No. 713,885. Patented Nov. 18, 1902.

A. W. HOWE.

FEED MECHANISM FOR PLATES OR STRIPS.

(Application filed Dec. 23, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

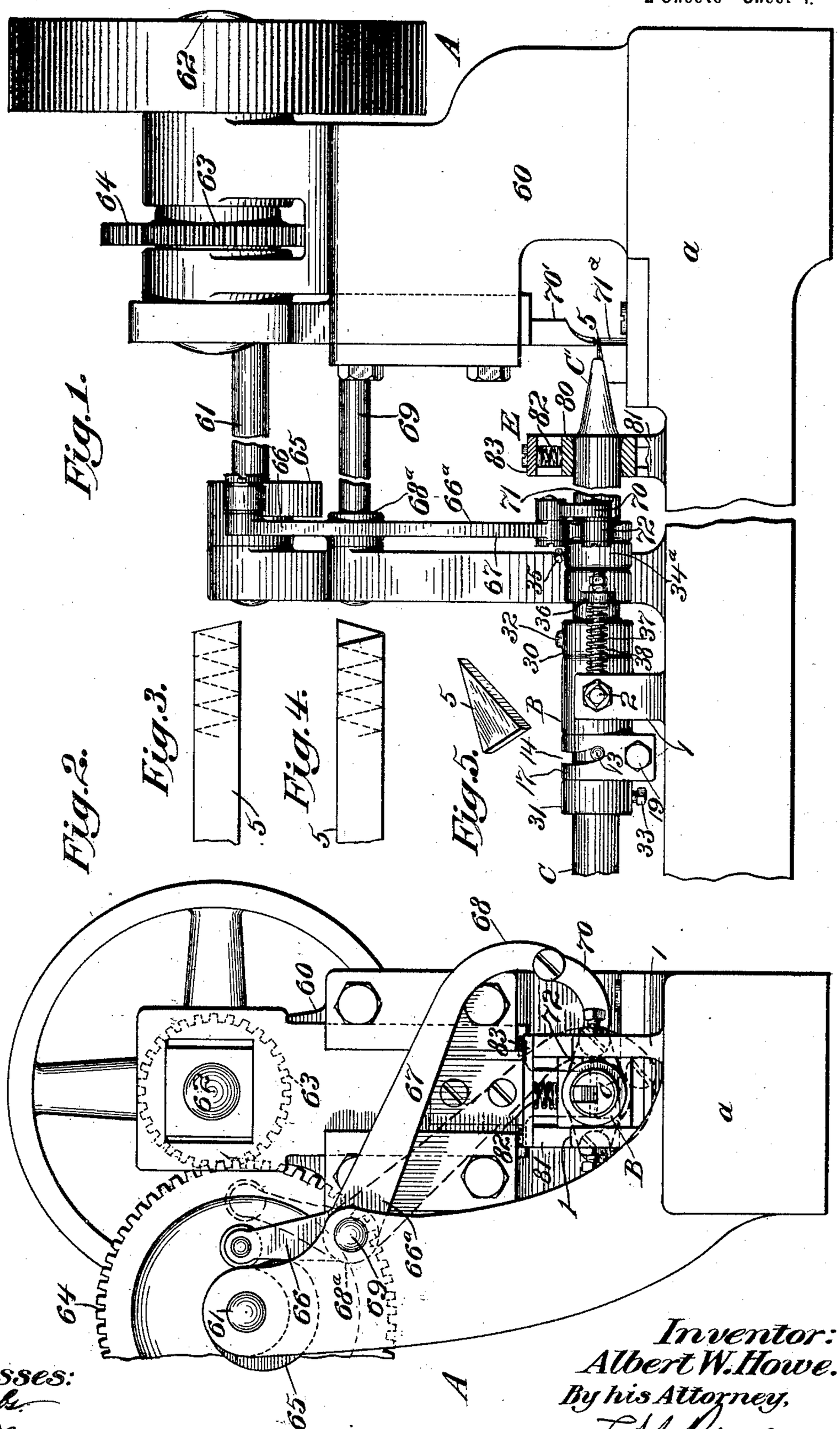

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Witnesses:
N. Jacobs.
F. E. Maynard.

Inventor:
Albert W. Howe.
By his Attorney,
F. A. Richards.

No. 713,885. Patented Nov. 18, 1902.

A. W. HOWE.

FEED MECHANISM FOR PLATES OR STRIPS.

(Application filed Dec. 23, 1901.)

(No Model.) 2 Sheets—Sheet 2.

Witnesses:
N. Jacobs.
F. E. Maynard

Inventor:
Albert W. Howe.
By his Attorney.
F. W. Richards.

UNITED STATES PATENT OFFICE.

ALBERT W. HOWE, OF DERBY, CONNECTICUT, ASSIGNOR OF ONE-HALF TO SHELTON COMPANY, OF SHELTON, CONNECTICUT.

FEED MECHANISM FOR PLATES OR STRIPS.

SPECIFICATION forming part of Letters Patent No. 713,885, dated November 18, 1902.

Application filed December 23, 1901. Serial No. 86,907. (No model.)

To all whom it may concern:

Be it known that I, ALBERT W. HOWE, a citizen of the United States, residing in Derby, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Feed Mechanism for Plates or Strips, of which the following is a specification.

This invention relates to feed mechanism for plates or strips; and it consists substantially in the improvements hereinafter more particularly described.

The invention is applicable to different purposes in the arts, but is intended more especially as a feed for plates or strips from which blanks are cut for subsequent shaping into nails or tacks, such being the adaptation preferably selected for the purpose of the present specification.

The invention may also be said to comprehend or include a cutting device for the blank, since the feed mechanism proper is partly dependent for its action upon the coöperative relation which the said cutting device bears to the plates or strips acted upon. The severed blanks are substantially triangular in shape, and in order that they may be cut off on the proper line or angles certain means are employed for turning the plates or strips to alternately present opposite sides thereof to the action of the cutting device, since in this way the severance of the blanks may be effected by means of a directly-operating reciprocatory knife, the position of the cutting edge of which does not require to be altered or changed in the operation thereof.

