

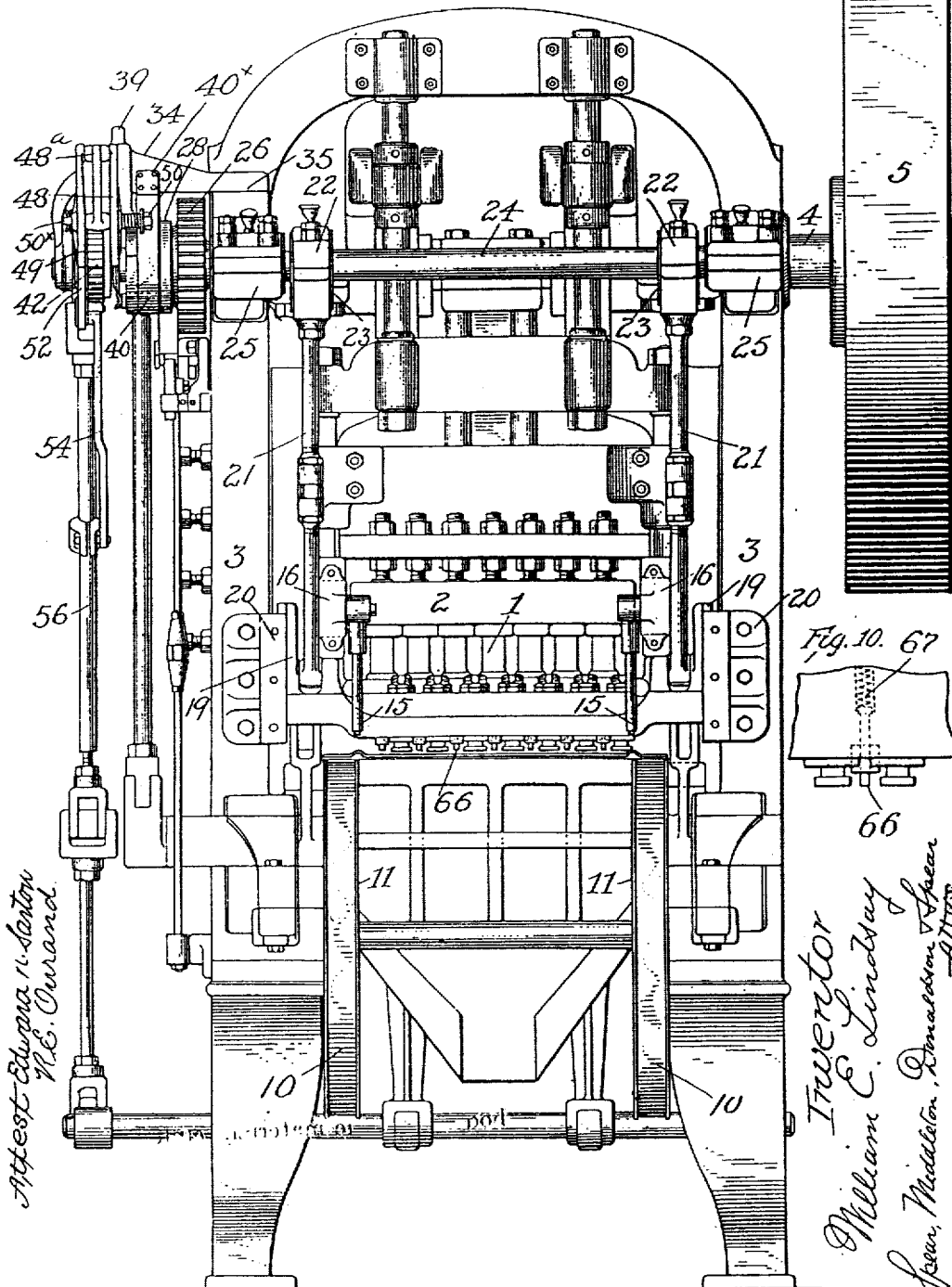
No. 829,277.

PATENTED AUG. 21, 1906.

W. E. LINDSAY.
PUNCHING MACHINE.
APPLICATION FILED JAN. 16, 1906.

5 SHEETS—SHEET 1.

Fig. 1.

