J. MONKS.

SLOTTING MACHINE.

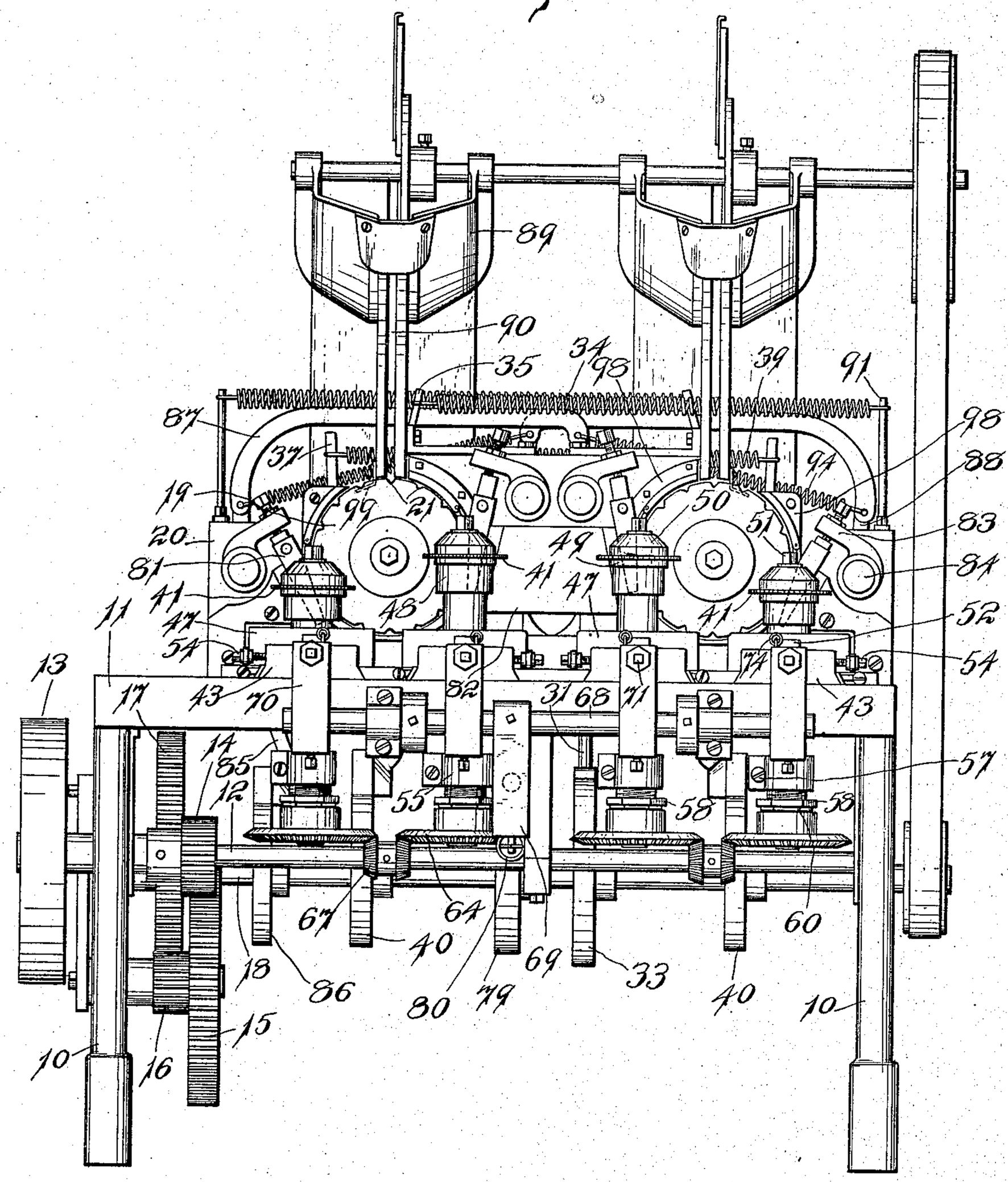
APPLICATION FILED DEC. 30, 1911.

