

July 7, 1925.

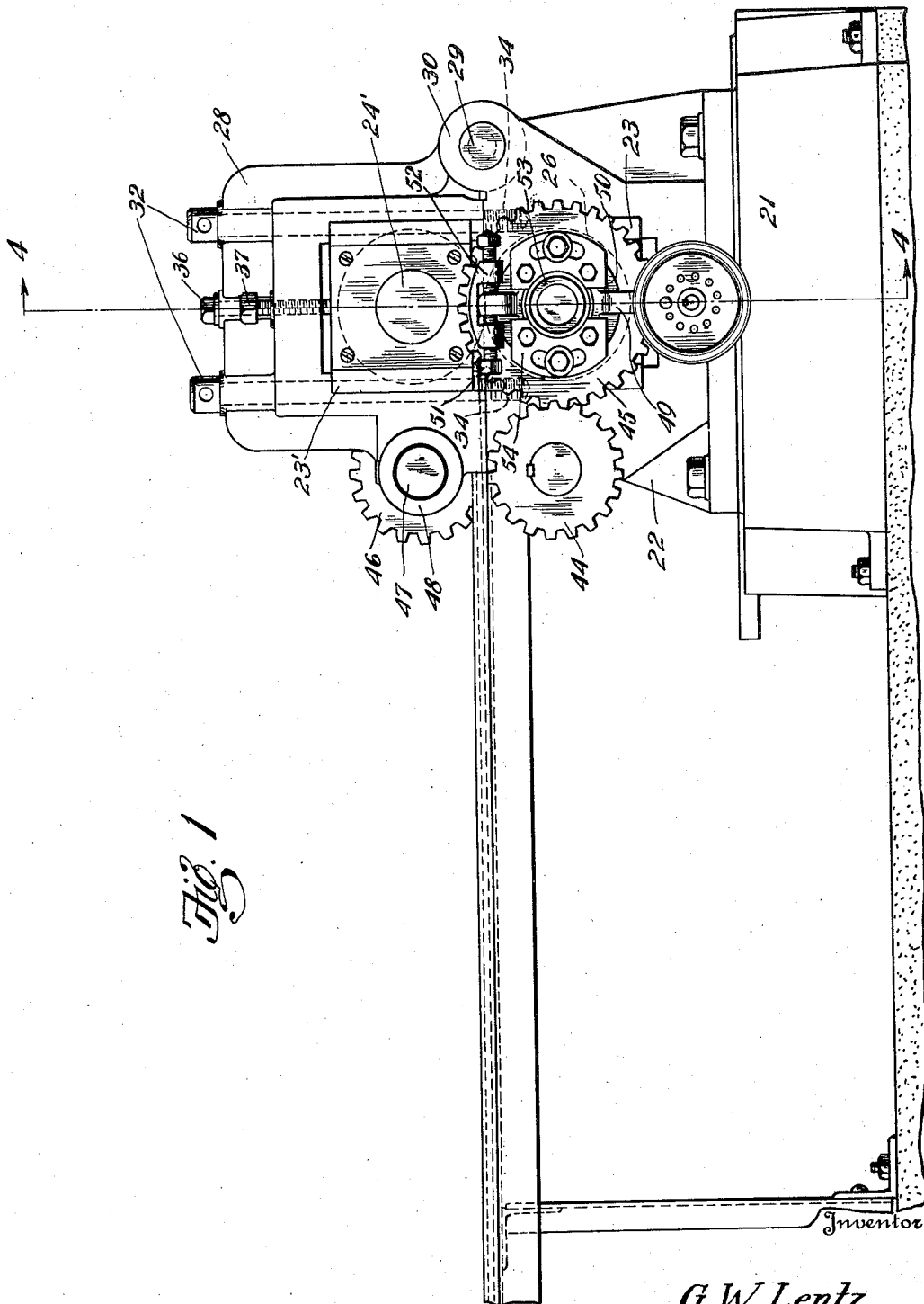
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SHEET METAL SLITTING MACHINE

Filed Jan. 15, 1923

9 Sheets-Sheet 1



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SHEET METAL SLITTING MACHINE