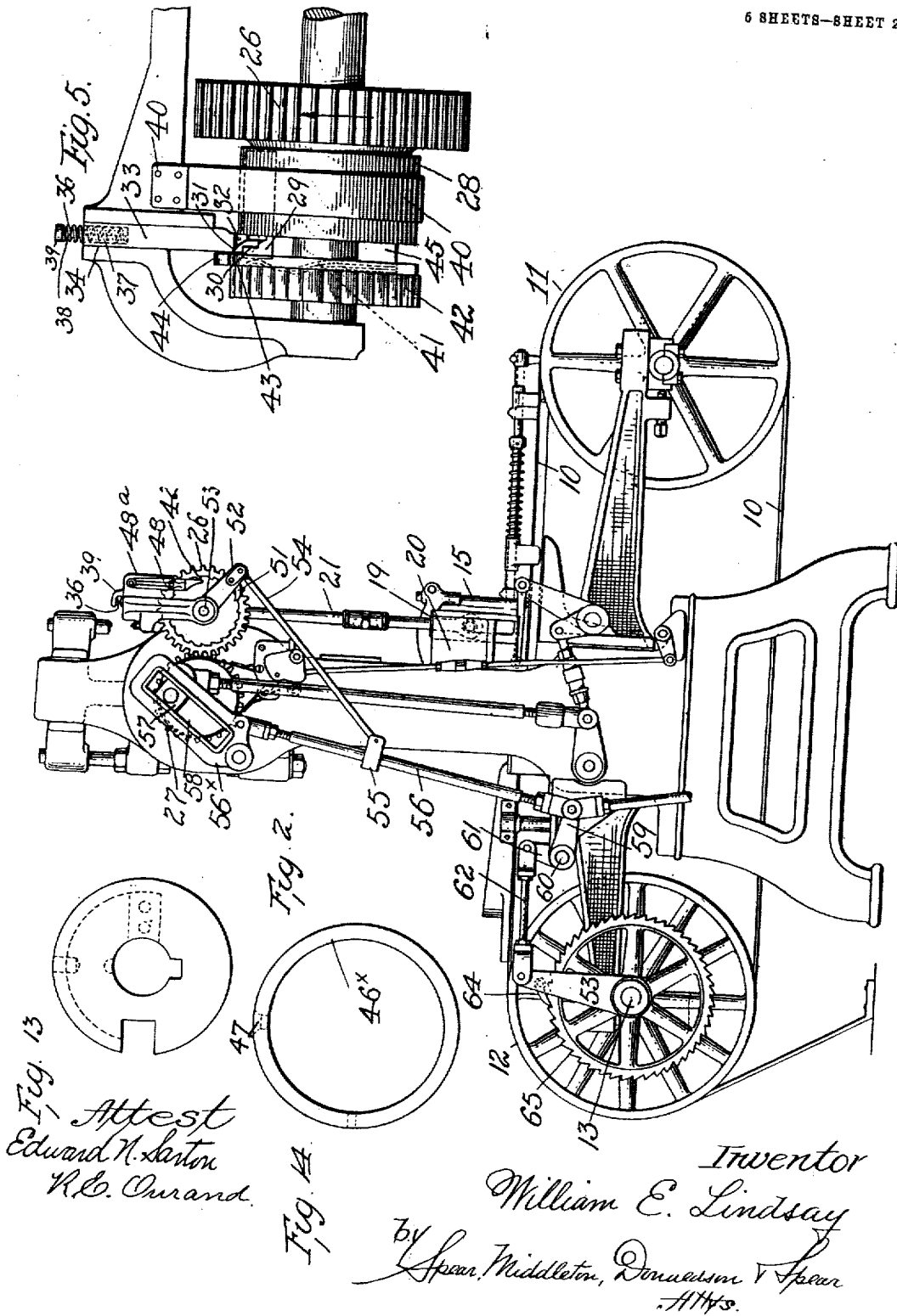


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6 SHEETS—SHEET 2.