The particular embodiment of the invention herein shown has numerous and special advantages in the art of nail and tack making and will be more fully understood hereinafter when taken in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of the improved feed mechanism coöperatively arranged or disposed in connection with an ordinary cutting device and operating mechanism therefor. Fig. 2 is a side view indicating more clearly a suitable connection for imparting to the feed mechanism proper an oscillatory motion about the longer axis thereof. Fig. 3 is a detail view showing one side of one of the plates or strips from which the blanks are cut, the dotted lines indicating the angle of severance of the blanks. Fig. 4 is a similar view showing the opposite side of the plate or strip to that shown in the preceding figure. Fig. 5 is a perspective view of one of the severed blanks from which a nail or tack is formed at a subsequent operation in a special machine for the purpose. Fig. 6 is an enlarged top plan view of the nose-piece (broken off) of the forward end of the guide for the metal plates or strips as they are fed to the knife or cutting device. Fig. 7 is a longitudinal sectional view of Fig. 6. Fig. 8 is an enlarged top plan view, partly in section and broken off at the ends, of the improved feed mechanism proper. Fig. 9 is a longitudinal sectional view of Fig. 8, parts being also shown in elevation; and Fig. 10 is a cross-section of Fig. 9 on the line $x\,x$, and Fig. 10^a is a detail view of the auxiliary devices for preventing back movement of the plates or strips. Fig. 11 is a part-sectional detail side elevation of a portion of Fig. 8, showing the construction and organization of certain parts more clearly.

Before proceeding with a more detailed description it may be stated that in carrying the invention into effect a suitable non-rotatable bearing is provided in which is held or supported a tubular body which contains several sets of devices for feeding the plates or strips forwardly to the cutting device, as well as other sets of devices by which the plates or strips are prevented from slipping backward in the guide therefor during the feeding operation. The said tubular body is prevented from lateral movement with respect to said bearing; but the two together have a limited reciprocating movement longitudinally, which allows these parts to move rearwardly and forwardly in the manner and for the purpose hereinafter more specifically explained. The tubular body in part also constitutes a hopper for containing a pile of the plates or strips to be acted upon, and said plates or strips are successively moved from the bottom of the pile and fed forwardly step by step with respect to said tubular body, as will appear. As one plate or strip is moved forwardly beyond the action of the directly-operating feed devices within the tube it is

continued to be urged along by abutment of the end of the next succeeding plate or strip, and so on, so that the feeding operation is effected in a perfectly continuous manner and with but a comparatively limited range of movement of the several sets of said feed devices. Said tubular body together with its outside appurtenances and inner or contained devices are all partially rotated in opposite directions or oscillated about the longer axis of the tube to the extent of about one-half revolution, and during the first half (ninety degrees) of such movement in each direction the directly-operating feed devices are retracted within the tube, while during the remaining half (ninety degrees) of the movement the said devices are urged forwardly in the tube, the plates or strips acted upon being moved forwardly therewith a corresponding distance. The cutting device for the blanks may comprise a stationary or bed knife and a movable or reciprocating knife coöperating therewith, the said movable knife also coöperating with the ends of the plates or strips acted upon, as hereinafter specifically explained, by which to effect the desired action of the mechanism to carry the projecting portions of the plates successively beneath the movable knife. The stationary or bed knife also coöperates with the forward end of the guide for the plates or strips in such manner as to cause this end of the mechanism to rise and fall as the plates or strips are turned during the oscillating movements of the tubular body, attention being called to the fact that the nose-piece is supported by the said stationary or bed knife both during the shifting or turning movements thereof and the cutting of the blanks. Any suitable means may be employed to impart the desired oscillatory motion to the tubular body; but preferably this is effected by devices actuated by the mechanism which drives the movable or reciprocating knife, which mechanism may also be of any simple or preferred character.

Specific reference being had to the drawings, 1 1 represent suitable posts or standards rigidly secured upon the bed or base-plate *a* of an ordinary press or cutting-machine A, each of said posts having a set-screw 2, working through the same and provided with a jam-nut 3. Located between said posts and held or supported by the said set-screws is a tubular bearing B, having at the sides longitudinal slots in which are located the guide-plates 4 4, into which the ends of the set-screws pass and by which means the said tubular bearing B is prevented from rotation, while permitted to have a limited longitudinal or endwise movement between said posts. This construction has been adopted on account of its simplicity and effectiveness, but it is evident that I am not limited thereto in practice. Mounted in the said bearing B is a tube C of proper length, the same being provided at the inner or forward end thereof with a flattened nose-piece C′, formed with a central longitudinal slot or opening *d* for the passage therethrough of the plates or strips 5 as they are fed along by the action of the directly-acting feed devices hereinafter described. The said nose-piece is formed with an enlarged portion or plug *f*, which snugly fits the end of the tube C, and a screw *g* passes through the side of the tube and enters the plug to prevent movement of said nose-piece with respect to said tube. The plug *f* is provided with an enlarged central opening in which fits the enlarged end *h* of a guide *i* for the plates or strips 5 as they are fed forwardly in the tube, the said guide being formed with a longitudinal opening *j*, coinciding with the opening *d* in the nose-piece for the proper passage of the said plates or strips 5. At its inner end or extremity the said guide *i* is enlarged to form a block *k*, which snugly fits the interior of the tube and which is also prevented from relative longitudinal or rotary movements by means of the said screw *g*. The opening *j* of the guide *i* is continued at *i′* through the said block, and the block is also formed transversely with slots or openings *l l*, which extend vertically or from the upper to the lower surfaces of the block. The said openings are separated by an intermediate wall or partition *l′*, the height or vertical diameter of which is somewhat less than the inner diameter of the tube, so as to provide spaces for the accommodation of the heads of screws l^2, by which suitable pairs of flat springs 6 6 are fastened to the upper and lower sides of the said wall or partition *l′*, as shown in Fig. 9. The free ends of the said springs extend partly across the said openings *l l*, and they exert a pressure upon the edges or peripheries of pairs of disks or rolls *m m*, which constitute gripping devices for the plates or strips 5, which pass between them. The said disks or rolls are each mounted eccentrically at 7 between the opposite sides of the openings *l l*, and one of the functions thereof is to prevent backward movement or slipping of the plates or strips 5, since if the forward movement of said plates or strips is impeded in any way or if a contrary force is brought to bear thereon said disks or rolls are immediately swung on their axes and caused to bind thereon in an obvious manner. The said gripping devices may be variously constructed without departing from the spirit of the invention, and, as hereinafter fully set forth, these devices also constitute a resistance by means of which is derived the power for successively urging the entire mechanism forwardly to introduce the projecting portions of the plates or strips the proper distance between the knives of the cutting device, also to be described.