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9 Sheets-Sheet 2

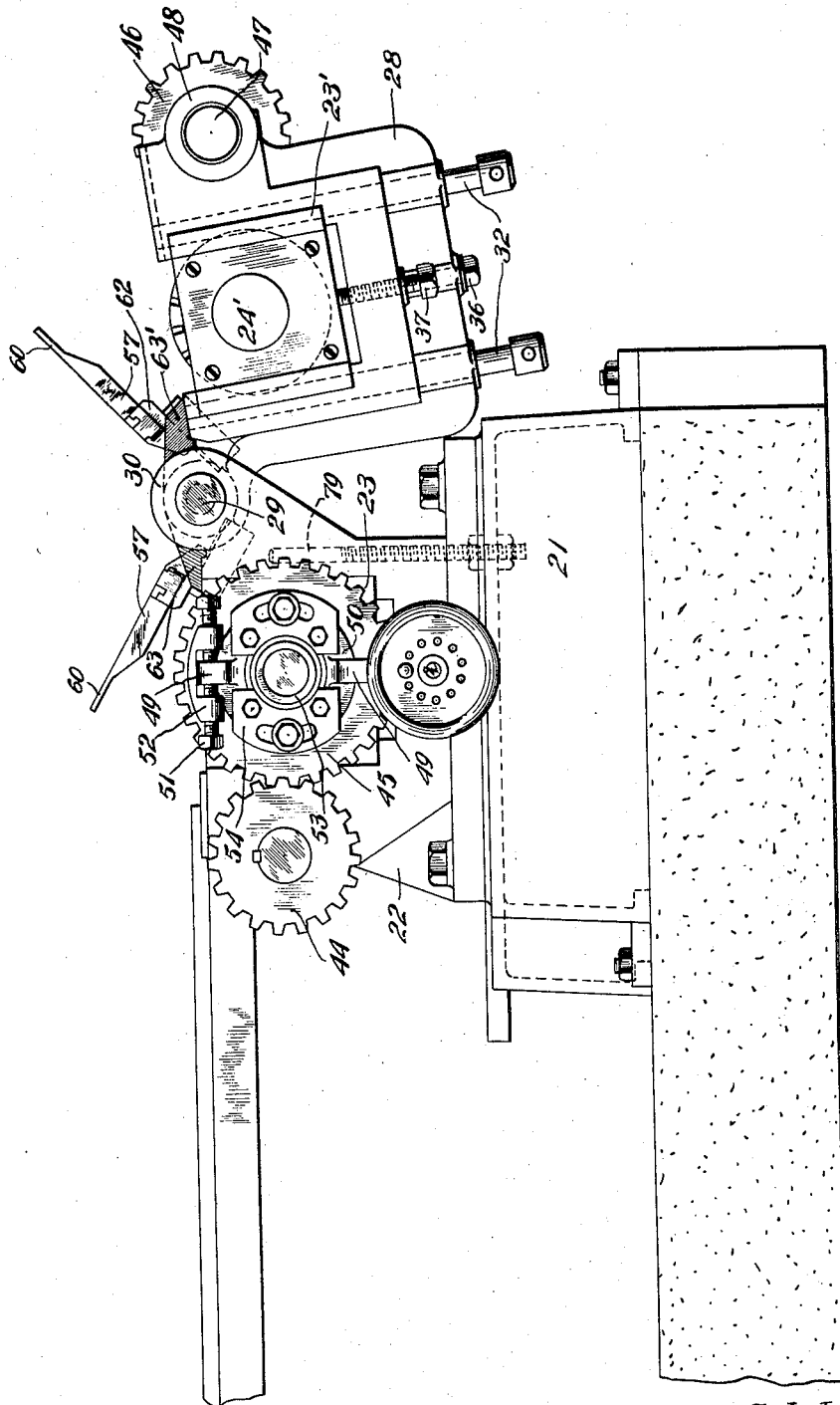


Fig. 2

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9 Sheets-Sheet 3

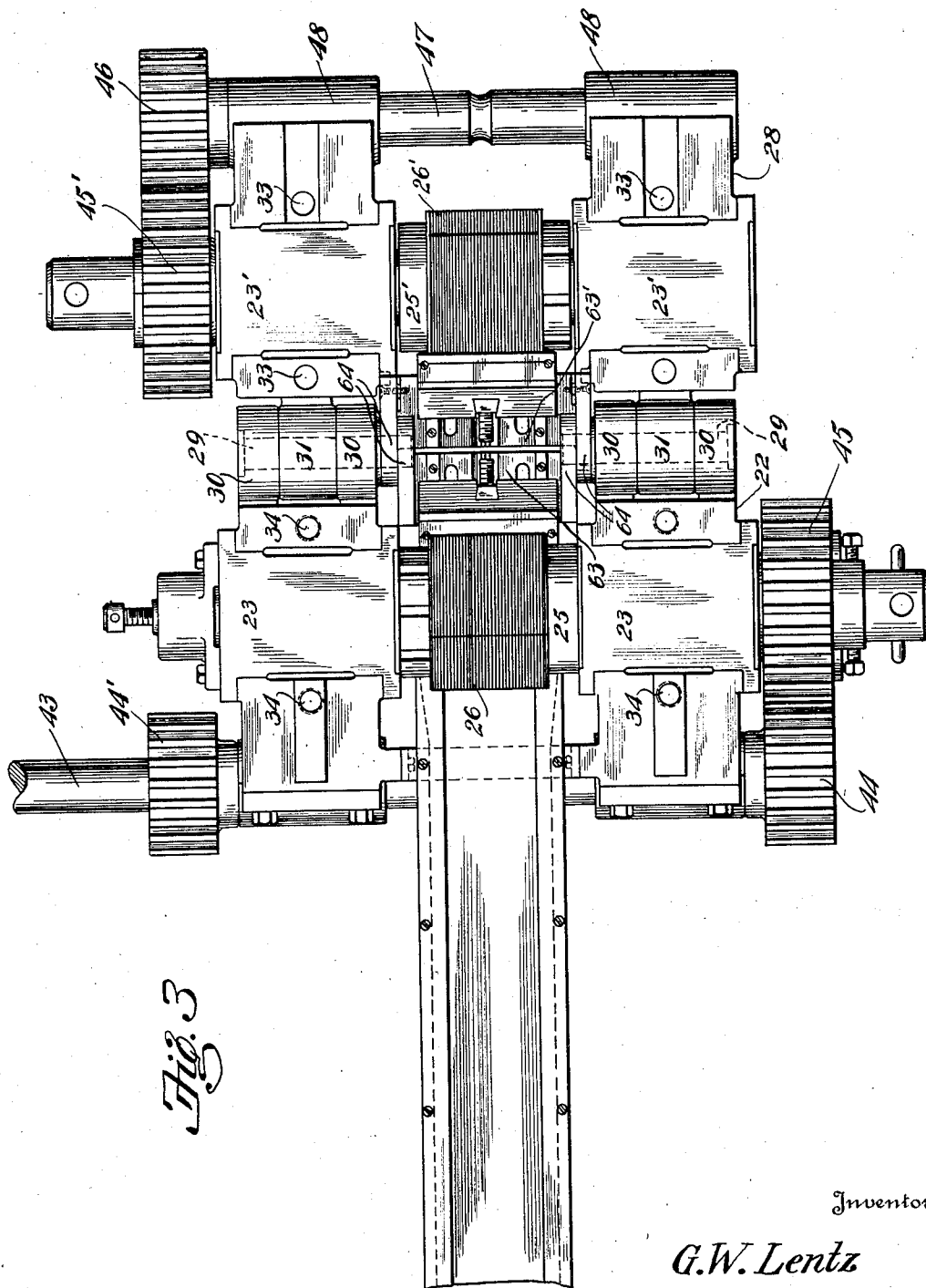


Fig. 3

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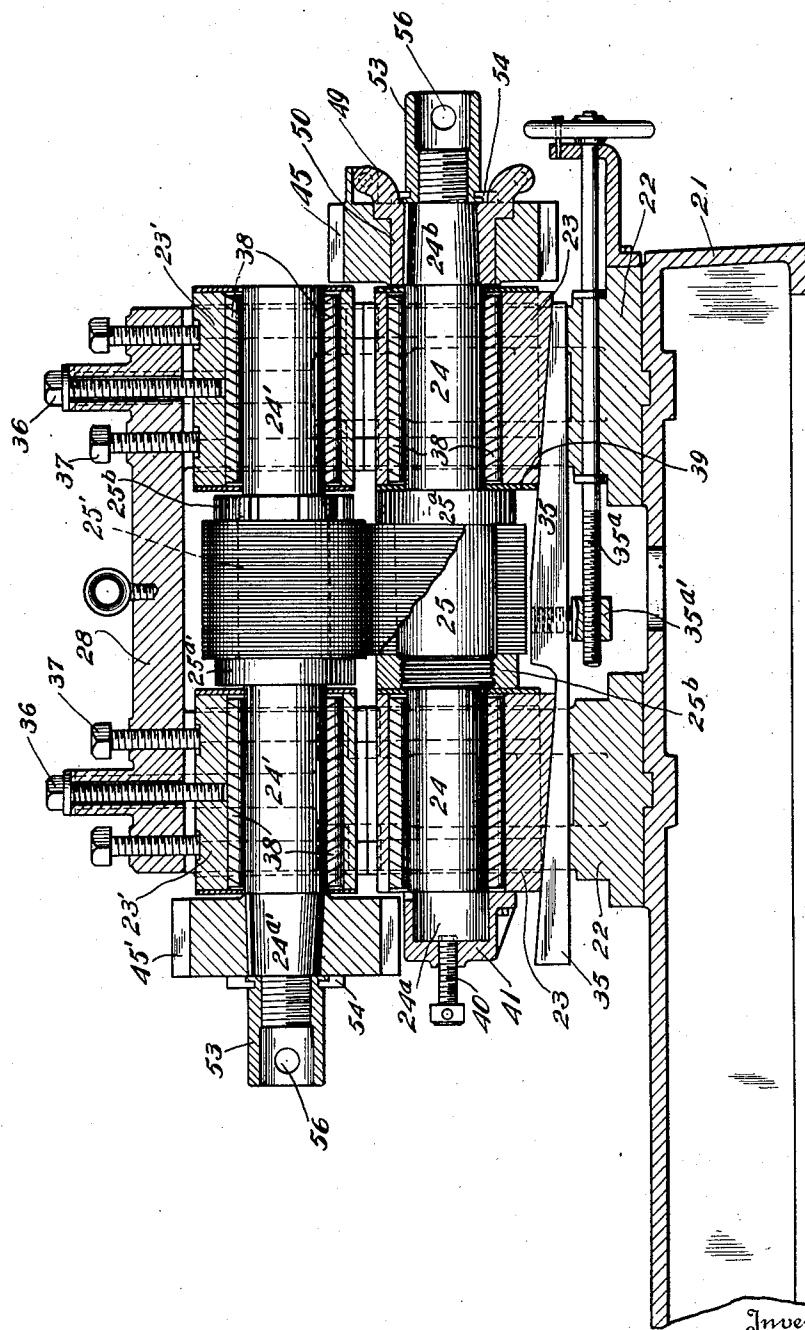
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9 Sheets-Sheet 4

