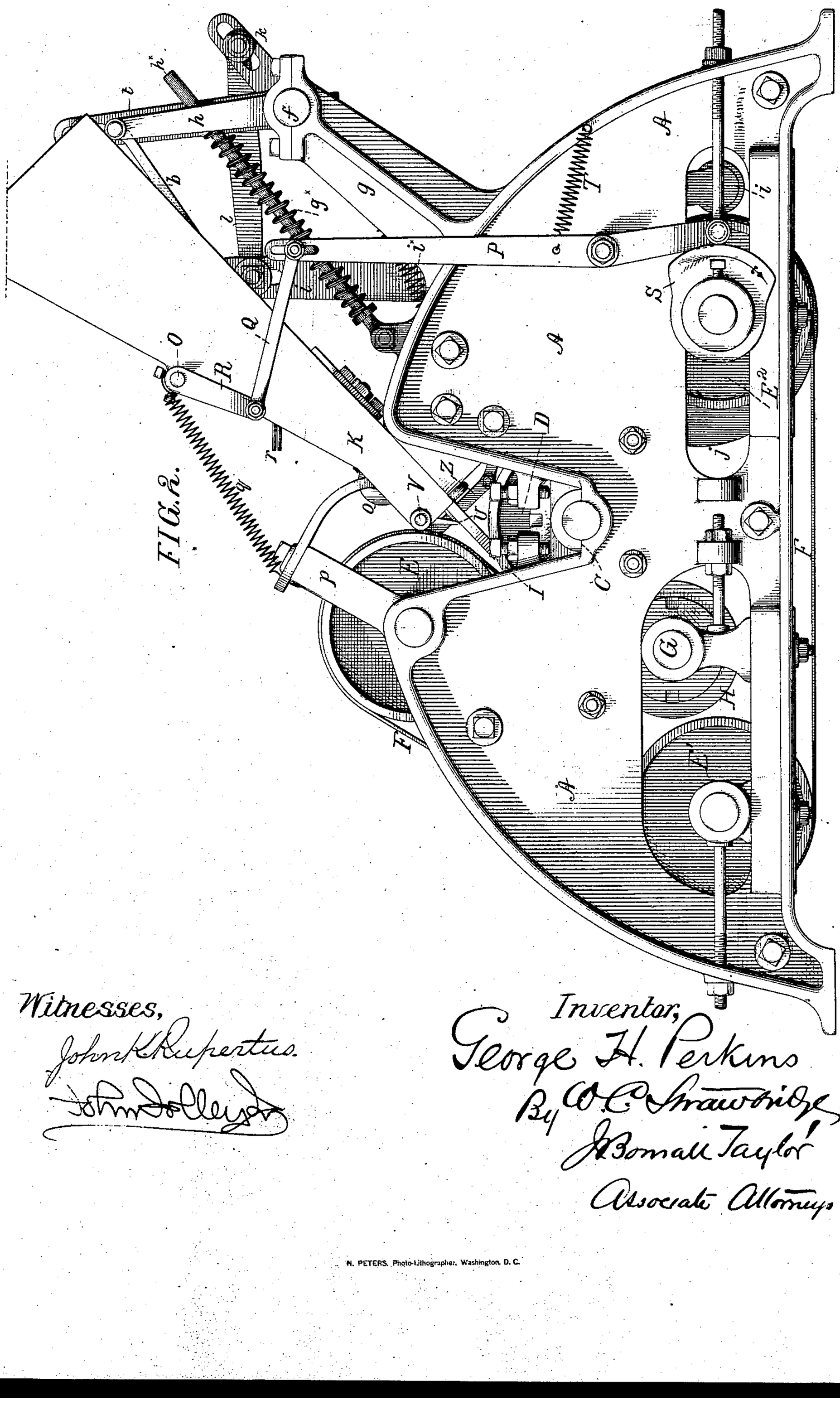
Inventor,
George H. Perkins
By W. C. Strawbridge
J. Bonsall Taylor
Associate Attorneys.

6 Sheets—Sheet 2.

G. H. PERKINS.

MACHINE FOR SHEARING SHEET METAL.

No. 260,779. Patented July 11, 1882.



Witnesses,
John K. Rupertus.
John D. Colegate

Inventor,
George H. Perkins
By O. C. Strawbridge
J. Bonsall Taylor
Associate Attorneys

6 Sheets—Sheet 3.

G. H. PERKINS.

MACHINE FOR SHEARING SHEET METAL.

No. 260,779. Patented July 11, 1882.