Located within the tube C to the rear of the block *k* is a block *n*, having a limited longitudinal movement with respect to said tube and which movable or sliding block *n* is formed or provided with an opening *n′*, communicating with opening *i′* for the uninterrupted

passage of the plates or strips 5. Said block *n* is also constructed with slots or openings *o o*, extending from the upper to the lower surfaces of the block, and said openings are separated by an intermediate wall or partition *o'*, the height or vertical diameter of which is somewhat less than the inner diameter of the tube, so as to provide spaces for the accommodation of suitable pairs of flat springs 8 8 and the screws or other fastenings 9 9, by which said springs are secured to the upper and lower sides of the said intervening wall or partition *o'*. In like manner as the springs 6 6 the free ends of the springs 8 8 extend partly across the openings *o o*, and they exert a pressure upon the edges or peripheries of pairs of disks *p p*, which are mounted eccentrically at points 10, between opposite sides of said openings *o o*. In stationary positions of block *n* within the tube C these latterly-described disks or rolls and their springs will of course serve in like manner as the gripping devices already described to prevent backward movement or slipping of the plates or strips; but inasmuch as said block *n* is constantly reciprocated within the tube, as will be described, the said latterly-described devices are changed or converted into feeders for the plates or strips, since on the backward (to the right, Fig. 9) movements of the block the disks or rolls *p p* are caused to swing or turn forwardly on their axes, thus freely passing over the surfaces of the said plates or strips, whereas on the forward (to the left, Fig. 9) movements of said block the said disks or rolls are caused to swing or turn in the reverse direction or rearwardly, and thus are the plates or strips grasped thereby and carried forwardly the extent of the forward movement of said block. The movable or reciprocating block *n* is formed or provided with a rearward extension n^4 of about one-half the vertical diameter of said block, the upper surface of said extended portion being preferably flat and constituting a bed-plate upon which are arranged or disposed the primary or initial feed devices presently to be described. Any suitable means may be employed for reciprocating the block *n* within the tube, and in order to guide the movements thereof the said block is provided with a lug or pin 11 (see dotted lines, Fig. 9) at one side, which works back and forth in a longitudinal slot 12, (see also dotted lines, Fig. 9,) formed in the corresponding side of the tube C. The said lug or pin 11 projects through the slot beyond the side of the tube and is provided with a roller 13, (see Fig. 8,) working in a cam-slot 14, formed by the two working surfaces 15 and 16 of a cam device 17, secured to a projection 18 on the bearing B by means of a bolt 19. (See Fig. 9.) The said cam device constitutes a convenient means for operating the block *n*, and it is evident that as the tube C is oscillated or partially rotated within the bearing B the roller 13 will be acted upon by the opposite surfaces or sides of the cam-slot 14 in such manner as to move the block *n* back and forth the extent permitted by the pitch of said surfaces or sides. The primary or initial feed devices hereinbefore referred to may be constructed and arranged in different ways; but preferably they consist in part of two frame pieces or guides 20, fastened by means of screws 21 or other devices to the upper surface of the extension n^4 of the movable block *n*, said frame pieces or guides being separated a suitable distance to permit passage of the plates or strips 5 between them. The said frame pieces or guides are formed in their opposite edges with wedge-shaped notches or recesses 22, the longer sides of which are beveled or undercut at 23, (see dotted lines, Fig. 8,) and working in said recesses are the wedges 24, the outer edges of which are inclined forwardly and outwardly and are beveled correspondingly to the beveled edges of the said notches or recesses 22, while the inner or adjacent edges of said wedges are straight, so as to take hold of the edges of the plates or strips 5 on the forward movements of the block *n*, and thus urge or feed said plates or strips forwardly of the tube. The construction of frame pieces or guides 20 is precisely the same as that of similar devices hereinafter referred to and shown very clearly in the detail view, Fig. 10ª. On the opposite or backward movements of the block *n* the wedges bear but lightly against the plates or strips, as is evident from the construction and arrangement shown. The said wedges are preferably notched at 25, by which to lessen as much as possible frictional contact thereof with the plates or strips on the backward movements of the block *n*, while still retaining ample gripping-surface to feed the strips on the forward movements of said block. The wedges are held to their work by means of a spring 26, extending between the frame pieces or guides 20, at the wider or forward ends of the wedges, said spring being sunken or recessed in the upper edge of its central portion to permit the plates or strips 5 to sink down between the wedges to be properly fed thereby. This notched construction of said spring 26 will be more fully understood hereinafter from the reference which is made to a like construction shown in detail in Fig. 10ª. Suitable means are to be described by which the tube C is oscillated or turned back and forth upon its longer axis in an arc of about one hundred and eighty degrees, or one-half revolution, and it will be observed that the working surfaces 15 and 16 of the cam-groove 14 are so curved or constructed that for one half (ninety degrees) of this movement in each direction the pin 11 will be so acted upon as to move the block *n* backwardly its full limit, while for the remaining half of the movement the said block will be moved forwardly in a similar manner. As is under-

stood, the plates or strips 5 are fed forwardly a predetermined distance on each forward movement of said block.