Fig. 4



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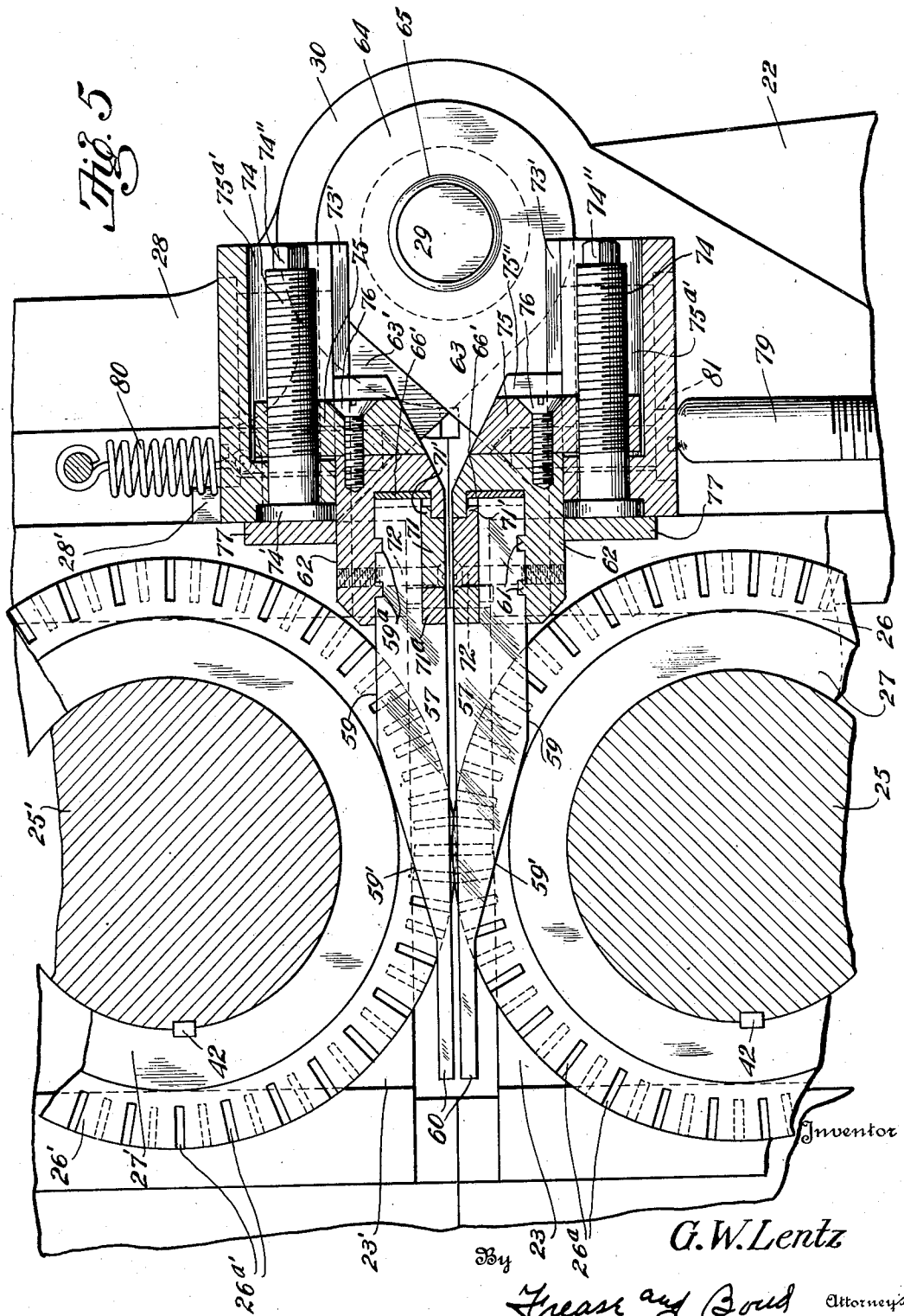
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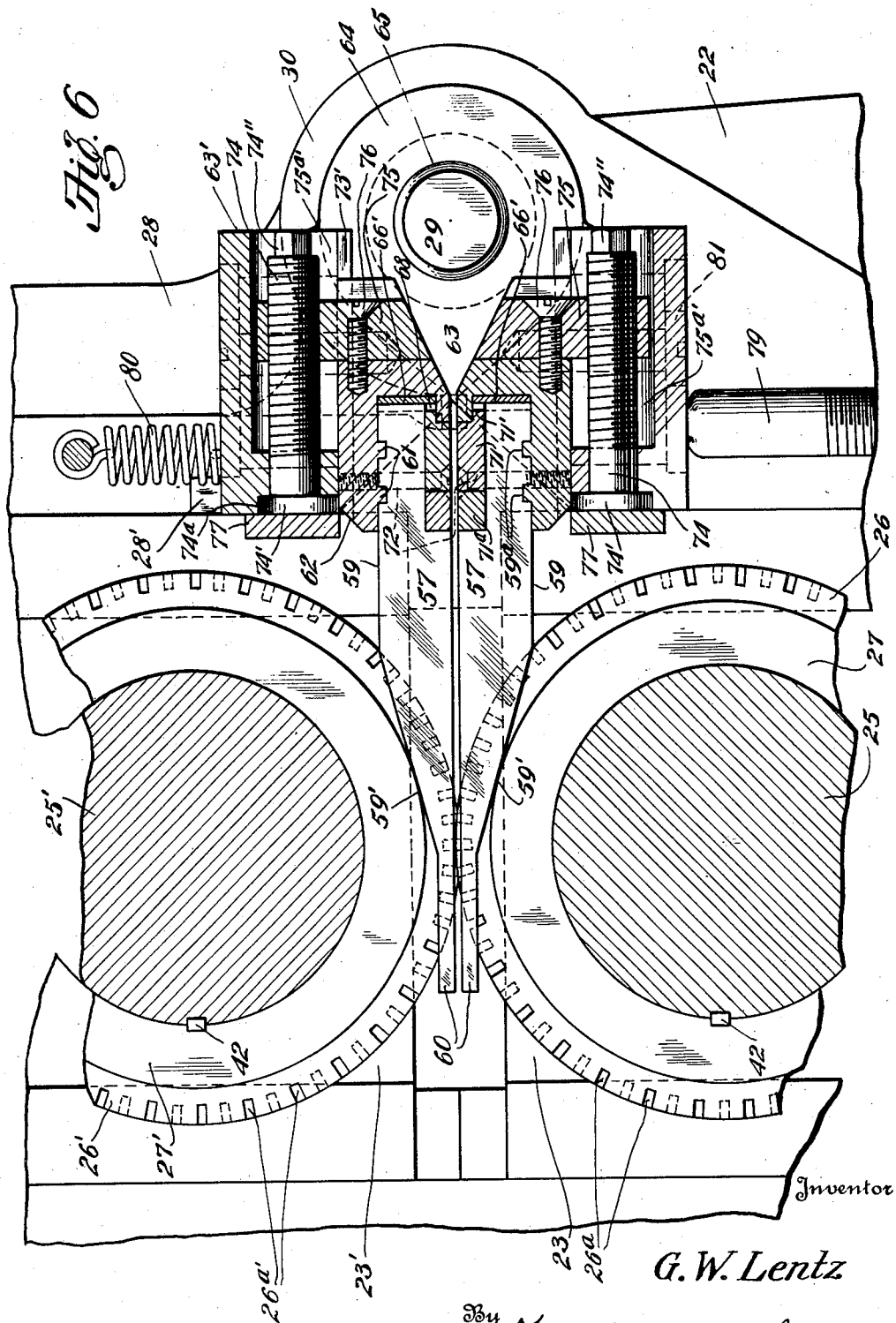
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SHEET METAL SLITTING MACHINE