1,166,621.

Patented Jan. 4, 1916.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

Eva L. Stoughton

Louis Lucia

INVENTOR.

James Monks,

BY

Arthur B. Jenkins.

ATTORNEY.

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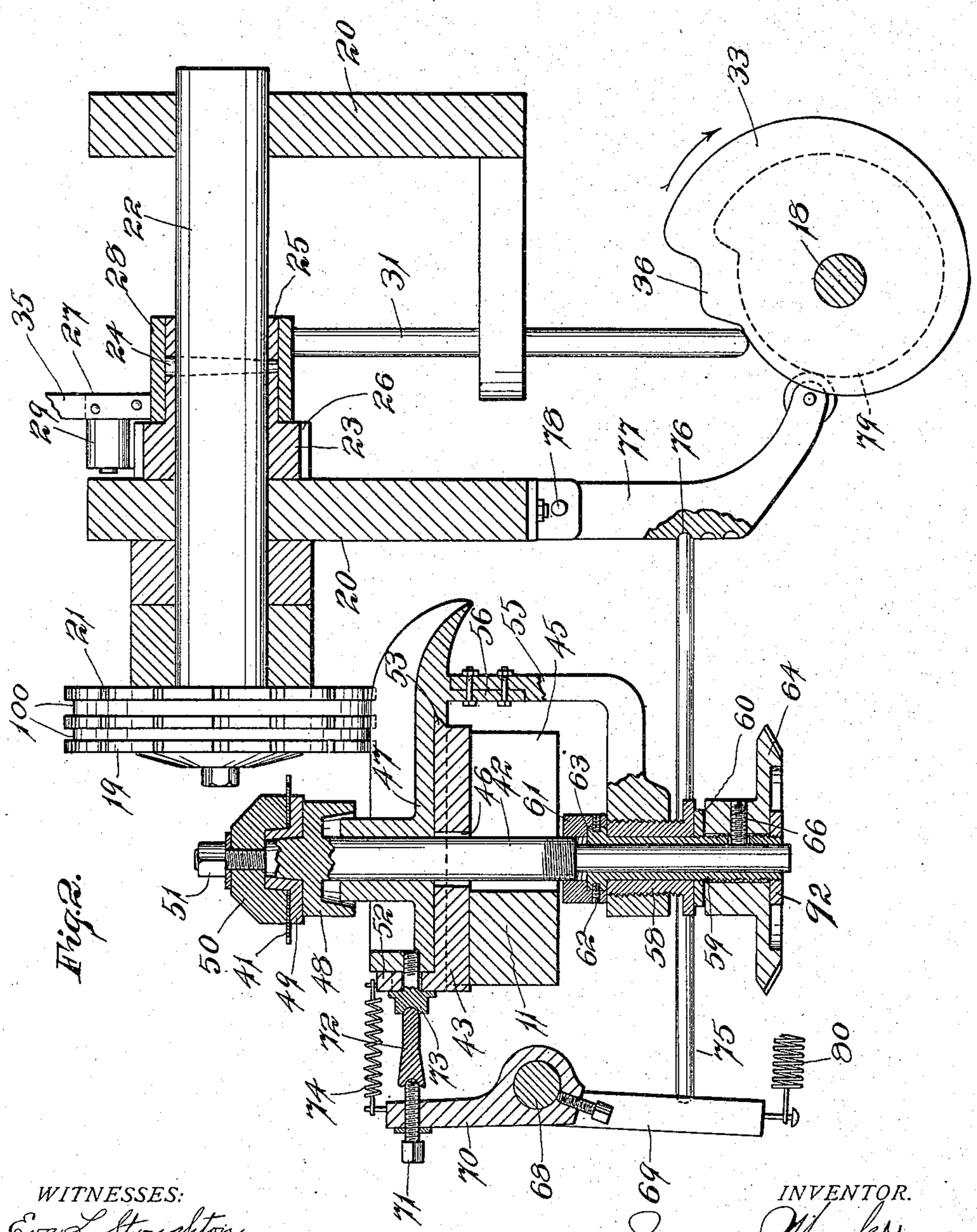

Fig. 2.