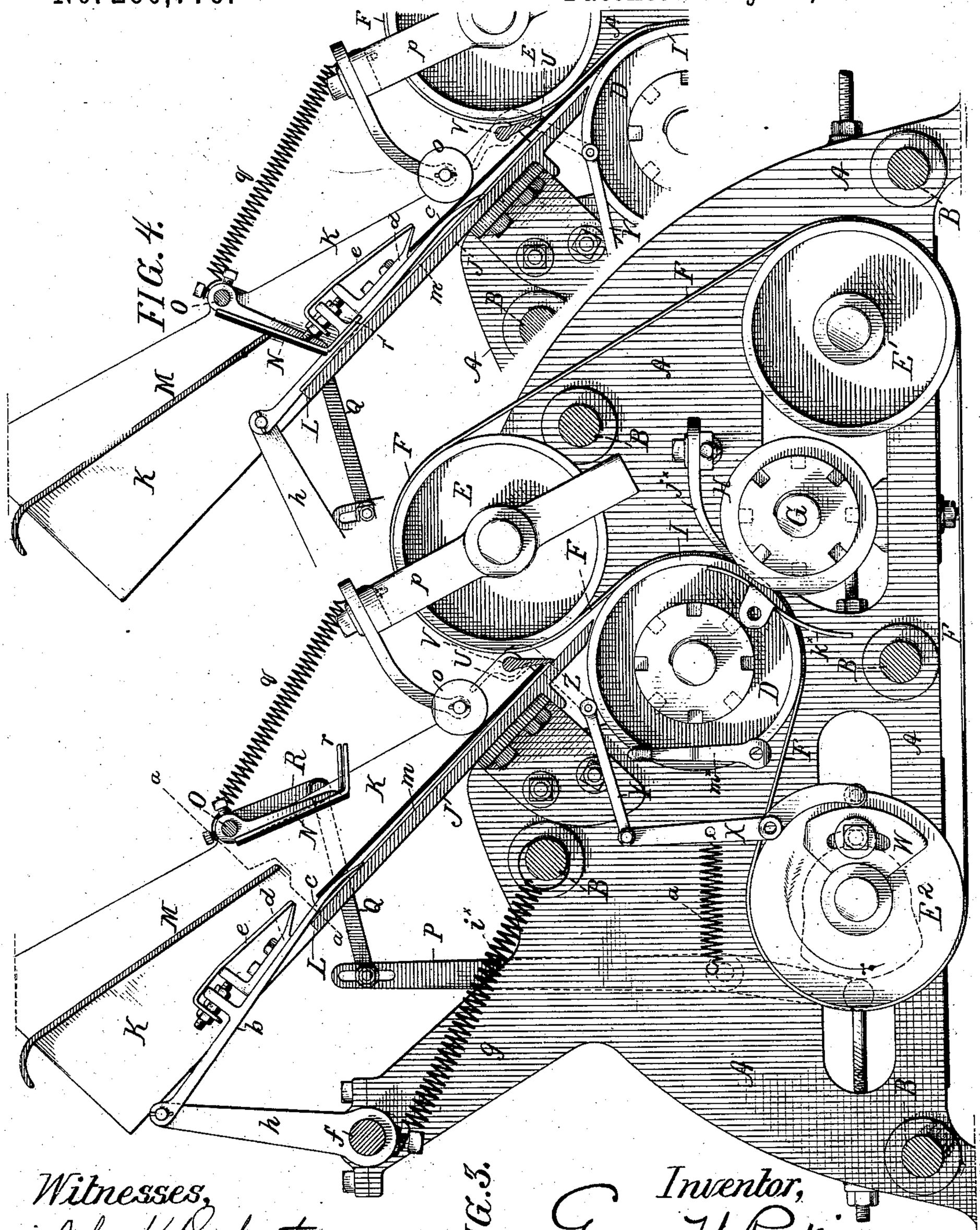


FIG. 4.

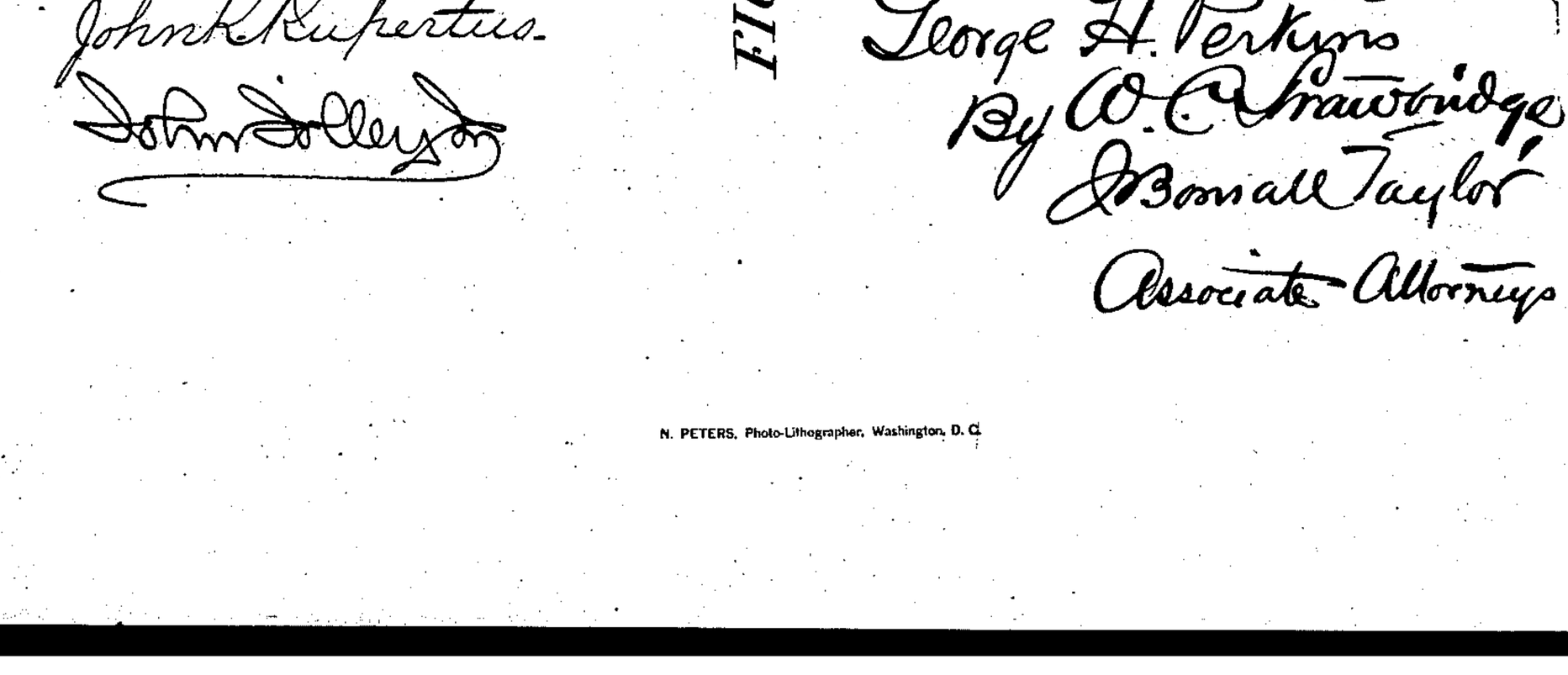


FIG. 5.

Witnesses,
John K. Rupertus.
John Dolley Jr.

Inventor,
George H. Perkins
By O. C. Crawbridge
& Bonsall Taylor
Associate Attorneys

6 Sheets—Sheet 4.

G. H. PERKINS.

MACHINE FOR SHEARING SHEET METAL.

No. 260,779. Patented July 11, 1882.