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9 Sheets-Sheet 6



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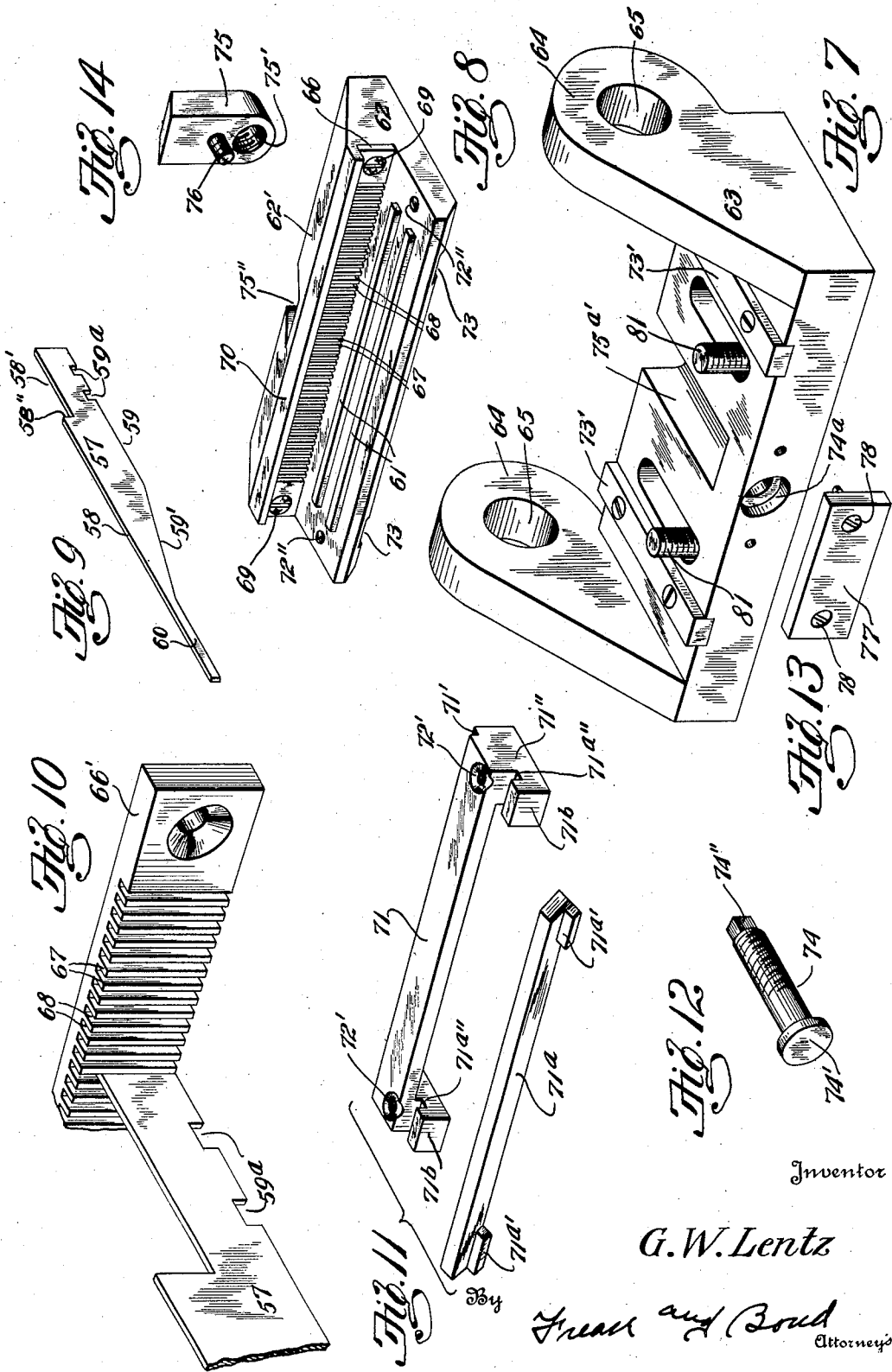
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9 Sheets-Sheet 7



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SHEET METAL SLITTING MACHINE