WITNESSES:

Eva L. Stoughton

Louis Lucia

INVENTOR.

James Monks,

BY

Arthur B. Jenkins.

ATTORNEY.

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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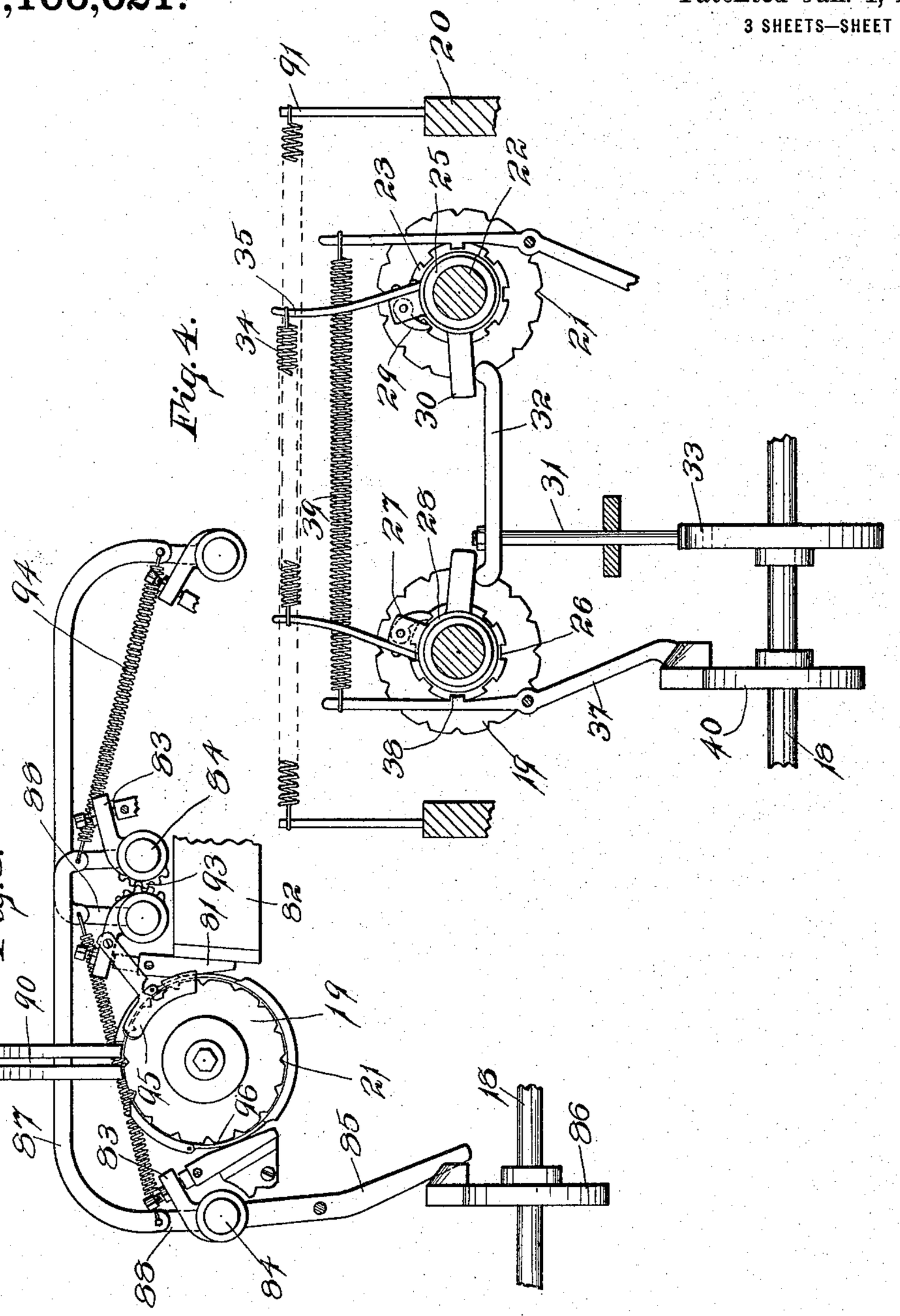
3 SHEETS—SHEET 3.