Attest
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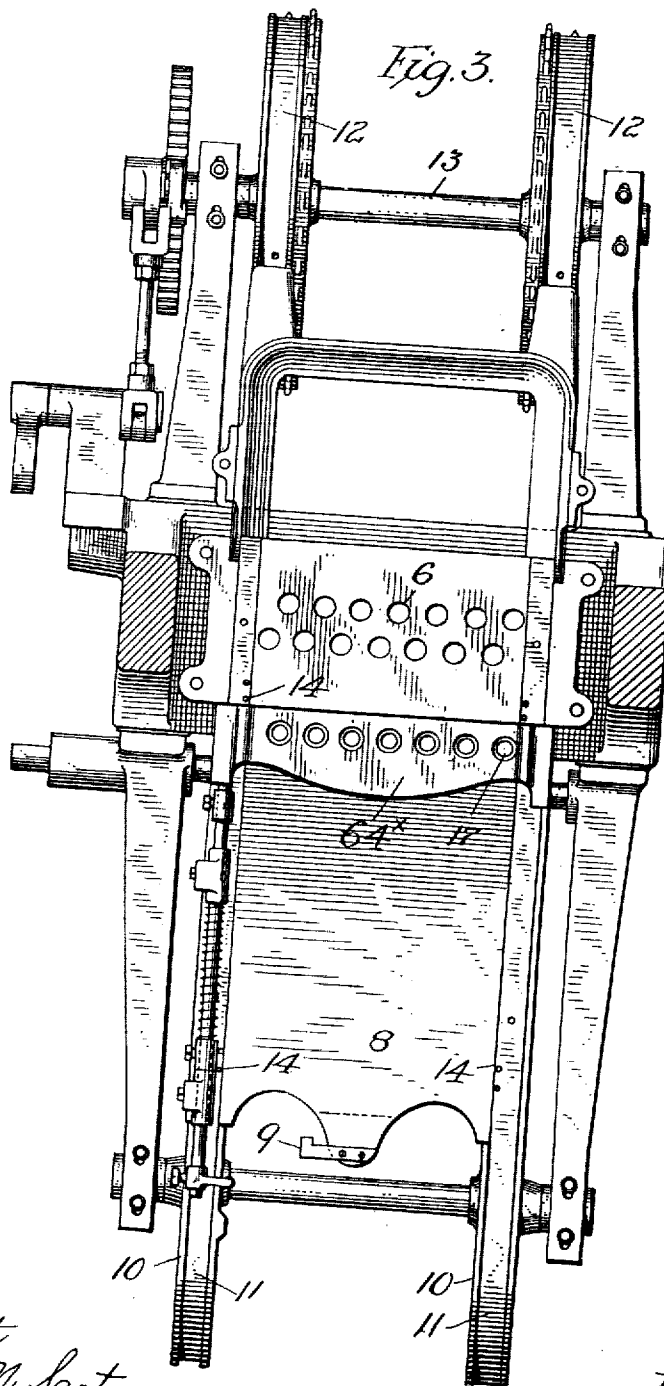
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5 SHEETS—SHEET 3.