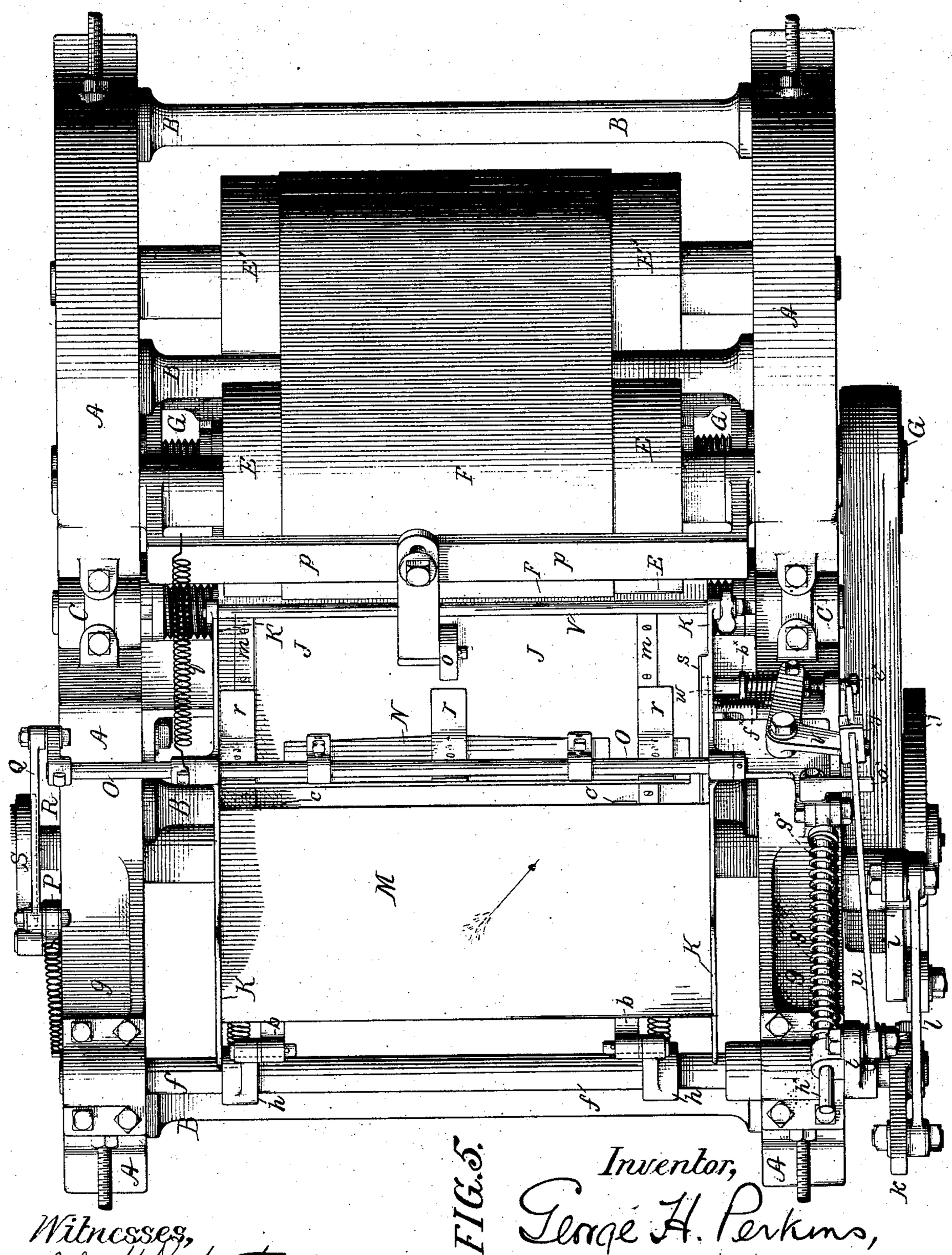


FIG. 5.

Witnesses,
John K. Lupertus.
John Dalley Jr.

Inventor,
George H. Perkins,
By O. C. Snow & Bridgeman
J. Bonsall Taylor
Associate Attorneys

6 Sheets—Sheet 5.

G. H. PERKINS.

MACHINE FOR SHEARING SHEET METAL.

No. 260,779. Patented July 11, 1882.

FIG. 6.

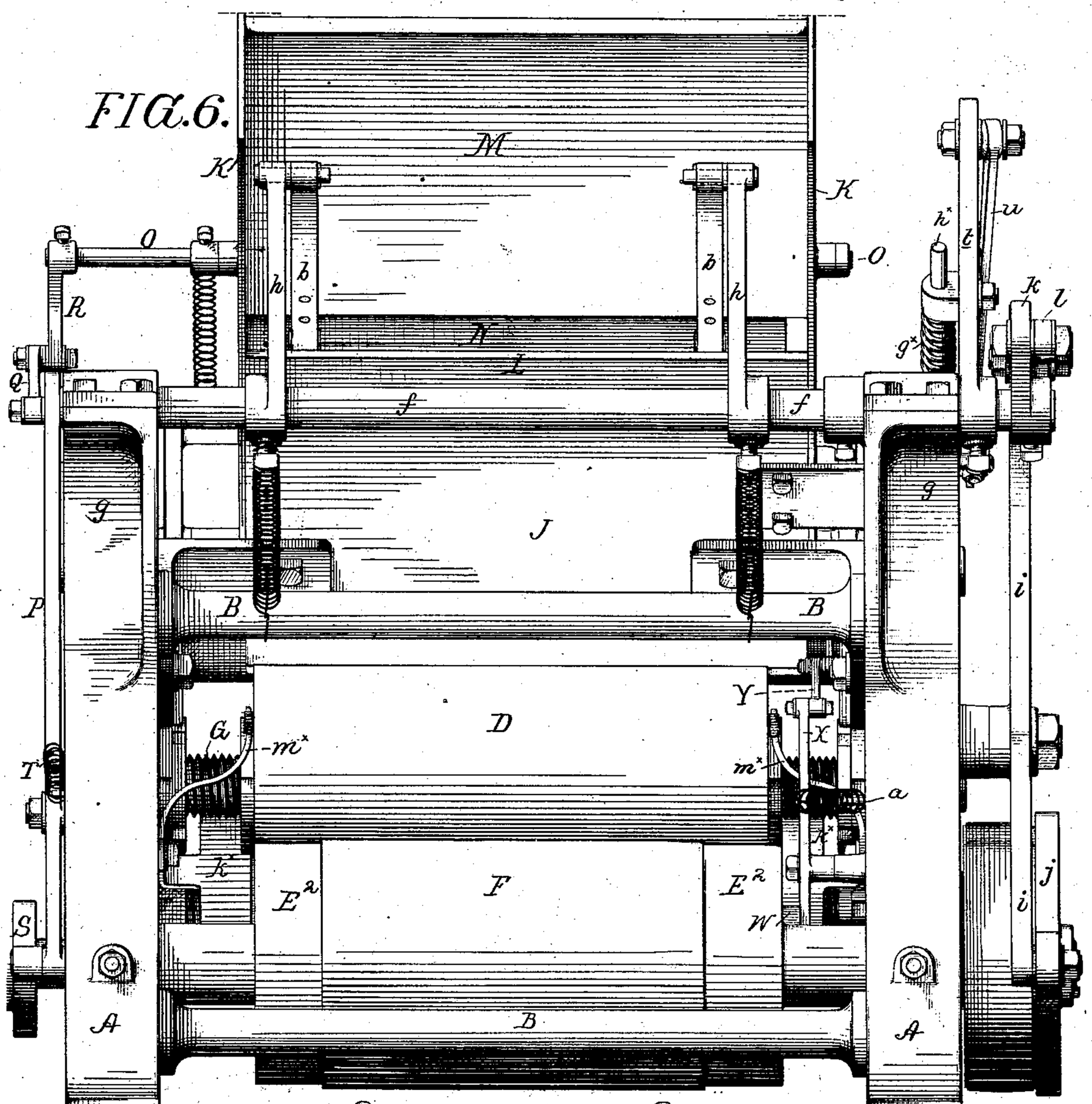
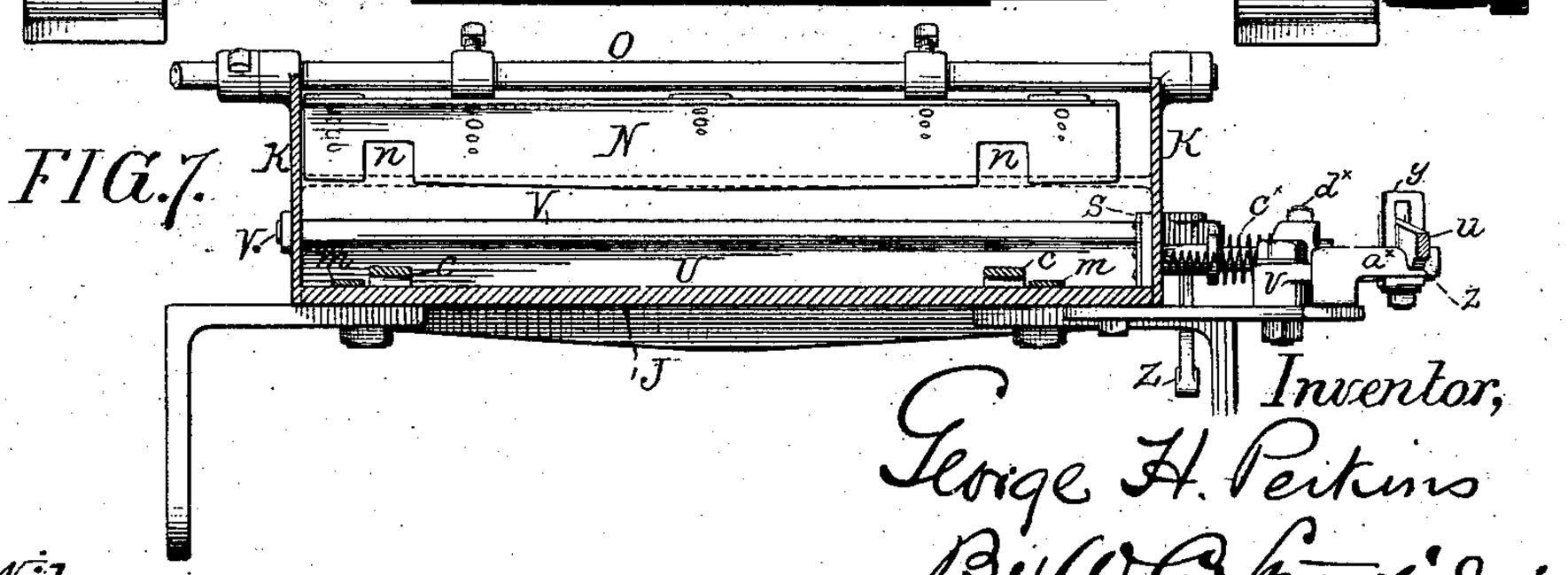