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9 Sheets-Sheet 8

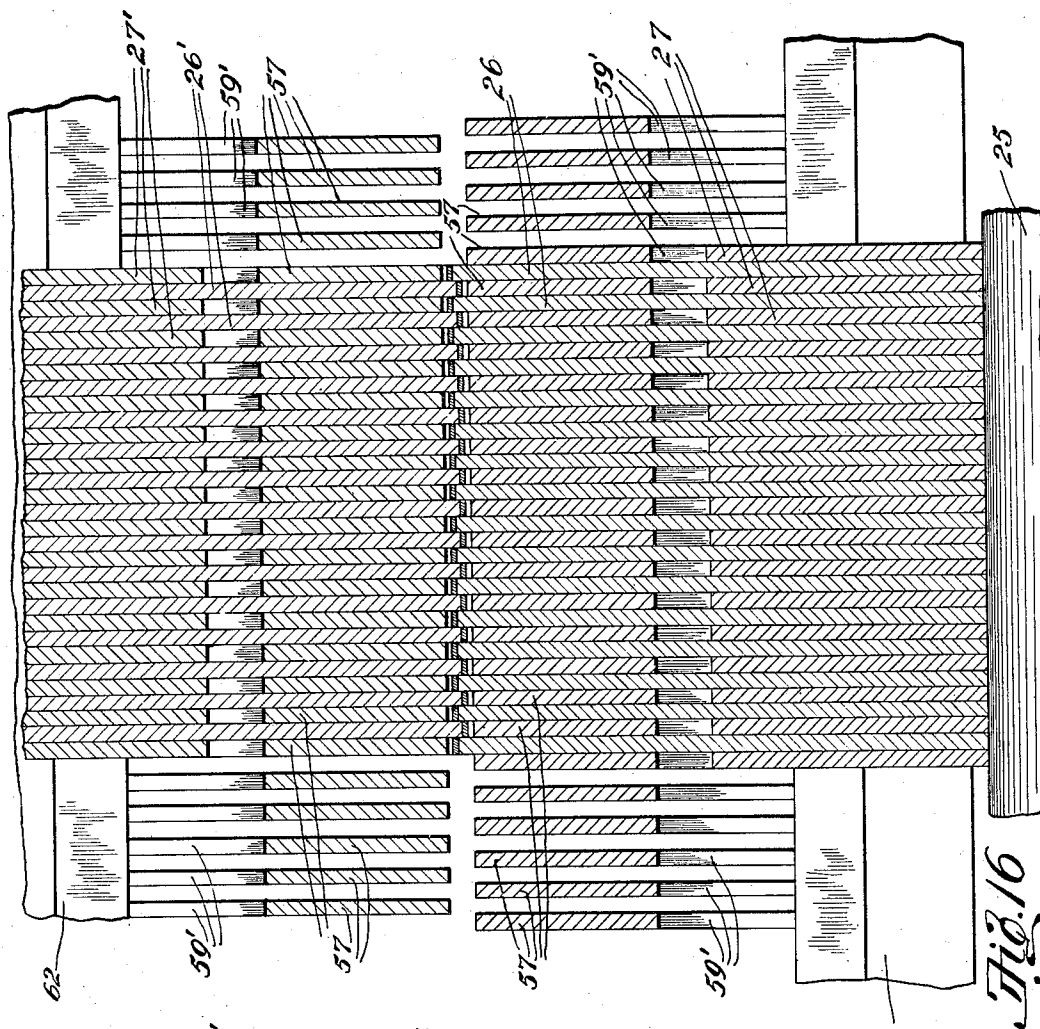


Fig. 16

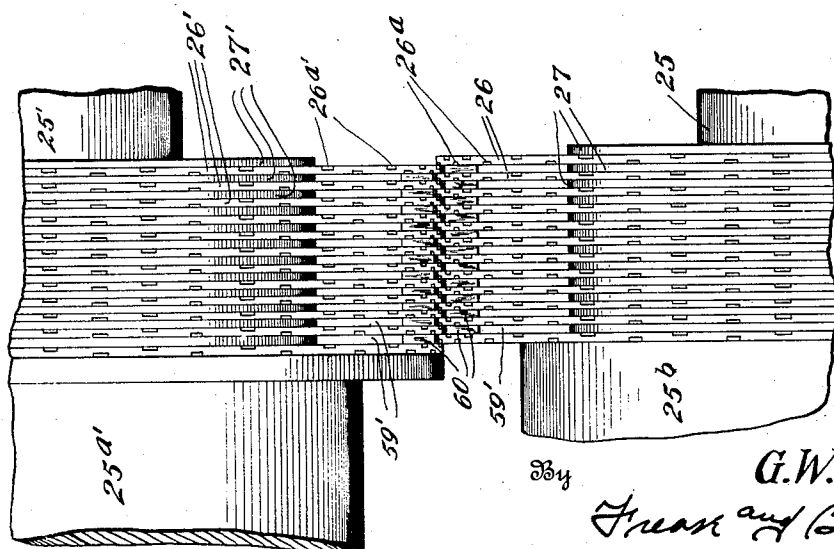


Fig. 15

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SHEET METAL SLITTING MACHINE

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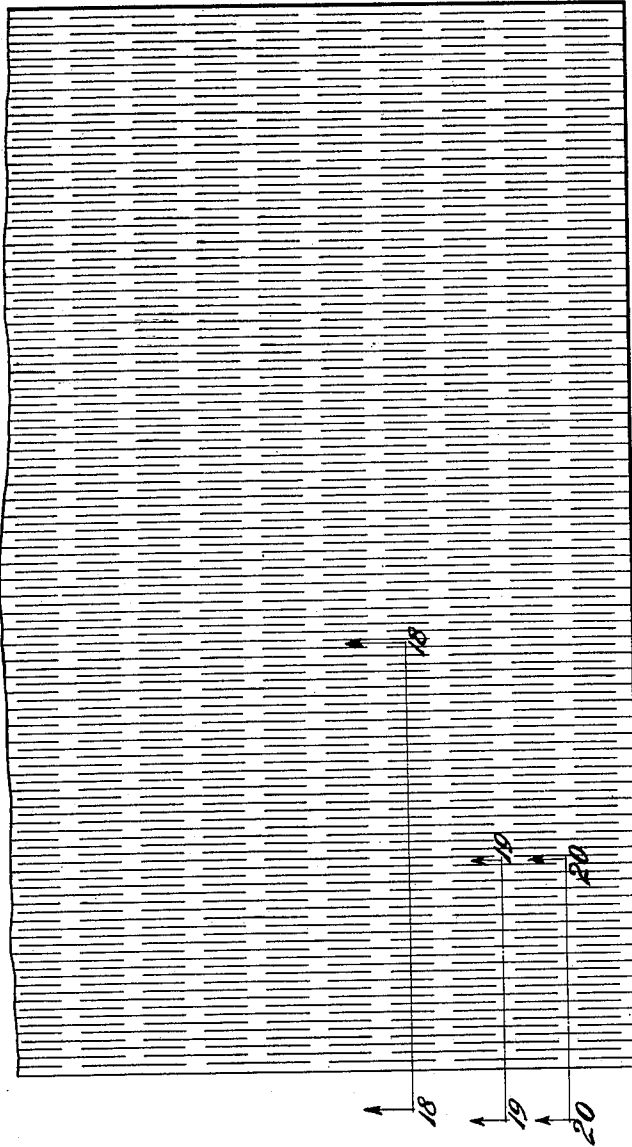