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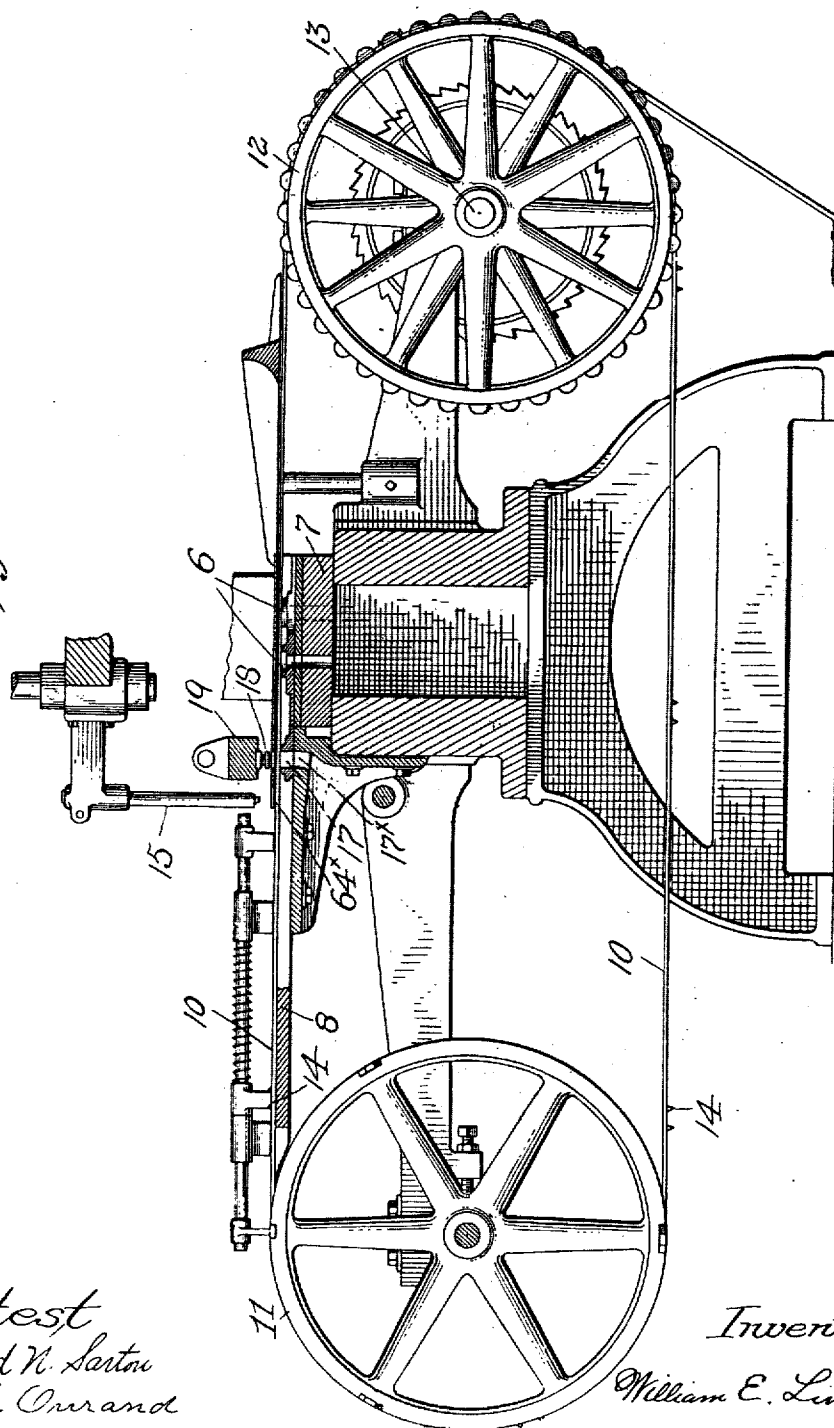
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5 SHEETS—SHEET 4.

Fig. 4.



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5 SHEETS—SHEET 5.

Fig. 6.

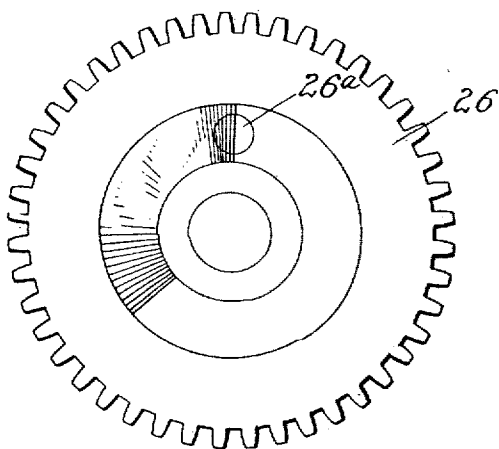


Fig. 9.

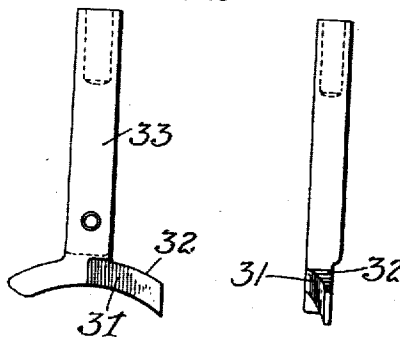


Fig. 8.

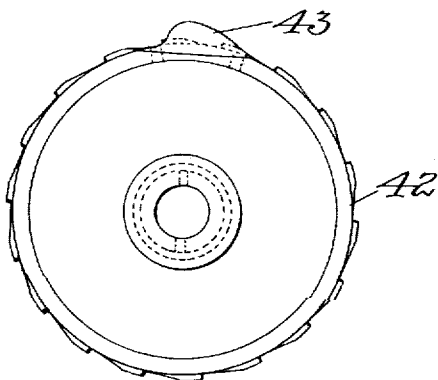


Fig. 7.