In order to prevent endwise or lateral movement of the tube C with respect to the bearing B, collars 30 and 31 are secured to the tube by means of screws 32 and 33, and also arranged upon the tube beyond said collar 30 is a yoke 34, which is held in position by means of another collar 34ª, having a fastening-screw 35 bearing upon the tube. The arms 36 36 of said yoke are each provided with an opening through which passes a rod 37, and the rearward ends of said rods are secured in the adjacent sides of the posts or standards 1 1 in any suitable manner—as, for instance, by screwing therein. Located upon the rods and bearing between said posts or standards and the yoke-arms are the buffer-springs 38 38, and fitting upon the forward ends of said rods are the nuts 39 39 for moving up the yoke and adjusting or regulating the tension of the springs and lock-nuts 40 40. From the construction and arrangement of parts explained it is evident that any force tending to move the mechanism backwardly upon the guide-plates 4 4 will cause the said buffer-springs to be compressed between their bearings, whereupon when such force is removed the said springs will again expand, and thus carry the mechanism forwardly to its former position. Located in the bottom of the said tube C and secured therein by means of a screw 41 or otherwise is a stationary block 42 of about equal height or vertical diameter with the extension n' of movable block n, and arranged upon the upper surface of said stationary block in successive order are two or more sets of stops or devices which are for the purpose of gripping the sides of the plates or strips 5 on any tendency to back movement of the latter. Said stops or gripping devices serve as an aid or auxiliary to the gripping devices located in advance of block n, and they are preferably constructed substantially the same as the primary or initial feed devices already referred to, although it is evident, of course, that they may be constructed in any other suitable manner. The use of these said auxiliary devices is not absolutely essential to the working of the feed mechanism; but they are preferred as a safeguard against any possible tendency to rearward or backward slipping of the said plates or strips. In some instances also a single set only may be employed, according to the requirements of the case, and, indeed, in further instances they may be dispensed with altogether. Each set of said devices comprises two frame-pieces or guides 43, secured to the block 42 in any suitable manner, as by screws 44, said frame-pieces being separated a suitable distance for the passage between them of the plates or strips 5 and each being formed in its inner edge with a wedge-shaped notch or recess 45, the longer side of which is beveled or undercut. (See dotted lines, Fig. 8.) Working in said recesses are the wedges 46, the outer edges of which are beveled to fit the beveled edges of the recesses, while the inner edges of said wedges are straight or parallel with the edges of the said plates or strips 5. Said wedges are constructed substantially the same as the wedges 24, and they are also held to their work by springs 45′ in Fig. 10ª, which latter are the same in construction as the spring 26, already described, in that both are notched, as at 24ª, Fig. 10ª, to permit the plates or strips to sink between the wedges which coöperate therewith. In virtue of the fact that the block 42 is stationary with respect to the tube the action of the wedges 46 is the reverse of the wedges 24, and therefore said wedges 46 will firmly grip the plates or strips between them on any tendency to backward movement thereof. The rearward portion of the said tube C above the said movable and stationary blocks n and 42 constitutes a hopper or reservoir D, in which is placed a pile of plates or strips 5 to be acted upon, (see Fig. 9,) and located at the forward end of said hopper is a stop or gage 50, which is secured to the collar 31 by means of a rivet 51 or otherwise, said gage preserving the proper position of the plates or strips within the hopper and comprising, preferably, though not essentially, a strip of metal bent downwardly and forwardly substantially at right angles, with the lower part 52 thereof sufficiently elevated above the initial or primary feed devices to permit the passage of the said plates or strips to and through said feed devices. The forward ends of the plates or strips 5 abut the vertical straight portion 53 of the said gage or stop, as shown, while exerting a downward pressure upon the pile of plates or strips is a suitable pressure device, which in the present instance consists of a flat spring 54, which is riveted at 55 to a collar 56 and which in turn is secured to the tube C by means of a set-screw 57. The hopper or reservoir is formed with an opening 58 in the top thereof, through which the said spring or pressure device works, while the outer or rearward end of the tube may be left open for the insertion or introduction of the pile of plates or strips to be acted upon. It will be understood that the plates or strips are fed forwardly in successive order from the bottom of the pile and that as soon as the rearward end of one plate has passed beyond the vertical side or portion 53 of the gage or stop 50 the next succeeding plate above will be caused to descend into place and be fed forward in a similar manner, and so on with each plate of the pile until the pile is exhausted. It will also be understood that as each plate or strip is passed or urged along beyond the direct action of the feeding devices proper its further forward movement relative to the tube is effected by the abutting end of the following or next succeeding plate or strip, and so on. In this way but a limited movement of the said feeding devices

is all that is required, the extent of which is usually about equal to the width of the blank to be cut.