Fig. 17

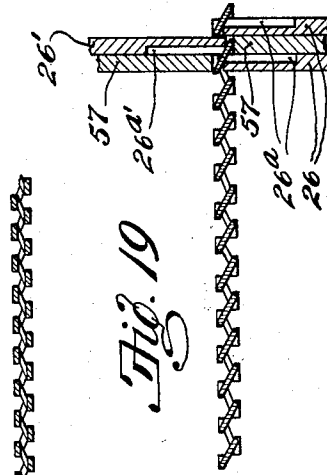


Fig. 19

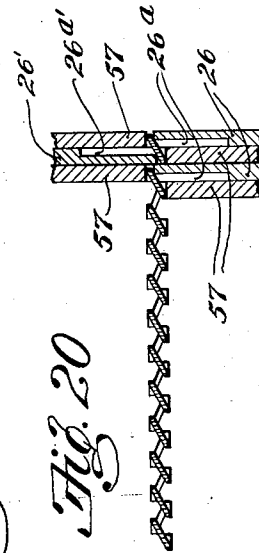


Fig. 20

Fig. 18

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UNITED STATES PATENT OFFICE.

GEORGE W. LENTZ, OF CANTON, OHIO, ASSIGNOR TO UNITED ALLOY STEEL CORPORATION, OF CANTON, OHIO, A CORPORATION OF NEW YORK.

SHEET-METAL-SLITTING MACHINE

Application filed January 15, 1923. Serial No. 612,747.

To all whom it may concern:

Be it known that I, GEORGE W. LENTZ, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Sheet-Metal-Slitting Machines, of which the following is a specification.

The invention relates to roller slitting machines in which the rolls are made up of a plurality of cutting rings with intervening-spacing rings, and especially to the stripper bars used for guiding a sheet into and out of the nip of the rolls and to strip the sheet from the cutting rings at the rear side of the roll.

The general object of the improvement is to provide a supporting block for the free end of the stripper bars in front of the rolls, so that the stripper bars will extend rearward between the peripheral portions of the cutting rings and terminate with free ends in rear of the rolls; and another object of the improvement is to hinge the supporting block for each set of stripper bars, so that they may be swung collectively to and from their operating position between the cutting rings, and also to support the stripper bars upon the blocks in such a manner that individual bars can be readily removed for repair or replacement in case of need, without disturbing other bars of the set.

In machines of this type when stripper bars are supported in rear of the slitting rolls so as to extend forward to terminate with free ends in front of the roll, difficulty is experienced when soft spots are present in the cutting disks, because the sheets are not always cut but will sometimes wedge between the cutting rings, and the ejection of the same by the stripper bars is difficult, and often causes a congestion of the slit sheet in rear of the rolls, which results in the breaking of one or more stripper bars, whereupon the sheet will buckle and bunch and will frequently break many, if not all of the stripper bars, and may also damage the cutting rings.

The present invention overcomes this difficulty by supporting the stripper bars solely

in front of the slitting rolls, so that the slit sheet will freely slide off from the rear free ends of the stripper bars and in case of the breaking of a bar the sheet will not buckle or bunch at the rear of the rolls, or cause any further damage to the machine.

And again when the free end of stripper bars extend forward freely in front of the slitting rolls, the hands of workmen engaged in feeding sheets into the machine have sometimes been caught and mangled by the rolls. This danger is prevented by the present improvement, in which the supporting blocks for the upper and lower sets of stripper plates, form a guard in front of the slitting rolls which prevents the hand of a workman from entering between the same.

Another object of the improvement is to provide means for adjusting the slitting rolls with reference to each other, to compensate for the reduced diameter when the peripheries of the cutting rings are sharpened by grinding, and also to shape the stripper bars with inclined edge portions to bear upon the spacer rings and to provide means for adjusting them longitudinally to accommodate a change in the diameter of the slitting rings when the same are ground to keep them sharp.

A further object of the improvement is to provide a separate housing for the upper slitting roll and to hinge the same to the housings of the lower slitting roll, and to locate the hinge in front of the slitting rolls coaxially with the hinge of the supporting block for the stripper bars; so that the upper roll with its set of stripper bars can be swung forward free from the lower roll, and so that the sets of stripper bars can then be swung upward freely from the corresponding slitting rolls, to give free and ready access to all of these parts in case of need.

The invention is illustrated in the accompanying drawings, forming part hereof, in which—

Figure 1 is a side elevation of the slitting machine;

Fig. 2, a similar view showing the upper

roll and housing swung forward, and the two sets of stripper plates swung upward on their hinges;

Fig. 3, a plan view of the slitting machine, showing the upper roll and housing swung forward, with the stripper bars in normal position with respect to each roll;

Fig. 4, a transverse elevation section of the machine through the axes of the slitting rolls, on line 4—4, Fig. 1;

Fig. 5, a longitudinal median-line elevation-section of the slitting rolls, stripper bars, and the supporting blocks and hinges for the same, showing the stripper bars adjusted rearward;

Fig. 6, a similar view, showing the stripper bars adjusted forward;

Fig. 7, a detached perspective view of the hinge frame for the stripper bar supporting block;

Fig. 8, a detached perspective view of the stripper bar supporting block;

Fig. 9, a detached perspective view of a single stripper bar;

Fig. 10, a fragmentary detached perspective view of a stripper bar spacing plate;

Fig. 11, a detached perspective view of the two sections of a stripper bar locking plate;

Fig. 12, a detached perspective view of a stripper bar adjusting screw;

Fig. 13, is a detached perspective view of a retaining plate for the same;

Fig. 14, a detached perspective view of a screw bearing for the same;

Fig. 15, a fragmentary elevation of the slitting rolls;

Fig. 16, a fragmentary enlarged section of the slitting rolls in the plane of their axes, as on line 4—4, Fig. 1;

Fig. 17, a plan view of a sheet slit by the machine;

Fig. 18, a transverse section of the same on line 18—18, Fig. 17;

Fig. 19, an enlarged section as on line 19—19, Fig. 17, showing the operation of the cutting disks; and

Fig. 20, an enlarged section as on line 20—20, Fig. 17, showing the operation of the cutting disks.

Similar numerals refer to similar parts throughout the drawings.

The machine may include a base 21 upon which is mounted housings 22 carrying bearing boxes 23 for journals 24 of an arbor 25 upon which are mounted cutting rings 26 and spacing rings 27, comprising the lower cutting roll.

Upon the lower housing 22 is mounted an upper housing 28, in each side of which is carried a bearing box 23' for journals 24' of an arbor 25' upon which are mounted cutting rings 26' and spacing rings 27', comprising the upper cutting roll.

A hinge shaft 29 is secured in bearing lugs 30 provided on the forward side of each

lower housing 22, which shafts form journals for hinge lugs 31 provided on the forward side of the upper housing, the hinge lugs entering between the corresponding bearing lugs on the lower housing.