FIG. 7.



Witnesses,
John K. Rupertus.
John Dolleyson

Inventor,
George H. Perkins
By W. C. Strawbridge
Donald Taylor
Associate Attorneys

6 Sheets—Sheet 6.

G. H. PERKINS.

MACHINE FOR SHEARING SHEET METAL.

No. 260,779. Patented July 11, 1882.

FIG. 9.

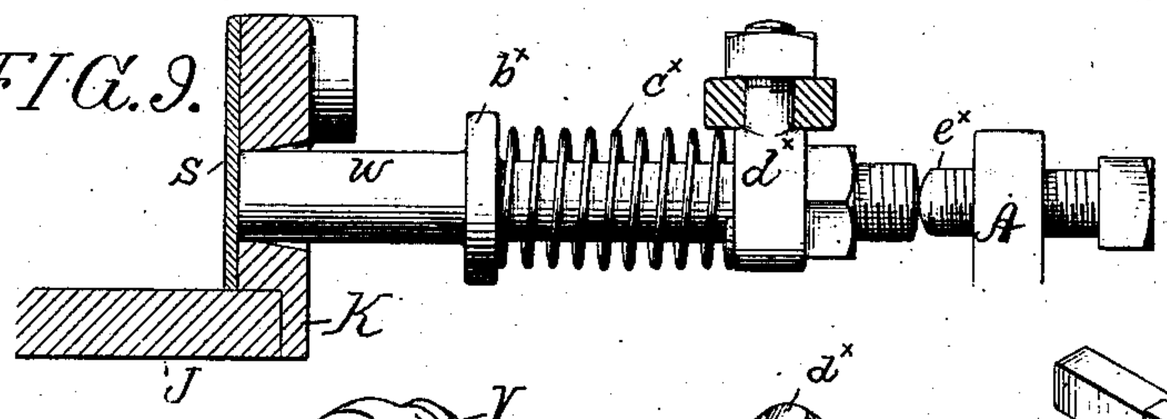


FIG. 8.