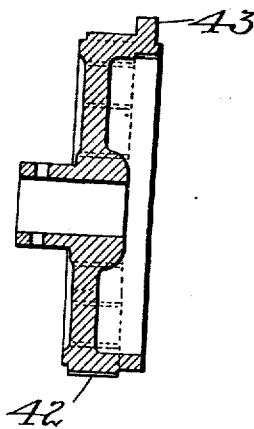


Fig. 12.



Fig. 11.

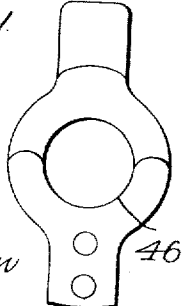
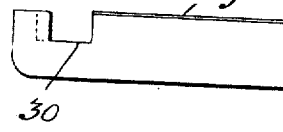


Fig. 15.



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UNITED STATES PATENT OFFICE.

WILLIAM E. LINDSAY, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE
CROWN CORK & SEAL CO., OF BALTIMORE, MARYLAND.

PUNCHING-MACHINE.

No. 829,277.

Specification of Letters Patent.

Patented Aug. 21, 1906.

Application filed January 15, 1906. Serial No. 296,113.

To all whom it may concern:

Be it known that I, WILLIAM E. LINDSAY, a citizen of the United States, residing at Baltimore, Maryland, have invented certain new and useful Improvements in Punching-Machines, of which the following is a specification.

In the manufacture of articles from sheet-metal by cutting or punching therefrom disks or other forms to be struck up by dies to the desired shape it is of material advantage to feed in the sheets of metal in such a manner that the forward edge of the fresh sheet will abut against and follow the trailing edge of the sheet previously fed in, this not only saving time, but also preventing uneven wear on the cutting and die members, the latter advantage accruing because the dies in this way find material to work upon throughout their extent and the severe strain and uneven wear which would result from working on a blank which covered only part of the die being avoided. Such a method of feeding, however, necessarily produces from the forward and rearward edges of each sheet only partial or half blanks, and if these are immediately operated upon by the dies a series of half articles are produced which must be subsequently sorted from the complete articles. In order, therefore, to secure the advantages flowing from the feeding of the sheets one after the other with their adjacent edges substantially in contact and at the same time avoid the production of half articles or segments of the complete articles I have devised an apparatus in which the half-blanks are cut from the meeting edges of the sheets before these portions of the sheets reach the dies or forming members, and when so cut the half blanks or disks are discharged from the machine into a separate receiver from that used for the completed articles, so that they do not commingle therewith and no subsequent sorting is necessary.

The invention consists in the features, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a front view of a punching-machine embodying my invention. Fig. 2 is a side view of said machine. Fig. 3 is a plan view of the lower portion of the machine in the plane of the die-plate. Fig. 4 is a detail sectional

view from front to rear through the feeding and cutting and punching mechanism, parts being shown in elevation. Fig. 5 is a detail view of the intermittent driving connections for the cutting mechanism for the half-blanks. Fig. 6 is a detail view of the clutch-gear. Fig. 7 is a detail sectional view of the ratchet and its cam for timing the actions of the half-blank-cutting mechanism, and Fig. 8 is a side view of the ratchet-wheel. Fig. 9 is a detail view of the cam for controlling the clutch-pin of the driving connections leading to the cutting devices for the half-blanks. Fig. 10 is a detail view of a part of the supplemental cross-head and the half-blank-cutting dies with spring presser-pins. Fig. 11 is a detail side view of a spring. Fig. 12 is a detail edge view of the same. Fig. 13 is an end view of the clutch-block. Fig. 14 is a detail view of the ring, and Fig. 15 is a detail view of the clutch-pin.

The machine comprises a series of plungers 1, mounted in a complex cross-head 2, which is vertically reciprocated within the housing 3 by connections of any suitable form operated from the main shaft 4, having the fly-wheel 5 thereon and operated in any suitable manner.

The plungers carry a series of dies in staggered relation to each other, their relative positions being the same as that of the fixed dies, (indicated generally in Fig. 3 at 6,) suitably supported in the lower part 7 of the main frame, as indicated in Fig. 4.