The upper housing is normally secured to the lower housing by bolts 32 extending through free openings 33 in the upper housing and screwed into tapped holes 34 in the lower housings, and for releasing the upper housing to swing it forward upon its hinged connection with the lower housings, it is only necessary to unscrew the bolts 32.

The lower journal boxes 23 are adjusted upward and downward in the lower housing by means of tandem wedges 35, bearing in the lower housings and operated by a screw 35^a swivelled in the housings and turning in a screw bearing 35^{a'} secured to the wedge between the housings, with a hand wheel at the side of the machine; and the upper journal boxes 23' are adjusted upward and downward by means of hold-up bolts 36 and hold-down bolts 37; by means of which adjustments the rolls can be moved toward each other to compensate for the reduced diameters thereof resulting from a grinding of the cutting rings to keep them sharp.

Each arbor is provided with an annular flange 25^a and 25^{a'} and spacing rings 27 and 27', which are mounted on the respective arbors and are stopped from rotation thereon by means of keys 42; and a collar nut 25^b is screwed on the other end of each arbor for clamping the series of cutting and spacing rings sidewise together thereon.

The several bearing boxes 23 and 23' for the journals 24 and 24' of the slitting rolls, may be provided with anti-friction rolls 38; and the arbor 25 of the lower roll is held in fixed position endwise by the abutment of its flange collar 25^a with a fiber washer 39 bearing against the inner end of the adjacent bearing box, and by a set screw 40 turned through the head of a cap 41 secured to the outer end of the opposite bearing box and operating against an extension 24^a on the end of the journal 24; while the length of the arbor 25 of the upper slitting roll, between the outer faces of its annular flange 25^{a'} and its collar nut 25^b, is slightly less than the interval between the inner ends of the bearing boxes 23', so as to give this arbor a sufficient endwise play to permit the peripheries of the spaced cutting rings 26' of the upper roll to find their way between the peripheral portions of the spaced cutting rings 26 of the lower roll, when the upper roll is swung into operative position and the upper housing is secured to the lower housing by means of the bolts 32.

Power from a suitable source, not shown, is communicated to the machine by a drive shaft 43 having drive pinions 44 and 44' fixed thereon at opposite sides of the ma-

chine; one of which pinions 44 meshes with a gear wheel 45 fixed upon an extension 24^b on one end of the lower arbor journal, and the other one of which pinions 44' meshes with an idle pinion 46 mounted on a counter-shaft 47 journaled in bearings 48 provided on the rear side of the upper housing, which idle pinion in turn meshes with the gear wheel 45' secured upon an extension 24^a on the corresponding journal of the upper arbor; it being understood that the idle pinion 46 is adapted to be swung to and from the drive pinion 44 when the upper housing is swung to and from the lower housings.

When the gear wheels are all in mesh, an exact rotary adjustment of the lower arbor with reference to the upper arbor so as to bring the notches 26^a in the lower cutting rings to register with corresponding notches 26^a in the upper cutting rings, is accomplished by abutment ears 49 protruding from the end of a sleeve 50 keyed upon the extension 24^b on the end of one journal 24 of the lower arbor, and set screws 51 turning in ears 52 protruding from the corresponding side of the gear wheel 45, which wheel is swiveled on the sleeve 50 so as to permit a rotary adjustment of the gear wheel with reference to the lower arbor 25 by a proper turning of the set screws 51.

Tubular extensions 53 may be screwed to the end of one journal of each roll with a swivelled connection by means of retaining plates 54, secured to the sides of the corresponding gear wheels 45 and 45' and each of the tubular extensions may be provided with radial openings 56 for the engagement of a suitable tool with which to pull the gears from the ends of the arbors.

Each stripper bar 57 is formed straight, and with an intermediate portion 59' of its opposite edge 59 inclined or beveled rearward toward the guide edge so as to form a comparatively narrow finger 60 for extending rearward through and beyond the interval between the spaced peripheral portions of adjacent cutting rings; in which position the inclined portion of the opposite edge of the bar may bear upon the peripheral edge of the spacing ring located between the same cutting rings, as shown in Figs. 5 and 6.

The same edge 59 of each stripper bar is provided with one or more notches 59^a near the rear end of the bar, for engagement with retaining ribs 61 provided on the supporting block 62 which block is secured to a hinge frame 63 or 63', having ear flanges 64 on each end with bores 65 therein, bearing on the inner ends of the shafts 29 upon which the upper housing is hinged. The supporting block and hinge frame for each set of stripper bars are exactly alike, excepting that the length of the block and the frame for the lower set is shorter than

the length of the bar and block for the upper set, so that the ear flanges 64 of the lower frame will fit inside the ear flanges of the upper frame, as well shown in Fig. 3.

Each supporting block is provided with an upright abutment 66 for the forward ends of the stripper bars, and this shoulder is provided with a series of spaced tongues 67 with intervening upright grooves 68 for receiving and properly spacing the forward ends of the stripper bars. For convenience of construction and replacement, these tongues and grooves may be formed on a detachable plate 66' secured to the abutment shoulder 66 by means of screws 69, at each end, as shown in detail in Figs. 8 and 10.

Each supporting block is also provided with a retaining flange 70 extending rearward from the upright abutment so as to overhang the rear ends of the stripper bars 57, which in turn are provided with a recess 58' formed by an off-set 58'' in the guide edge 58 adjacent to the rear end of the bar, into which recess is entered a locking plate 71 extending across the ends of all the stripper bars in the set supported by the block, and being provided with a rabbeted lip 71' for extending under the retaining flange 70 of the supporting block, as shown in Figs. 5 and 6.

Each locking plate may also be provided with a foot 71'' on each edge end for resting upon the supporting block when the locking plate engages the recessed edge 58' of the stripper bar, and the locking plate may be clamped in position upon the supporting block by means of screws 72 entered through free holes 72' in the ends of the locking plate and turned into tapped holes 72'' provided in the supporting block.

For convenience in assembling the parts each locking plate is preferably made with a detachable rear section 71^a which is provided with foot lugs 71^a' for engagement in grooves 71^a'' formed by L-flanges 71^b on the rear ends of the feet 71'' of the locking plate. The detachable section of the lock bar may be secured in position by overhanging portions of the heads of the screws 72, as shown by broken lines in Figs. 5 and 6.

The stripper bars are engaged with the supporting block by entering the rear end of each bar into one of the grooves 68 in the abutment plate 66', as shown in Fig. 10, and at the same time engaging the notches 59^a with the retaining ribs 61 on the block; after which the locking plate 71 is placed in position against the recessed edges 58' at the rear ends of the stripper bars, by entering its lip 71' under the overhanging flange 70 of the supporting bar, whereupon the detachable section 71 of the

locking plate is placed in position with its foot lugs 71^a engaged in the grooves 71^a and its rear edge in abutment with the offsets 58 in the guide edges of the stripper bars and the locking plate is then clamped against the recessed edge of the stripper bars by the screw 72.