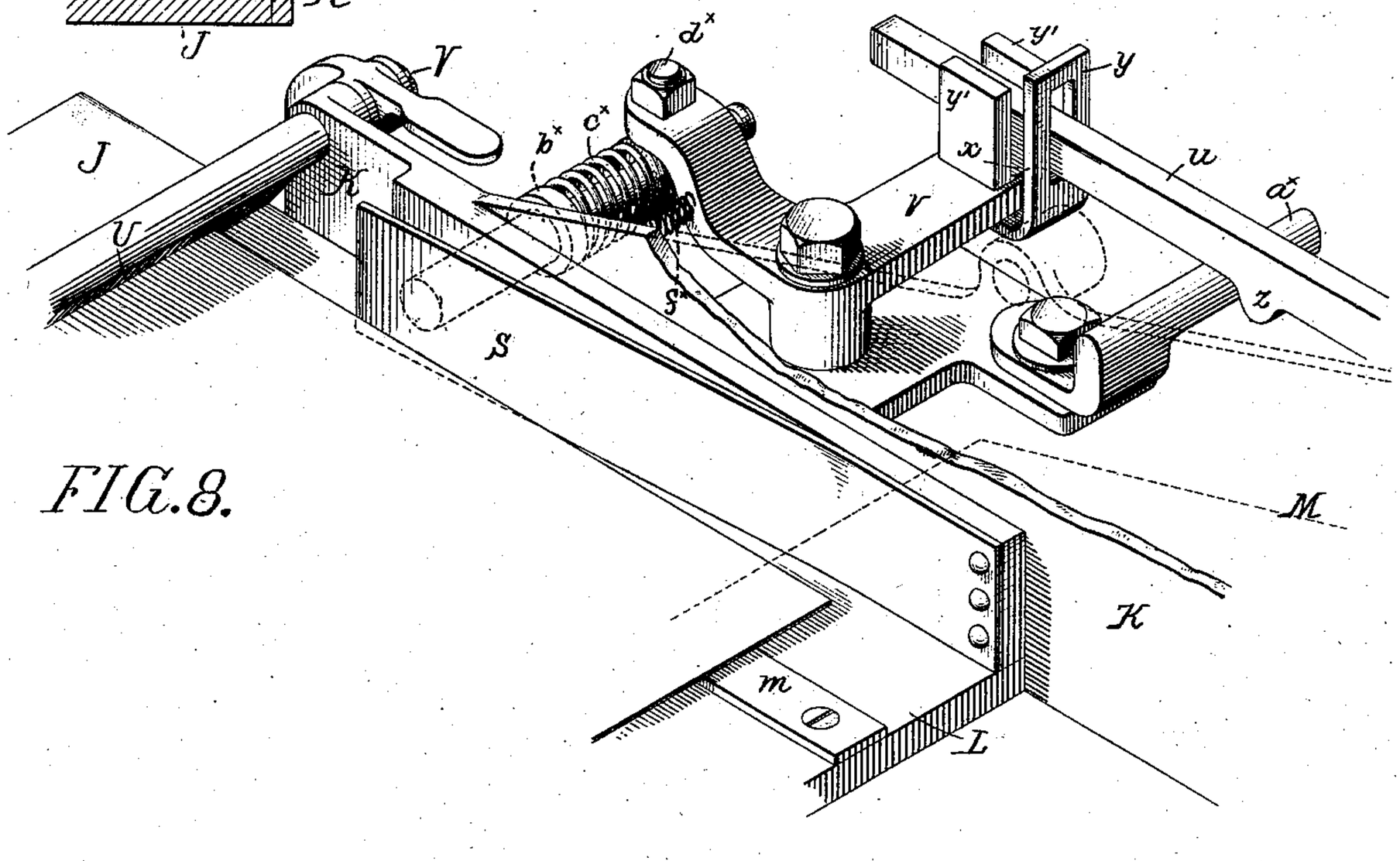


FIG. 10.

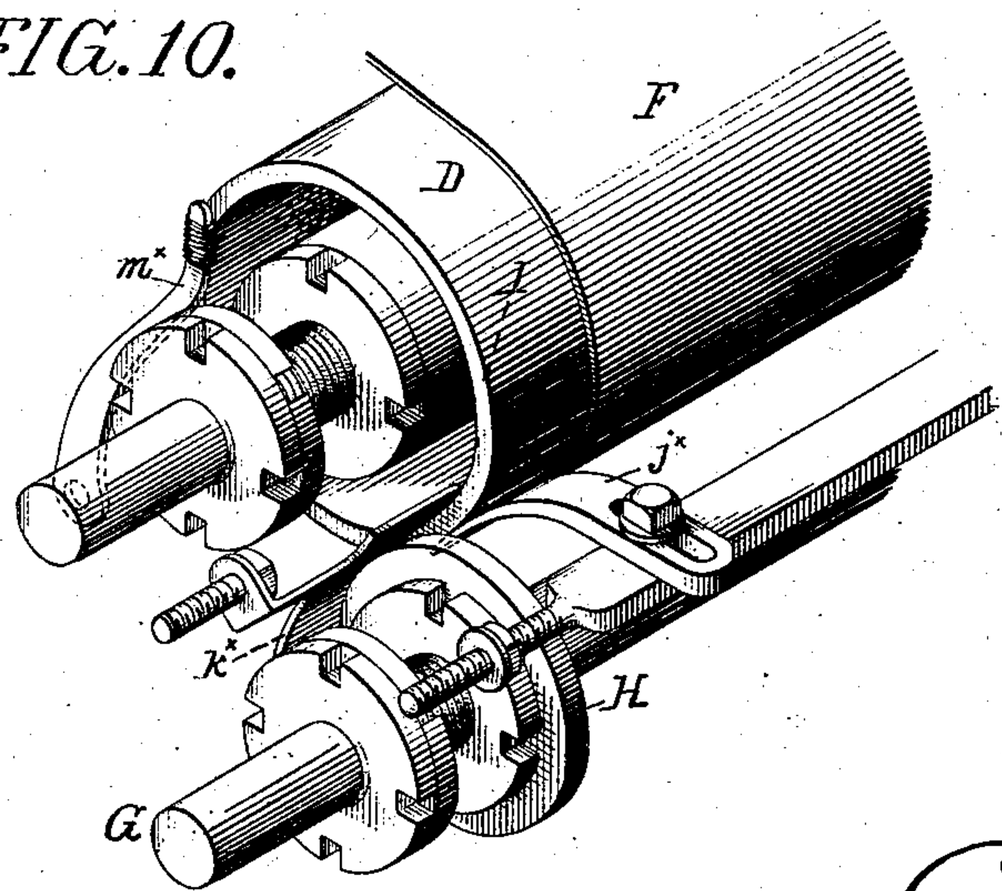
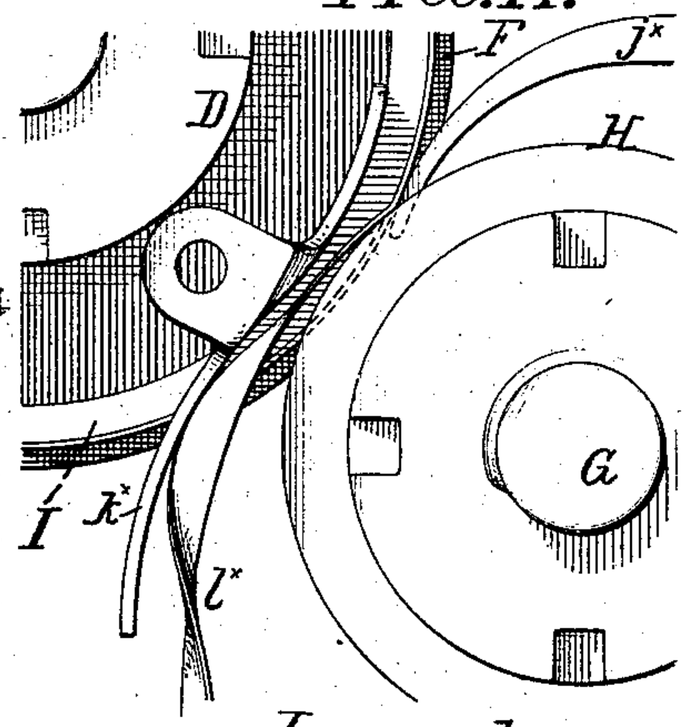


FIG. 11.



Witnesses,
John K. Rupertus.
John D. Clyde

Inventor,
George H. Perkins
By, O. C. Strawbridge
J. Bonsall Taylor
Associate Attorneys

UNITED STATES PATENT OFFICE.

GEORGE H. PERKINS, OF PHILADELPHIA, PENNSYLVANIA.

MACHINE FOR SHEARING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 260,779, dated July 11, 1882.

Application filed October 23, 1877.

To all whom it may concern:

Be it known that I, GEORGE H. PERKINS, of the city and county of Philadelphia, in the State of Pennsylvania, have invented an Improvement in Machines for Cutting, Shearing, or Trimming Sheet Metal, of which the following is a specification.

This invention is an improvement upon the apparatus for cutting or shearing sheet metal which was invented by me and patented to me, as assignor to Le Comte & Perkins Manufacturing Company, (limited,) in and by Letters Patent No. 194,168, dated August 14, 1877. To the above-named Letters Patent reference is to be made for a thorough understanding of my present improvements, as the latter relate to and are connected with the principal instrumentalities of my former invention.