Any suitable means may be employed for imparting a rotary oscillating motion to the tube C and its appurtenances and contained devices, and said means may be in turn actuated or operated from any suitable source, as from the drive-shaft from which the reciprocating cutter for the blanks is operated. In Figs. 1 and 2 a simple and convenient organization of mechanisms is shown and wherein the base or bed plate *a* of the press or cutting-machine A has mounted thereon a standard 60, in the upper part of which is supported one end of a shaft 61, which receives its motion from the main shaft 62 through the medium of the gear-wheels 63 and 64, carried by said shafts. The said shaft 61 also carries a cam 65, which acts upon a roller held at the end of a shorter member 66 of a movable arm 66^a, the longer member 67 of which extends transversely of the machine and is curved downwardly at the lower end thereof, as shown at 68. Said arm has its working bearing at 68^a upon a fixed rod or shaft 69, suitably supported by the machine, and loosely pivoted at the lower end of said member 67 is a movable link 70, which in turn is loosely pivoted at 71 to the end of a yoke 72, rigidly fastened upon the said tube C. It is apparent that as the shaft 61 is rotated the cam 65 will so act upon the vertically-disposed shorter member of the arm 66^a as to carry both members of said arm to and from the full and dotted line positions indicated in Fig. 2, and consequently the tube will be oscillated a semirevolution in each direction. The reciprocating knife 70′ is so regulated in its actions, of course, as to descend at the proper intervals to cut off or sever the blanks from the said plates or strips. The severance of said blanks is effected by a shearing cut of the reciprocating knife as the projecting ends or portions of the plates or strips rest upon the stationary or bed knife 71^a, which latter is securely fastened to the bed-plate *a* beneath. In the normal position of the mechanism (shown in Figs. 1, 8, and 9) the forwardly-projecting portions of the plates or strips 5 rest flatwise upon the stationary or bed knife, and in order that the opposite sides thereof may be alternately presented to the action of the descending knife the tube must also have a rising-and-falling motion at its forward end in conformity with the changing positions of said plates or strips, which are alternately brought edgewise of the bed-knife in the oscillatory or turning movements of the tube. This rising-and-falling movement of the forward end of the tube, as well as its endwise movements, are so comparatively slight as not to interfere with the operation of the mechanism or devices by which the oscillatory or turning movements thereof are effected, and in order that said forward end of the tube may always be brought into horizontal alinement to properly introduce the ends of the plates or strips beneath the movable knife a suitable yieldable device E is provided for the tube intermediate the operative connections from the main shaft and the cutting device. Said yieldable device may be constructed and operated in different ways, but preferably consists of a vertically-slidable bearing 80, working between guides 81 81 (see Figs. 1 and 2) and acted upon constantly by pressure of a spring 82, confined between the upper edge of said bearing and a cross-piece 83, connecting the upper ends of said guides. The rising movements of the nose-piece or forward end of the tube take place against the tension of said spring, whereas the slidable bearing 80 is assisted to be again lowered in position by the reactionary effect of the spring.

From the foregoing it will be seen that the tubular body C has both an endwise reciprocating motion and a rising-and-falling motion at one end in addition to the rotary or oscillatory movements thereof on its longer axis. It will also be seen that the effective movements of the directly-operating feed devices take place simultaneously with the said rotary or oscillatory movements of the tube and that said devices also partake of all of the movements of said tube during the operation of the mechanism. In its endwise movements the said tube is guided by means of the guide-plates 4 4 in the slotted bearing B, as already understood, and set-screws 2 2 practically constitute trunnions upon which the rising and falling motions of the tube take place. The different motions of said tube, as well as those of the directly-operating feed devices, may all be derived by the use of any preferred character of mechanism or operating devices therefor, and hence it will be understood that I am not limited to the particular devices or mechanisms herein shown for such purposes nor to the particular construction or dispositions of the several elements thereof.

In order to explain the operation of my improved feed mechanism, let it be assumed that the parts have been operated to be carried to the positions shown in Figs. 1, 8, and 9 and that a blank has just been cut off or severed from the portion of the plate or strip 5 projecting from the nose-piece at the forward end of the tube C. At this time the tube will be at one of the limits of its rotary movements and also at the forward limit of its endwise-reciprocating movement and one side of the plate or strip will have been presented to the action of the cutting device the operative edges of which are disposed at a suitable angle, as shown and for the purpose described. At this time also the sliding block *n* will be at the forward limit of its independent movements relatively to the tube, the directly-acting feed devices carried thereby having fed or moved a plate or strip forwardly a corresponding distance. The tube now starts to rotate or turn in the opposite or reverse direction; but inasmuch as the rise of the mov-

able knife is slight (being only approximately equal to the thickness of the plate or strip) the obliquely-sheared end of the plate or strip is caused to ride or turn against the adjacent face of the movable knife, such face, as shown in Fig. 1, being at an angle corresponding to the angle on which the blanks are cut. This action exerts a rearward pressure endwise of the said plate or strip, tending to force or carry the entire mechanism rearwardly upon the guide-plates 4 4 of the bearing B, and thus also compressing the springs 38 38 between their bearings. Such is the effect for about the first half of the rotatory movement of the tube in each direction, the contained feed devices of the tube being at the same time retracted or moved rearwardly of the tube by the rotation thereof, whereupon as soon as the half-point in the movement of the tube is reached the forward movement of said feed device starts to take place by the continued rotation of the tube and engagement of pin 13 in the cam-slot of bearing B, tending to urge or feed the plate or strip forwardly of the tube, and consequently causing the end of said plate or strip to bear with increased pressure against the movable knife. The counter forces thus set up tend to still further compress the said springs 38 38 between their bearings, and immediately the plate or strip has been turned flatwise to pass beneath the movable knife the said springs again expand and the entire mechanism is moved forwardly to the first or initial position thereof, by which the next succeeding portion of the plate or strip is presented to the cutting device, and so on repeatedly does the operation take place. As the said plates or strips are thus turned from side to side the edges of the projecting portions thereof rest upon the upper surface of the stationary or bed knife, and consequently the forward end of the tube is given a rising-and-falling motion about equal in extent to one-half the width of the plates or strips acted upon. It will be seen that during the turning of the end of the plate or strip against the movable knife the gripping devices located in advance of the movable block *n* also constitute a resistance by which is secured the effective compression of springs to derive the power for moving the entire mechanism forwardly in the manner already explained.

It will be understood, of course, that for cutting ordinary straight blanks the operative edges of the cutting device may be disposed substantially at right angles to the direction of feed of the plates or strips and in which case also the horizontal endwise motions of the oscillatory tube may be dispensed with. The invention clearly comprehends or includes such an embodiment, although intended more particularly as a feed for plates or strips from which approximately triangular blanks are cut in the manner shown and already described. It will also be understood that other means than a compression device (such as the springs 38 38) may be employed for returning the horizontally-oscillating tube to its original position after being forced backwardly or rearwardly by the pressure exerted at the end of the projecting portions of the plate or strip. The different motions of the tube, as well as those of the directly-acting feeders for the plates or strips, all take place synchronously, as is apparent. Moreover, by dispensing with said horizontal endwise motions of the tube and also dispensing with a cutting device altogether the mechanism is equally adapted as a feed for punching, stamping, and other similar apparatus or machinery.