To the dies 6 and beneath the dies carried by the plungers the sheets of material are fed with their edges in contact, as above indicated. This feeding action is accomplished in the manner disclosed in Letters Patent of the United States granted to William Painter, No. 605,334, June 7, 1898, as will now be briefly referred to. The sheets of material from which the articles are to be made are placed by the attendant on the table 8, each with its rear or following edge against the gage 9 and with its side portions or margins overlying the feed-bands 10, which pass around the pulleys or wheels 11 at the front of the machine and about the pulleys 12 at the rear, said rear pulleys being on a shaft 13, rotating in bearings in the frame and operated through suitable mechanism hereinafter referred to.

The margins of the sheet placed against

the gage 9 overlies the bands and the sheet-feeding studs 14 carried thereby, and the feeding action of the sheets takes place when these studs carried by the bands are brought
5 beneath the socket-punches 15, which then descend and force the overlying metal down around the feeding-studs, so that the sheet will now be carried along with the feed-studs and the bands to the cutting and die mem-
10 bers, and, as above indicated, the onward movement of the fresh sheet begins as soon as the edge of the sheet just previously fed and now being acted on is moved rearward a sufficient distance to bring its trailing edge
15 to the forward edge of the fresh sheet.

The socket-punches depend from brackets 16, attached to the cross-head 2, by which the said socket-punches receive their vertical movements. The socket-punches, it will be
20 understood, while reciprocating in unison with the cross-head are not effective in their action until the feed-studs get in position beneath them, whereupon they act to unite the metal sheet with its feed-studs for conveying
25 the sheet through the machine. As before stated, the action of the dies in the machine as operated heretofore would produce half articles by reason of the fact that the partial blanks, or what I have termed for convenience "half-blanks," cut out from the meeting
30 edges of the metal sheets were acted on by the dies, and these half articles were then discharged into the same receptacle or at the same point with the complete articles. In
35 order to avoid the formation of these half articles and to at once eliminate the half-blanks from further attention or consideration in the carrying on of the work, I have provided a series of cutters at a point in front of the po-
40 sition of the die members for cutting out the half-blanks from the adjacent edges of the sheets of metal and for causing their immediate discharge from the machine into a separate lot from the completed articles. These
45 half-blank cutters comprise a series of fixed cutters 17 and a coöperating series of movable cutters 18, carried by a supplemental cross-head 19, working vertically in guides
50 formed in brackets 20, attached to the housing 3. The cross-head is reciprocated by the eccentric-rods 21, depending from straps 22, surrounding eccentrics 23 on a supplemental
55 shaft 24, having its bearings in brackets 25, formed with or attached to the housing. This shaft is driven intermittingly and only
when the joint or the meeting edges of the sheet being operated upon by the dies and that freshly fed are brought below the half-blank cutters 18.

60 In the machine as at present organized the actions of the half-crown cutters occur at intervals equal to eighteen strokes of the die cross-head 1; but of course this interval depends entirely upon the length of the sheet

and the number of die actions necessary to
utilize the stock to the maximum extent.

When the half-blank cutters operate, the forward edge of the fresh sheet and the adjacent trailing edge of the previously-fed sheet
70 are cut out and the half-disks fall through the openings 17* through the framework beneath. The fixed cutters are thus prevented from passing to the dies. They are collected in any suitable receptacle, and no sorting of
75 half-crowns from complete crowns is necessary, as has been the case heretofore.

When the sheets of metal just mentioned reach the dies in their passage through the machine, the dies will work idly through the
80 spaces in the meeting edges of the sheets left by cutting out the half-blanks therefrom.