My invention relates to a class of devices which are employed to trim the edges of sheets of tinned iron and other sheet metal, and in which the trimming is accomplished in a right line, an edge strip being cut from the sheet in order to reduce its width or length, according to the position in which it is introduced into the machine.

My present invention embraces means for more accurately feeding or supplying the sheets to the cutting mechanism, for controlling and guiding the metal in such introduction, for preventing its displacement from rectilinear position upon the feeding-chute, as well as for preventing the buckling of the sheet upon the chute. It also embraces improved means for disengaging the cut strip or scrap from the operative parts of the machine and for guiding it to the scrap-heap.

In my former patented apparatus the principle of operation of trimming the sheet of metal is carried into effect by means of certain combined instrumentalities, which may be briefly stated to consist of an endless belt or carrying-apron which is caused to travel against and around a rotating bending-drum provided with a circular cutting-edge operating in connection with another circular cutter upon a drum or shaft contiguous to the bending-drum, the apron being held taut against the drum which it semi-encircles by means of tightening-rolls; and, also, of a feeding-chute whose feeding extremity is disposed in such relation to the drum over which the apron is bent that sheets of metal fed upon the chute descend upon the drum beneath the point where the apron first comes into tangential contact therewith, so that the sheet is gripped between them and carried half-way around the drum in such manner that its edge, in the passage, comes between the cutting-edge on the bending-drum and the cutters which co-operate therewith and is cut off, the sheet so cut to the proper width being discharged at the rear of the bending-drum. All of the above members are suitably assembled in a frame-work.

In the accompanying drawings I have represented an apparatus conveniently embodying my improvements.

Figure 1 represents in right-hand side elevation a cutting and shearing apparatus conveniently embodying my improvements. Fig. 2 represents in left-hand side elevation the same apparatus. Fig. 3 is a view similar to Fig. 1, with the exception that the right-hand side frame, or that nearest the eye, and all members of the apparatus exterior to said right-hand side frame are removed, while the main chute and primary chute are represented in central sectional elevation. In this view the apparatus is represented at the moment when a sheet of tin has descended from the primary chute into the main chute and before the pushers have operated to force it through the supplemental gate and into the embrace of the bending-drum and apron. Fig. 4 is a partial detail of certain of the parts represented in Fig. 3, especially illustrative of the operation of the pushers and gates controlling the chutes, the various members of the apparatus being represented at the moment when the pushers have advanced to project the sheet into the embrace of the apron and bending-drum, when the main gate has descended to close the primary chute and the supplemental gate has been elevated by the passage of the sheet. Fig. 5 is a top plan view of the apparatus represented in the previous views, the parts being represented in the positions which they occupy in Figs. 1, 2, and 3. Fig. 6 is a front elevation of my aforesaid apparatus viewed from the left hand of Fig. 1, or viewed from that end of the apparatus at which the feeding is effected. In this view the under side of the primary chute is exposed to view. Fig. 7 is a sectional view, looking down the main chute from the

upper end thereof, section being taken transversely across the chute on the line *a a* of Fig. 3, and the parts being in the position which they occupy in said Fig. 3. In other words, this is a view looking under the main gate and down the bottom of the chute against the supplemental gate. Fig. 8 is a view in perspective, looking down the main chute from above the same and in the direction of the arrow in Fig. 5, representing in detail one of the ways upon the surface of the chute, the spring-plate which controls the adjustment of the sheet thereupon, the supplemental gate, and the contrivances which actuate the spring-plate in its operation upon the sheet. Fig. 9 is a partial sectional and partial elevational detailed view taken lengthwise through the spring-controlled plunger of the spring-plate, representing in section the spring-plate and the right-hand side and bottom of the chute. Fig. 10 is a view in perspective of the bending-drum, shearing-shaft and cutters, hold-down, strip guide-piece, and wiper in their assembled relation; and Fig. 11, a partial detail side elevational view of certain of the same parts, representing the operation of cutting a strip off the edge of the sheet.

Similar letters of reference indicate corresponding parts.

In the accompanying drawings, A represents the side frames of the machine, which are two parallel housings of suitable material suitably erected and united together by connecting cross-bars B or other suitable means. These frames are of semicircular contour and cut out, preferably in V shape, from their upper edge down to an approximately central point, in order to afford a convenient central bearing, C, for the shaft of the bending-drum D, which is placed horizontally between the side frames, as well represented in Figs. 3 and 6.

E E′ E² are apron-rollers, likewise transversely and horizontally journaled between the side frames in such position and relation as to cause the endless apron F, which travels around them, to semi-encircle the bending-drum and be stretched taut against it, as represented in Fig. 3. The two lower apron-rollers are adjustable to impart the requisite tension to the apron, as described in my former patent.

G, Figs. 3, 10, and 11, is the shearing-shaft, or the shaft which carries the circular cutters H, which register against the cutting-edge I of the bending-drum and occasion the shearing of the edge l^{x} of the sheet metal, as represented in Fig. 11. This shaft is similarly transversely set through the frame-work, and is adjustable therein, in order to enable the setting of its cutters in suitable relation to the cutting-edge of the bending-drum. The relative positions and relationship of the bending-drum and the shearing-shaft are well represented in Figs. 3, 10, and 11. J is the main or feeding chute, being an inclined platform erected at an angle of about forty-five degrees between the side frames of the machine, and having its lower or discharging end terminated upon the surface of the bending-drum at a point in advance of the point at which the apron encounters said bending-drum, as represented in Figs. 1, 3, and 4. The chute is provided with sides K, which extend upwardly and backwardly beyond the receiving end L of the floor of the chute proper.

All of the foregoing elements were embodied by me in my former invention, and are described and represented in my Letters Patent referred to. The several devices which, either separately or in combination with the elements just described, constitute the subject-matter of my present invention are those hereinafter described and claimed.

M is a primary chute, erected between the sides of the main chute at a point above the receiving end of the latter. It is designed to afford the first resting-place in the machine for the sheet to be sheared. This primary chute is controlled as to its discharging extremity by a main gate, N, supported transversely between the sides of the chute upon an axial rod, O, which is actuated either to rise and permit the descent by gravity of the sheet onto the main chute, as represented in Fig. 3, or else to block the discharging end of the primary chute and retain the sheet thereupon by means of a rocking lever, P, linked by a link, Q, to a crank, R, affixed to the axial rod of the gate, (as best represented in Fig. 2,) and taking its vibratory movement from a cam, S, upon the shaft of the apron-roller E². This last-named cam is so timed as to operate the main gate intermittingly, whereof hereinafter. The return of the main gate is effected by means of a coil-spring, T, operating upon the rocking lever above its fulcrum, as shown in Fig. 2.