It will be still further understood that the several elements or parts constituting my invention may be organized and lined up in various ways to effect the desired manipulation of the plates or strips and also that I am not limited to the precise details thereof herein shown and described, since changes therein may be made and still be within the spirit and scope of my invention.

Having described my invention, I claim—

1. A feed mechanism comprising a tube having a flattened nose-piece at its forward end, and constructed to hold a pile of plates, means for partially rotating the tube alternately in opposite directions, means for feeding portions of each plate beyond the nose-piece intermittently, a bearing upon which the nose-piece rests in turning, whereby the tube is caused to rise and fall at the end, means preventing back-slipping of the plate, an abutment against which the end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and a compression device receiving this thrust and operating to urge the mechanism forwardly on completion of the partial rotation of the tube.

2. A feed mechanism comprising a tube having a flattened nose-piece at its forward end, and constructed to hold a pile of plates or strips, means for partially rotating the tube alternately in opposite directions, means for feeding portions of each plate beyond the nose-piece intermittently, a bearing upon which the nose-piece rests in turning, whereby the tube is caused to rise and fall at the end, means preventing back-slipping of the plate, a knife or cutter against which the end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and a compression device receiving this thrust and operating to urge the mechanism forwardly on completion of the partial rotation of the tube.

3. A feed mechanism comprising a tube having a flattened nose-piece at its forward end, and constructed to hold a pile of plates or strips, means for partially rotating the tube alternately in opposite directions, devices for feeding portions of each plate beyond the nose-piece intermittently, and means for operating said devices rendered effective by the rotary motions of the tube, a bearing upon which the nose-piece rests in turning, whereby

the tube is caused to rise and fall at the end, a resistance preventing back-slipping of the plate, a cutter the face and operative edge of which are in a plane oblique to the direction of feed of the plate, said cutter constituting an abutment against which the end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and a compression device receiving such thrust and operating to urge the mechanism forwardly on completion of the partial rotation of the tube.

4. A feed mechanism comprising a tube having a flattened nose-piece at its forward end, and constructed to hold a pile of plates or strips, means for partially rotating the tube alternately in opposite directions, devices for feeding portions of each plate beyond the nose-piece, and means for retracting and advancing said devices rendered effective by the rotary motions of the tube, means whereby the tube is caused to rise and fall at the end, a gripping device preventing back-slipping of the plate, an abutment against which the end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and springs receiving such thrust and operating to urge the mechanism forwardly on completion of the partial rotation of the tube.

5. A feed mechanism comprising a tube having a flattened nose-piece at its forward end, and constructed to hold a pile of plates or strips, means for partially rotating the tube alternately in opposite directions, devices for feeding portions of each plate beyond the nose-piece, and means for retracting and advancing said devices rendered effective on the rotary motion of the tube, means whereby the tube is caused to rise and fall at the end, a gripping device preventing back-slipping of the plate, and operated by the plate to release the latter on the feed motion thereof, a cutter the face and operative edge of which are in a plane oblique to the direction of feed of the plate, said cutter constituting an abutment against which the end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and a compression device receiving said thrust and operating to urge the mechanism forwardly on completion of the partial rotation of the tube.

6. A feed mechanism comprising a tube having a flattened nose-piece at its forward end, and constructed to hold a pile of plates or strips, means for partially rotating the tube alternately in opposite directions, devices for feeding portions of each plate beyond the nose-piece, and means for retracting and advancing said devices rendered effective by the rotary motions of the tube, a bearing upon which the nose-piece rests in turning, whereby the tube is caused to rise and fall at the end, a gripping device preventing back-slipping of the plate, a cutter the face and operative edge of which are in a plane oblique to the direction of feed of the plate, said cutter constituting an abutment against which the end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and means for urging the mechanism forwardly on completion of the partial rotation of the tube.

7. A feed mechanism comprising a tube having a flattened nose-piece at its forward end, and constructed to hold a pile of plates or strips, means for partially rotating the tube alternately in opposite directions, devices for feeding portions of each plate beyond the nose-piece intermittently, a bearing upon which the nose-piece rests in turning, whereby the tube is caused to rise and fall at the end, a resistance preventing back-slipping of the plate, an abutment against which the end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and means for again urging the mechanism forwardly on completion of the partial rotation of the tube.

8. A feed mechanism comprising a tube having a side slot and a flattened forward end, and constructed to hold a pile of plates or strips, means for partially rotating the tube alternately in opposite directions, devices for feeding portions of each plate beyond the flattened end of the tube, a reciprocating block supporting said devices and having a pin projecting through the slot, means engaging the pin to operate the block, rendered effective by the rotary motions of the tube, a bearing upon which the flattened end of the tube rests in turning, whereby the tube is caused to rise and fall at such end, a gripping device preventing back-slipping of the plate, a cutter the face and operative edge of which are in a plane oblique to the direction of feed of the plate, said cutter constituting an abutment against which the end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and means for again urging the mechanism forwardly on completion of each partial rotation of the tube.

9. A feed mechanism comprising a tube having a side slot and a flattened forward end, and constructed to hold a pile of plates or strips, means for partially rotating the tube alternately in opposite directions, a reciprocating block working in the tube and having a pin projecting through the slot, independently-movable devices supported by the block for feeding portions of each plate beyond the flattened end of the tube, means for engaging the pin to operate the block, said means being rendered effective by the rotary motions of the tube, a bearing upon which the flattened end of the tube rests in turning, whereby the tube is caused to rise and fall at such end, a gripping device preventing back-slipping of the plate, a cutter the face and operative edge of which are in a plane oblique to the direction of feed of the plate, said cutter constituting an abutment against which the end of the plate bears during the turning of the tube, whereby the mechanism is thrust

rearwardly, and a compression device receiving such thrust and operating to urge the mechanism forwardly on completion of the partial rotation of the tube.