Returning now to the mechanism for driving the supplemental shaft 24 intermittingly and referring particularly to Figs. 1 and 5, it
85 will be seen that there is a gear-wheel 26 on the shaft 24 just outside the housing. This gear-wheel is loose on the shaft 24 and is rotated constantly in the direction of the arrow by a gear-wheel 27 on the main shaft 4.
90 Alongside the loose gear 26 a clutch-block 28 is keyed on the shaft, which block carries a clutch-pin 29, having a notch 30 on one edge adapted to receive and pass along a segment
95 31, having an inclined face 32 and carried by a stem or shank 33, movable vertically in a supplemental housing 34, secured to the main housing at 35 in any suitable manner. This segment is pressed downwardly to lie
100 with its cam-face or incline 32 in the path of the clutch-pin by means of a spring 36, located in a socket 37 in the stem of the segment, the upper end of the spring being held
105 by a pin 38, depending from the arm 39 of the supplemental housing. When in its depressed position, the segment will by presenting its inclined face to the notch of the
110 clutch-pin cause the said clutch-pin to be retracted from its engagement with the rotating gear-wheel 26, and thus the shaft 24 will be disconnected from the driving power
and will come to rest with the supplemental cross-head and the half-blank cutters in raised position. The stopping of the shaft 24
115 in proper position is due also to the action of the brake-band 40, surrounding the clutch-block and having its ends attached to the supplemental housing, for instance, at the point 40*.

At the proper periods in the operation of the machine the clutch-pin is released from
120 the segment 31 by the lifting of the latter, and the pin then under the action of the leaf-spring 41 bearing on its end will be thrown into engagement with the constantly-rotating gear-wheel 26, or, more accurately speak-
125 ing, with a shoulder or pin 26* thereon, and the clutch-block and shaft 24 will immediately be set in motion and will perform only

one revolution, this, however, being sufficient to cause the half-blank cutters to perform their function by cutting out the half-blanks at the meeting edges of the metal sheets. The motion of the shaft 24 is limited to one revolution, because the segment 31 is so controlled that after releasing the clutch-pin it falls again into the path of the said clutch-pin, so that as the shaft is completing its one revolution the clutch-pin by engaging with the incline or cam-face of the segment will be retracted from the gear-wheel, and the shaft will thus come to rest with the cutters raised.

For controlling the segment or cam 31 I employ in addition to the spring 36 for forcing it down a timing-wheel for raising the segment from engagement with the clutch-pin, said timing-wheel consisting of a ratchet-wheel 42, supported to turn independently of the shaft 24. This ratchet-wheel has a cam portion 43 thereon arranged to act at each complete revolution of the ratchet-wheel upon a roller or pin 44, projecting from the stem of the segment, whereby at each revolution of the ratchet-wheel the cam-segment is lifted to release the clutch-pin. The cam portion of the ratchet-wheel is of a length equal substantially to the distance between two teeth, so that the said cam will after raising the segment almost immediately pass from beneath the roller or pin and allow the segment to fall into position to retract the clutch-pin when it is brought around by the revolution of the shaft 24.

The spring 41 is secured to the clutch-block at 45 and is perforated at 46 to fit about the shaft 24. The clutch-pin moves in a way or groove in the clutch-block, wherein it is held by a ring 46^x, fitted to the exterior of the clutch-block and secured in place by a screw at 47.

The timing ratchet-wheel is held under frictional restraint so as not to overthrow when moved by its pawl, for which purpose arms 48, supported from a bracket 48^a on the supplemental housing and depending on each side of the timing-ratchet, have leather brake-pieces 49 to bear on the said ratchet, the pressure being regulated by a spring on a bolt 50^x passing through the arms and having a nut 50, by which the pressure of the spring may be regulated, the opposite end of the bolt being connected to one of the depending arms.

The timing-ratchet is driven step by step by a pawl 51, pivoted to an arm 52, journaled at 53 and operated by a rod 54, extending and connected to a clip 55 on the link 56. This link forms a part of the operating connections for driving the rear pulleys or wheels 12 before mentioned for moving the feed-bands. This link is coupled to a vibrating arm 56^x, pivoted to the main housing of the machine and operated by a sliding block 57, swiveled

on the pin of the crank 58 on the main shaft 65. The lower end of the link is connected to an arm 59 of a rock-shaft 60, having another arm 61 connected by a link 62 to a pawl-lever 53, carrying a pawl 64, engaging a ratchet-wheel 65 on the shaft 13. It will thus be seen that the eccentric-shaft 24 is driven intermittently from the same connections which are employed for operating the feed mechanism of the machine.