U is a supplemental gate, Figs. 1, 2, 3, 4, 5, 7, and 8, pivoted transversely across the main chute near the lower end thereof, its pivotal rod V being set in the lower extremity of the sides of the main chute. This gate is of such shape and dimensions as to block the discharging extremity of the main chute. The opening of this gate is effected by the descent of the sheet of tin under influence of the pushers, whereof hereinafter, its normal position being that represented in Fig. 3, or shut, and it being retained in its shut position through the instrumentality of the cam W upon the shaft of the apron-roller E², which is so set and timed as at predetermined intervals to bear against the lower extremity of a locking-lever, X, which is connected by means of the link Y with the gate-crank Z, as clearly represented in Fig. 3. This contrivance last described is designed to guard against the accidental discharge from the main chute of the sheet of metal should the latter in its descent against the supplemental gate overcome the counteracting tension of the spring *a*, Fig. 3, which controls the locking-lever X above its fulcrum

and tends to retain the supplemental gate shut or closed down upon the chute.

The cam W is of course so timed as to move out of locking engagement with the roller-equipped lower extremity of the locking-lever X before the pushers hereinafter described operate to force the sheet of tin against and under the supplemental gate and into the embrace of the apron and bending-drum, no instrumentality opposing the lift of the gate after the movement of the cam W out of engagement with the locking-lever, except the spring *a*, referred to, and the latter being of such tension as to yield and permit the deflection of the locking-lever and the consequent lift of the supplemental gate.

b are what are termed "pushers," one, two, or more of which may be employed, preferably, however, two. The office of these pushers is to push the sheet of tin, after its descent from the primary chute upon the main chute, down through the supplemental gate and into the embrace of the apron and bending-drum. A convenient construction of these pushers is that represented in Figs. 3, 4, and 6. In brief, they consist each of a finger, *c*, an adjustable jaw, *d*, which has an endwise adjustability with respect to the finger, and of a guard or cover, *e*, likewise adjustable, if desired. The two fingers represented in the drawings are of similar construction.

f is a rock-shaft, Figs. 1, 2, 3, 5, and 6, transversely journaled between two parallel upwardly-extending standards, *g*, erected from and being a part of the side frames. Between these standards, and keyed upon the rock-shaft, are a pair of arms, *h*, to the upper extremities of which the rear extremities of the pushers are pivoted.

It will be comprehended that upon the rocking of the rock-shaft these arms will be rocked or vibrated and the pushers caused to travel continuously up and down the main chute—that is to say, from the position which they occupy in Fig. 3 to that which they occupy in Fig. 4, and then in the reverse direction.

Oscillation is imparted to the rock-shaft through the instrumentality of the rock-shaft lever *i*, Figs. 1, 2, 5, and 6, which is fulcrumed to the frame-work in such position as to be subject as to its lower extremity to the influence of a cam, *j*, upon the shaft of the apron-roller E^2, and which is connected with a crank, *k*, upon the rock-shaft by means of a link, *l*. This cam *j* is so timed with reference to the other cams in the machine as to cause the descent of the pushers immediately after the main gate has opened and the sheet of tin has descended from the primary onto the main chute.

Extending lengthwise of the floor of the main chute are two or more ways, *m m*, (represented in Figs. 3, 4, 5, 7, and 8,) upon which the sheets of tin descend from the primary chute and rest. The fingers of the pushers travel upon the surface of the main chute adjacent to these ways, as represented in Figs. 3 and 7, and in such manner are enabled unerringly to pass beneath the sheet and insure the contact of the jaws of the pushers therewith.

The lower edge of the main gate is curved or bellied as to its central portion, so that its greatest depth is at the center, as is clearly represented in Fig. 7, the object of which construction is to occasion the curving, doubling, or buckling down of the central portion of the sheet by the gate as the latter closes upon the sheet before the latter is forced down the main chute by the advance of the pushers. The fact that the sheet rests upon the ways of the chute above the surface of its floor enables the curved gate to effect this buckling action, which is of service in stiffening the sheet and enabling it to withstand the pushing action. The main gate is vertically slotted at either extremity, as at *n*, Fig. 7, to enable the passage of the pushers through the main gate when closed and also enable their return. This slotted construction of the main gate is of course essential to the operation of the pushers, as it would be manifestly impossible otherwise for the pushers to act upon the sheet of metal while the main gate held it down in a buckled condition, owing to the fact that the gate would block their pathway.

The lower edge of the main gate is also provided with a series of feet, *r*, Figs. 3, 4, and 5, which insure the requisite pressure of the gate upon the sheet.

o is a pressure-roller supported upon a swiveled frame, *p*, Figs. 1, 2, 3, 4, and 5, the office of which is to press upon the sheet centrally between the ways upon which it rests at its lower or forward portion in a manner kindred to that in which the curved bottom of the main gate presses upon its upper portion, and thereby to aid said gate in occasioning the buckling of the sheet to stiffen it against the action of the pushers and enable its true direction upon the chute.

The frame *p* is preferably mounted upon the shaft of the apron-roller E, and is controlled to occasion the constant pressure of the roller upon the sheet by the operation of a spring, *q*, connected with the front extremity of the frame on the one hand and the axial rod of the main gate or other fixed support on the other hand.

s is a spring-plate secured to the inner face of the right-hand side of the chute, or that side which is nearest the eye in Fig. 1. This plate, together with the mechanism which actuates it, is represented in detail in Figs. 5, 8, and 9. The object of the contrivance is to occasion the setting over of the sheet upon the main chute against the opposite side of said chute, or that side which is nearest the eye in Fig. 2. In Fig. 8 is very clearly represented the operation of the spring-plate which accomplishes this result. The plate itself is secured at one extremity to the side of the chute, and it is op-

erated by the following devices: Erected from the rock-shaft *f* is a crank-arm, *t*, Figs. 1, 2, 5, and 6, which is vibrated with the rock-shaft as the latter is caused to rock by its lever *i* under the influence of the cam *j*, as explained. The forward throw of this crank-arm occasions the downward and forward movement of the projector-arm *u*, the office of which is to deflect the bell-crank *v*, which operates the spring-plunger *w*, which in turn operates the spring-plate *s*. (Best represented in Figs. 5 and 8.) The forward extremity of the projector-arm is provided with a shoulder, *x*, which is adapted in the forward thrust of said arm to encounter or engage against a cross-arm, y^2, (shown in dotted lines in Fig. 1,) connecting two vertical standards, *y' y'*, forming part of the swiveled keeper *y*, upon the laterally-projecting arm of the bell-crank, so that in the downward movement of the projector-arm the bell-crank is deflected in such manner as to force inward against the spring-plate the spring-plunger *w*.

z is a lifting stud on the under surface of the projector-arm at a point above the shoulder *x*, which is adapted to encounter a fixed rest, $a^\times$, Figs. 1 and 8, connected with the chute, whereby the projector-arm is lifted and its shoulder *x* raised out of engagement with the swiveled keeper on the bell-crank, so that the further throw of the crank-arm *t* is without effect upon the bell-crank. Upon the return of the projector-arm its shoulder *x* re-engages, by gravity, with the swiveled keeper, in readiness to effect the second movement of the spring plate upon the next actuation of the parts.