10. A feed mechanism comprising a tube having a side slot and a flattened forward end, and constructed to hold a pile of plates or strips, means for partially rotating the tube alternately in opposite directions, a reciprocating block working in the tube and having a pin projecting through the slot thereof, independently-movable devices supported by the block for feeding portions of each plate beyond the flattened end of the tube, means for engaging the pin to operate the block, said means being rendered effective on the rotary motions of the tube, a bearing upon which the flattened end of the tube rests in turning, whereby the tube is caused to rise and fall at such end, means preventing back-slipping of the plate, an abutment against which the end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and means for again urging the mechanism forwardly on completion of the partial rotation of the tube.

11. A feed mechanism comprising a tube having a side slot and a flattened forward end, and constructed to hold a pile of plates or strips, means for partially rotating the tube alternately in opposite directions, a reciprocating block working in the tube and having a pin projecting through the slot thereof, independently-movable devices supported by the block for feeding portions of each plate beyond the flattened end of the tube, means surrounding the tube having a cam-groove the walls of which engage the pin and operate the block on the rotary motions of the tube, a bearing upon which the flattened end of the tube rests in turning, whereby the tube is caused to rise and fall at such end, means preventing back-slipping of the plate, an abutment against which the end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and means for again urging the mechanism forwardly on completion of the partial rotation of the tube.

12. A feed mechanism comprising a tube having a side slot and a flattened forward end, and constructed to hold a pile of plates or strips, means for partially rotating the tube alternately in opposite directions, a reciprocating block working in the tube and having a pin projecting through the slot thereof, independently-movable devices supported by the block for feeding portions of each plate beyond the flattened end of the tube, a stationary cam engaging the pin to operate the block on the rotary motions of the tube, a bearing upon which the flattened end of the tube rests in turning, whereby the tube is caused to rise and fall at such end, gripping devices preventing back-slipping of the plate, a cutter the face and operative edge of which are in a plane oblique to the direction of feed of the plate, said cutter constituting an abutment against which the end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and a compression device receiving such thrust and reacting to urge the mechanism forwardly on completion of the partial rotation of the tube.

13. A feed mechanism comprising a tube having a side slot and a flattened forward end, and constructed to hold a pile of plates or strips, means for partially rotating the tube alternately in opposite directions, a reciprocating block working in the tube and having a pin projecting through the slot thereof, eccentrically-mounted disks supported by the block for feeding portions of each plate beyond the flattened end of the tube, a stationary cam engaging the pin to operate the block on the rotary motions of the tube, a bearing upon which the flattened end of the tube rests in turning, whereby the tube is caused to rise and fall at such end, stationary eccentrically-pivoted disks preventing back-slipping of the plate, a cutter the face and operative edge of which are in a plane oblique to the direction of feed of the plate, said cutter constituting an abutment against which the end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and a compression device receiving such thrust and operating to urge the mechanism forwardly on completion of the partial rotation of the tube.

14. A feed mechanism comprising a tube having a flattened nose-piece at its forward end, and constructed to hold a pile of plates or strips, means for partially rotating the tube alternately in opposite directions, devices for feeding portions of each plate beyond the nose-piece, and means retracting and advancing said devices, rendered effective on the rotary motions of the tube, a bearing upon which the nose-piece rests in turning, whereby the tube is caused to rise and fall at the end, gripping devices in advance of said feed devices for preventing back-slipping of the plate, similar gripping devices to the rear of said feed devices, a cutter the face and operative edge of which are in a plane oblique to the direction of the feed of the plate, said cutter constituting an abutment against which the end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and a compression device receiving such thrust and operating to urge the mechanism forwardly on completion of the partial rotation of the tube, said first-named gripping devices constituting a resistance for enabling said rearward thrust of the mechanism to be accomplished.

15. A feed mechanism comprising a tube constructed to hold a pile of plates or strips, means for partially rotating the tube in opposite directions, consisting of a movable arm, a link movably connected thereto and to the tube, and a movable cam for actuating the arm; devices for feeding portions of each

plate beyond one end of the tube intermittently, means whereby this end of the tube is caused to rise and fall during the turning of the tube, means preventing back-slipping of the plate, an abutment against which the end of the plate bears, also during the turning of the tube, whereby the mechanism is thrust rearwardly, and means for urging said mechanism forwardly on completion of the partial rotation of the tube.

16. A feed mechanism comprising a tube constructed to hold a pile of plates or strips, means for partially rotating the tube in opposite directions, means for feeding portions of each plate beyond one end of the tube intermittently, means whereby this end of the tube is caused to rise and fall during the turning of the tube, means resisting back-slipping of the plate, means whereby the mechanism is thrust rearwardly, also while the tube is turning, and a compression device receiving such thrust and operating to again urge the mechanism forwardly on completion of the partial rotation of the tube.

17. A feed mechanism comprising a tube constructed to hold a pile of plates or strips, means for partially rotating the tube in opposite directions, consisting of a movable arm, a link movably connected to the arm and to the tube, and a movable cam for actuating said arm; devices for feeding portions of each plate beyond one end of the tube intermittently, means whereby this end of the tube is caused to rise and fall during the turning of the tube, means resisting back movement of the plate, an abutment against which the end of the plate bears also while the tube is turning, whereby the mechanism is thrust rearwardly, and an elastic device receiving such thrust and operating to again urge the mechanism forwardly on completion of the partial rotation of the tube.

18. A feed mechanism comprising a tube having a flattened nose-piece at its forward end, and constructed to hold a pile of plates or strips, means for partially rotating the tube alternately in opposite directions, intermittently-operating devices for feeding the plates forwardly from the bottom of the pile, a guide receiving said plates whereby each of them is urged along by abutment of the end of the one next behind, a bearing upon which the nose-piece rests in turning, whereby the tube is caused to rise and fall at the end, means resisting back-slipping of the plates in the guide, a knife or cutter the face and operative edge of which are in a plane oblique to the direction of feed of the plates, said cutter constituting an abutment against which the end of the foremost plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and a compression device receiving such thrust and operating by its expansion to again urge the mechanism forwardly on completion of the partial rotation of the tube.