At 64^x a head-plate is shown located adjacent the cutters for the half-blanks. Under this head-plate the forward end of the fresh metal sheet is placed by the attendant when feeding the machine. This head-plate aids in holding the sheet-metal plate in proper position to be cut by the half-blank cutters. The plate is perforated for the passage of the movable cutters. It is supported by its edges, and its middle portion is depressed to engage and hold the forward end of the newly-fed sheet-metal plate at the moment the cutting is done. For this purpose the supplemental cross-head is provided with a series of pins 66, adjacent the cutters carried by the said cross-head, and these pins engage and force down the head-plate just previous to the contact of the movable cutters with the sheet-metal plate. The pins are pressed downwardly by springs 67, arranged in sockets in the supplemental cross-head, and thus said pins are permitted to yield upwardly when the head-plate has been pressed down sufficiently.

The eliminating of the half-blanks takes place from the forward and trailing edges of each sheet, and in this my invention broadly consists without regard to the specific manner of feeding the sheets or the specific relation of the newly-fed sheet to that passing through the machine, and, further, the broad feature of my invention concerning, as it does, the elimination of the half-blanks from the complete ones does not call into account the exact relation of the die or forming operation to the half-blank-cutting operation, although in the present embodiment of my invention the die or forming operation takes place in the same machine with the half-blank cutting and immediately in rear of the position of the half-blank cutters.

I claim—

1. In a machine of the class described, the combination of main punching devices, and means for punching out the partial blanks and delivering the same separately from the complete blanks or the complete articles formed therefrom, the main punching devices operating idly in the openings formed by the partial-blank-punching means, substantially as described.

2. In a machine of the class described, the combination of main punching devices, means for punching out the partial blanks

and delivering the same separately from the complete blanks or the articles formed therefrom, and timing means for operating the partial-blank-punching means after a certain number of operations of the main punching devices have taken place, the main punching devices operating idly in the openings formed by the partial-blank-punching means, substantially as described.

3. In a machine of the class described, the combination of main punching devices, means for punching out the partial blanks and delivering the same separately from the complete blanks or the articles formed therefrom and means for feeding the material with the forward edge of the fresh sheet adjacent the trailing edge of the sheet previously fed in whereby the partial blanks will be cut out and delivered from the adjacent edges of the sheets before reaching the main punches, substantially as described.

4. In combination in a machine of the class described, main punches, partial-blank punches, means for feeding the sheets with their edges adjacent, means for operating the main punches to utilize the stock throughout the body of the sheets and timing means for operating the partial-blank punches when the meeting edges of the sheets are brought below the same, substantially as described.

5. In combination in a machine of the class described, main punching and die mechanism for cutting out complete blanks and forming the articles therefrom and partial-blank punches for cutting out the partial blanks from the edges of the sheet.

6. In combination in a machine of the class described, the main punches, a reciprocating cross-head carrying the same, partial-blank punches, a supplemental cross-head carrying the same, and timing means for operating the supplemental cross-head at intervals in respect to the operation of the main cross-head, said main punches operating idly in the openings formed by the partial-blank punches, substantially as described.

7. In combination in a machine of the class described the main punches, partial-blank punches, the cross-shaft 24, a cross-

head operated from said shaft and means for driving the said shaft intermittently, said main punches operating idly in the openings formed by the partial-blank punches, substantially as described.

8. In combination in a machine of the class described the main punches, partial-blank punches, the cross-shaft 24, a cross-head operated from said shaft and means for driving the said shaft intermittently, said means including the constantly-rotating member, the clutch-block on the shaft, a pin carried thereby to engage the constantly-rotating member, and means for controlling the said clutch-pin including a timing ratchet-wheel and the cam-segment, substantially as described.

9. In combination in a machine of the class described, main punches, partial-blank punches, feeding means for the sheets of material, connections thereto from the main shaft of the machine, timing means for operating the partial-blank punches and connections for operating the same from the feed connections, said main punches operating idly in the openings formed by the partial-blank punches, substantially as described.

10. In combination in a machine of the class described, main punches, partial-blank punches, timing mechanism for operating the partial-blank punches including a constantly-rotating member, a slow-motion member, a clutch and means for controlling the clutch from the slow-motion member, substantially as described.

11. In combination, in an organization of the class described, the combination of means for feeding the sheets with their edges adjacent and means for cutting half-blanks from the said adjacent edges and delivering the same without shaping them, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM E. LINDSAY.

Witnesses:

CHAS. H. KOPPELMAN,
LEW. S. GREENFIELD.