In practice the shoulder *x* upon the projector-arm may engage direct with the laterally-projecting arm of the bell-crank, instead of with any part of the swiveled keeper, whereby strains upon the pivot of the latter are avoided, and its office becomes strictly that of a guard or keeper.

The plunger *w* is provided with a collar, $b^\times$, and is surrounded by a spiral spring, $c^\times$, abutting between the collar and the depending sleeve $d^\times$, which is connected with or a part of the downwardly-projecting arm of the bell-crank, through the medium of which the plunger is thrown in against the spring-plate. The intent of this construction is to enable the plunger to be thrown in by the bell-crank, which operates upon the plunger through the resistance of the spring between the shoulder and sleeve, said resistance being sufficient to insure the movement of the spring-plate to such extent as will cause the placing of the sheet properly against the opposite side of the chute. After the plate has been forced over the further movement of the bell-crank is without influence upon the plunger, for the reason that such further forward movement simply compresses the spiral spring without moving the plunger, which is prevented from a further forward movement by the resistance of the sheet of tin against the spring-plate.

$e^\times$ is a stop-bolt, Figs. 5 and 9, screwing through a portion of the side frame of the machine and operating to limit the return-throw of the plunger after its forward throw by the bell-crank. The return-throw is occasioned by the combined operation of the spring-plate *s*, acting to return to a position parallel to the side of the chute to which it is attached, and of a compressed spiral, $f^\times$, abutted between the outer surface of the side of the chute and the side of the downwardly-projecting arm of the bell-crank. The return of the crank-arm *t* is occasioned by the expansion of the spring $g^\times$, Figs. 1, 2, 5, and 6, which encircles the spring-rod $h^\times$, pivoted to the frame, and abuts between a collar on said rod and a swiveled stirrup or the like on the crank-arm *t*. The above return is also aided by the contraction of the spring $i^\times$, linked between a fixed cross-bar or other member of the frame-work and a set-screw on the rock-shaft arm, as well represented in Fig. 3.

$j^\times$ is a hold-down or curved pressing-arm affixed in such relation to the bending-drum as to be in contact therewith at a point in proximity to its cutting-edge, and suitably supported from a cross-bar in the frame-work or kindred contrivance. Its office is to hold the tin which is bent around the bending-drum tightly against the latter immediately abreast the point at which the circular cutter of the shearing-shaft operates in combination with the cutting-edge of the drum. It further operates to prevent the sidewise movement of the apron, and thus prevents the possibility of the edge of the apron being cut by the cutters.

$k^\times$ is a guide-piece applied in such relation to the cutting mechanism as to guide the cut strip or edge of metal $l^\times$ out of contact with the endless apron and clear of the machine. The guide-piece is well represented in Figs. 3, 10, and 11. In Fig. 11 the operation of cutting is clearly depicted, as is also the action of the hold-down and guide-piece.

$m^\times$ is a wiper, Figs. 3 and 10, arranged in such relation to the cutting-edge of the bending-drum as to insure the wiping of said edge free from the slivers of tin made by the cutting devices.

Having thus described my invention, I claim—

1. In an apparatus for trimming sheet metal, in combination with shearing mechanism adapted to cut a sheet of sheet metal to a uniform width, a chute provided with two gates, one in advance of the other, and designed respectively to control the introduction of the sheet upon the chute and its introduction to the shearing mechanism.

2. In a machine for trimming sheet metal, in combination with a main chute provided with raised ways upon which a sheet of metal is fed and travels, a main gate the lower edge of which is curved so as to adapt it, in combination with the raised ways upon the chute, to buckle the sheet of tin, as and for the purpose specified.

3. In a machine for trimming sheet metal, in combination with a chute provided with raised ways upon which a sheet of tin is fed and travels, a pressure-roller adapted to bear between said ways and curve or buckle the sheet, as and for the purpose specified.

4. In combination, a bending-drum provided with a cutting-edge, an endless apron traveling over said drum, the side of which apron is in proximity to the cutting-edge, a shearing-shaft provided with a cutter adapted to register against said cutting-edge, and a hold-down or kindred contrivance which both holds a sheet of metal bent between the drum and apron closely against the surface of the drum and prevents the sidewise movement of the apron against the cutter, substantially as set forth.

5. In a machine for trimming sheet metal, in combination with a main chute adapted to receive a sheet of metal to be trimmed, and provided with pushers suitably operated to advance said sheet into contact with shearing mechanism, a spring-plate applied to one side of said chute, and the plunger, bell-crank, projector-arm, and means for actuating said arm, whereby the spring-plate is operated synchronously with the pushers, so as to cause the setting over of the sheet true against the opposite side of the chute synchronously with its advance.

6. In a machine for trimming sheet metal, in combination with mechanism for trimming the edge of a sheet of tin or kindred sheet metal, a primary chute adapted to receive the sheet to be trimmed, a gate for alternately closing said primary chute and opening it to permit of the escape, by gravity, of the sheet placed thereupon, a main chute so relatively placed with respect to the primary chute as to receive the sheet which descends by gravity from the latter, a supplemental gate controlling the main chute, pushers or equivalent means for forcing the sheet of tin down the main chute upon which it has been arrested by the supplemental gate, and into the shearing devices, and means for suitably operating the trimming mechanism, the main gate, and the pushers, substantially as set forth.

7. In a machine for trimming sheet metal, in combination with a chute upon which the sheet to be trimmed is finally delivered, and from whence it is fed to the shearing mechanism, pushers adapted at predetermined intervals and by suitable means to force the sheet down the chute, a spring-controlled arresting-gate, and means for locking said arresting-gate against the weight of the sheet to be trimmed as the latter descends upon the chute and prior to the time at which the pushers act to force it down the chute.

8. In a machine for trimming sheet metal, as a composite device for operating the spring-plate which adjusts the position of the sheet to be trimmed laterally upon the chute, the spring-controlled plunger, bell-crank, projector-arm, and means for actuating said arm.

9. In a machine for trimming sheet metal, in combination with a spring-plate which adjusts the position of the sheet upon the chute, the plunger, the bell-crank connected therewith, and the plunger-encircling spiral spring, whereby the plunger is adapted to transmit the throw of the bell-crank to the spring-plate until the latter is stopped by the setting up of the sheet against the opposite side of the chute, after which any further movement of the bell-crank is without influence upon the spring-plate by reason of the compression of the spring, substantially as set forth.

10. In a machine for trimming sheet metal, as a device for pushing the sheet down the chute and into the shearing mechanism, the pushers hereinbefore described, consisting of longitudinally-extending fingers, in combination with adjustable jaws.

11. In a machine for trimming sheet metal, in combination with the main gate, feet applied to the base thereof, as and for the purpose specified.

GEORGE H. PERKINS.

Witnesses:
JOHN A. WIEDERSHEIM,
H. E. HINDMARSH.