19. A feed mechanism comprising a tube flattened at one end and constructed to hold a pile of plates or strips, a tubular bearing for the tube, said tube having a slot, means for partially rotating the tube alternately in opposite directions, a reciprocating block having a pin projecting through said slot, means carried by said block for feeding portions of each plate beyond the flattened end of the tube, a cam secured to said bearing and operating against said pin to reciprocate the block, a bearing upon which the flattened end of the tube rests in turning, whereby the tube is caused to rise and fall at such end, means resisting back-slipping of the plate, a cutter with its face and operative edge in a plane oblique to the direction of the feed of the plate, said cutter constituting an abutment against which the projecting end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and a compression device receiving such thrust and operating to urge the mechanism forwardly on completion of the partial rotation of the tube.

20. A feed mechanism comprising a tube flattened at one end and having a chamber for containing a pile of plates or strips, a bearing for the tube, and supports for the bearing, a yoke fitting the tube, rods between the yoke and supports having springs thereon, means for partially rotating the tube alternately in opposite directions, devices for feeding portions of each plate beyond the flattened end of the tube, a bearing upon which the flattened end of the tube rests in turning, whereby the tube is caused to rise and fall at such end, a cutter disposed obliquely to the direction of feed of the plate, and constituting an abutment against which the end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and means resisting back-slipping of the plate to store up power in the springs to urge the mechanism forwardly on completion of the partial rotation of the tube.

21. A feed mechanism comprising a tube flattened at one end and having a chamber for holding a pile of plates or strips, a bearing for the tube having longitudinal slots, plates in the slots, stationary supports, screws passing through said supports and engaging the plates, means for partially rotating the tube alternately in opposite directions, devices for feeding portions of each plate beyond the flattened end of the tube intermittently, a bearing upon which the flattened end of the tube rests in turning, whereby the tube is caused to rise and fall at such end, means resisting back-slipping of the plate, a cutter with its face and operative edge in a plane oblique to the direction of feed of the plates, said cutter constituting an abutment against which the projecting end of the plate bears during the turning of the tube, whereby the mechanism is thrust rearwardly, and a compression device receiving such thrust and operating to urge the mechanism for-

wardly on completion of the partial rotation of the tube.

22. A feed mechanism comprising feeders for a plate or strip to a cutter, means for turning the plate from side to side alternately in opposite directions, means causing the plate to rise and fall at its forward end while turning, means resisting back-slipping of the plate, an abutment against which the end of the plate bears, also while turning, whereby the plate is thrust rearwardly, and means again urging the plate forwardly on completion of the turning thereof in either direction.

23. A feed mechanism comprising feeders for a plate or strip to a cutter, means for turning the plate from side to side alternately in opposite directions, means causing the plate to rise and fall at its forward end while turning, means resisting back-slipping of the plate, an abutment against which the end of the plate bears, also while turning, whereby the plate is thrust rearwardly, and a compression device receiving such thrust and again urging the plate forwardly on completion of the turning thereof in either direction.

24. A feed mechanism comprising feeders for a plate or strip, means for turning the latter from side to side alternately in opposite directions, means causing the plate to rise and fall at its forward end while turning, means resisting back-slipping of the plate, a cutter with its face and operative edge oblique to the direction of feed of the plate, said cutter constituting an abutment against which the end of the plate bears, also while turning, whereby the plate is thrust rearwardly, and a compression device receiving such thrust and again urging the plate forwardly on completion of the turning thereof in either direction.

25. A feed mechanism comprising intermittently-operating feeders for a plate or strip to a cutter, means for turning the plate from side to side alternately in opposite directions, a bearing upon which the plate rests whereby it is caused to rise and fall while turning, means resisting back-slipping of the plate, an abutment against which the end of the plate bears, also while turning, whereby the plate is thrust rearwardly, and a compression device receiving such thrust and operating to urge the plate forwardly on completion of the turning thereof in either direction.

26. A feed mechanism comprising intermittently and progressively operating feed devices for a plate or strip, means for turning the plate from side to side alternately in opposite directions, means causing the plate to rise and fall at its forward end while turning, swinging grippers engaging and resisting back-slipping of the plate, said grippers being operated by said plate to release such engagement on the feed motion of the latter, a cutter with its face and operative edge oblique to the direction of feed of the plate, said cutter constituting an abutment against which the end of the plate bears, also while turning, whereby the plate is thrust rearwardly, and a compression device receiving such thrust and operating to urge the plate forwardly on completion of the turning thereof in either direction.

27. A feed mechanism comprising a support for a pile of plates or strips, means for feeding the plates progressively in a given direction successively from the pile, means for turning each plate from side to side alternately in opposite directions, means causing the fed plate to rise and fall at its forward end while turning, means resisting back-slipping of the plate, a cutter with its face and operative edge oblique to the direction of feed of the plate, said cutter constituting an abutment against which the end of the plate bears, also while turning, whereby the plate is thrust rearwardly, and duplicate springs receiving such thrust and again urging the plate forwardly on completion of the turning thereof in either direction.

28. A feed mechanism comprising a hopper for containing a pile of plates or strips, means for feeding the plates progressively in a given direction from the pile, means for turning each plate from side to side alternately in opposite directions, means causing the fed plate to rise and fall at its forward end while turning, swinging grippers resisting back-slipping of the plate, a cutter with its face and operative edge in a plane oblique to the direction of feed of the plate, said cutter constituting an abutment against which the end of the plate bears, also while turning, whereby the plate is thrust rearwardly, and duplicate springs receiving such thrust and operating to urge the plate forwardly on completion of the turning thereof in either direction.

ALBERT W. HOWE.

Witnesses:
S. J. FORBES,
R. L. FLYNN.