The parts are so proportioned that the face of the overhanging flange 70, the face of the lock bar and its detachable section, are in the same plane with the guide edge of the stripper bars, so as to form a straight guide way between the adjacent edges of the stripper bar and the faces of the supporting blocks and locking plates; and the faces 62' of the supporting block in front of the retaining flange are divergently beveled or inclined forward so as to form a flared opening for receiving and directing the edge of a sheet into the guide-way formed by the stripper bars and their supporting members, while the blocks proper guard the entrance to the nip of the rolls.

Each supporting block is provided with guide grooves 73 for receiving guide tongues 73' formed or secured on the body of the hinged frame, when the supporting block is mounted thereon, the guide ways and guide grooves extending across the block and frame longitudinally of the machine; and each guide block may be adjusted longitudinally of the machine by means of a screw 74, swivelled in an opening 74^a in the hinge frame and turning in a screw bearing 75' formed in a lug 75 extending from the forward side of the supporting block and operating in channel 75^a provided in the body of the hinge flange.

For convenience of construction, the lug 75 may be detachably secured in a recess 75'' in the forward edge of the supporting block by means of a screw 76; and the rear end of each screw 74 may be provided with a head 74' countersunk in the opening 74^a wherein it is retained by a plate 77 secured to the rear edge of the hinge frame by screws 78; while the forward end of each screw 74 may be provided with a squared protrusion 74'' to which a tool may be applied for turning the screws to adjust the supporting blocks forward and rearward upon the hinge frames.

An adjustable abutment post 79 is secured to and rises from the base of the machine, upon which the hinge frame 63 of the lower supporting block rests for normally holding the guide edges of the lower set of stripper bars in proper position; and lugs 28' protruding from the upper housing form abutments for the inner rear corners of the hinge frame for the upper supporting block to normally stop the same for holding the guide edges of the upper stripping bar in proper position: it being understood that

the lower hinge frame will rest upon the abutment post 79 by the action of gravity, while the upper hinge frame is held against the abutments 28' by means of an expansion spring 80 connecting the upper hinge frame with the upper housing.

The rear ends of the stripper bars may also be sustained by a bearing of their inclined edge portions 59' upon the peripheries of the spacing rings 27 or 27', as shown in Figs. 5 and 6; and the endwise adjustment of the stripper bars by means of screws 74 is provided, to accommodate the varying distance between the peripheries of the spacing rings, as the slitting rolls are adjusted toward each other when the diameter of the cutting rings is reduced by a grinding of the peripheries thereof.

The position of the parts, before the slitting disks have been ground to reduce their diameter, is shown in Fig. 5, wherein the stripper bars are longitudinally adjusted rearward so that the forward portions of their inclined edges 59' may bear upon the peripheries of the spacing rings; and the position of the parts, after the slitting disks have been ground to materially reduce their diameter, is shown in Fig. 6, wherein the stripping bars are longitudinally adjusted forward so that the rearward portions of their inclined edges may bear upon the peripheries of the spacing rings.

In this manner the stripping bars are always supported and sustained by the peripheries of the spacing rings in front of the nip of the rolls, whatever may be the diameter of the slitting rings, until the same have been so reduced in diameter by grinding that they must be replaced by new rings.

When the supporting block 62 has been adjusted one way or another upon the hinge frame 63, it may be fixed thereon by means of cap screws 81.

I claim:—

1. A slitting machine including slitting rolls, stripper bars extending through between the rolls, and supporting means for the stripper bars solely in front of the nip of the rolls.

2. A slitting machine including slitting rolls, stripper bars extending through between the rolls, supporting means for the stripper bars in front of the nip of the rolls, and means for adjusting the stripper bars endwise.

3. A slitting machine including slitting rolls with cutting rings and intervening spacing rings, stripper bars extending through between adjacent cutting rings and bearing on the spacing rings, and supporting means for the stripper bars in front of the rolls.

4. A slitting machine including slitting rolls with cutting rings and intervening

spacing rings, stripper bars extending through between adjacent cutting rings and having inclined edges bearing on the spacing rings, and supporting means for the stripper bars solely in front of the rolls.

5 5. A slitting machine including slitting rolls with cutting rings and intervening spacing rings, stripper bars extending through between adjacent cutting rings and having inclined edges bearing on the spacing rings, supporting means for the stripper bars at the sides of the rolls, and means for adjusting the stripper bars endwise.

15 6. Supporting means for the ends of the stripper bars for the rolls of a slitting machine, including a block engaging one edge of the bars, with an abutment having grooves receiving and spacing the ends of the bars, and a detachable locking plate extending across the other edge of the bars.

20 7. Supporting means for the ends of stripper bars in a slitting machine, including a block with a transverse rib thereon, a notch in one of the edges of the bars engaging the rib, and a detachable locking plate extending across the other edges of the bars.

25 8. A slitting machine including housings, slitting rolls journaled in the housings, stripper bars extending through between the rolls, supporting blocks for the ends of the stripper bars to guard the rolls, the faces of the blocks being beveled to guide the sheet between the stripper bars.

30 9. A slitting machine including a housing, a slitting roll journaled in the housing, stripper bars extending through the peripheral portion of the roll, and a hinged support for the ends of the stripper bars at one side of the roll.

40 10. A slitting machine including a housing, slitting rolls journaled in the housing, a hinge connection between the housings at one side of the sliding rolls, stripper bars extending through between the rolls and

supports for the ends of the stripper bars 45 hinged coaxially with the housing hinge.

11. A slitting machine including a housing, a slitting roll journaled in the housing, stripper bars extending through the peripheral portion of the roll, a transverse block 50 at the side of the rolls engaging the ends of the stripper bars, and a frame supporting the block, with means for adjusting the block on the frame to move the stripper bars endwise.

55 12. A slitting machine including housings, bearing boxes in the housings, a slitting roll journaled in the bearings, and adjusting means for the bearing boxes including tandem wedges bearing in the housings, and a screw swiveled in one housing, 60 a screw bearing secured to the wedges between the housings, there being a hand wheel on the adjusting screw at one side of the machine.

65 13. A slitting machine including housings, bearing boxes in the housings, a slitting roll journaled in the bearings, and adjusting means for the bearing boxes including tandem wedges bearing in the housings, 70 and means for adjusting the tandem wedges endwise.

14. A slitting machine including slitting rolls, stripper bars extending through the adjacent peripheral portions of the rolls, 75 hinged supports for the ends of the stripper bars at the side of the rolls and abutments for the hinged supports to properly position the stripper bars.

15. A slitting machine including slitting 80 rolls, stripper bars extending through the adjacent peripheral portions of the rolls, hinged supports for the ends of the stripper bars at the side of the rolls, abutments for the hinged supports to properly position the 85 stripper bars and a spring sustaining the upper hinged support.

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