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ATTORNEY.

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JAMES MONKS, OF HARTFORD, CONNECTICUT.

SLOTTING-MACHINE.

1,166,621. Specification of Letters Patent. **Patented Jan. 4, 1916.**

Application filed December 30, 1911. Serial No. 668,600.

To all whom it may concern:

Be it known that I, JAMES MONKS, a subject of the King of England, and a resident of Hartford, in the county of Hartford and State of Connecticut, have invented a new and Improved Slotting-Machine, of which the following is a specification.

My invention relates more especially to that class of machines used for slotting the heads of screw blanks, and an object of my invention, among others, is to provide a device of this class that shall be extremely efficient in the character of work produced, and rapid in the quantity of work turned off. This and other objects, which will appear from the accompanying drawing and description, may be obtained in the construction and use of the machine illustrated in the accompanying drawings, in which—

Figure 1 is a view in front elevation of a portion of a machine embodying my invention, the holders shown in Fig. 3 being omitted. Fig. 2 is a detail view, scale enlarged, of the mechanism relating to the saws, and also the feed for the carrier disks. Fig. 3 is a detail view illustrating the construction of the support for the carrier disk, the securing means for the spring holders and the extractors, shown in Fig. 1, being omitted. Fig. 4 is a detail view illustrating the feed mechanism for the carrier disk and also the locking mechanism therefor.

In the accompanying drawings the numeral 10 denotes standards or legs, and 11 the bed of my improved machine, which may be of any suitable form and construction, and in which standards a main shaft 12 is mounted having a driving pulley 13 secured thereto. A driving pinion 14 is secured to the driving shaft and meshes with an intermediate gear 15 suitably mounted, as upon a stud projecting from the standards and having an intermediate pinion 16 meshing with a gear 17 on a cam shaft 18 mounted in the standards or legs, and having secured thereto cams for performing various operations.

A carrier disk 19 is suitably mounted in the frame of the machine, which frame apart from the bed and standards hereinbefore mentioned will be generally designated by the numeral 20. This disk has notches 21 located in its periphery to receive blanks, the heads of which are to be slotted or nicked by the machine. In the form of construction herein shown the disk is secured in any suitable manner to a shaft 22, to which shaft an indexing wheel 23 is secured as by means of a tapered locking pin 24 passing through a hub 25 extending from the indexing wheel. This indexing wheel has notches 26, in my improved construction these being half in number as compared with those in the carrier disk.

A pawl supporting arm 27 is pivotally mounted upon the hub 25, in the form of construction shown this arm having a hub 28 forming the bearing for the arm. A pawl 29 is pivotally mounted upon the arm in such position that its free end will engage the notches 26 in the indexing wheel.

My improved machine herein shown contains a plural number of carrier disks which operate in pairs, a single member in many instances being employed to perform a double function in connection with both disks, and where herein the description mentions a single disk only, it will be understood as applying equally to both or all the disks unless it be specifically stated that it refers to a designated disk.

An indexing arm 30 is secured to and projects from the hub 28 in position to be operated by an indexing plunger 31 mounted for reciprocating movement in the frame 20.

In the form of construction herein shown a single plunger is employed to actuate the indexing mechanism of two disks, this plunger having a cross arm 32 located to underlie two of the indexing arms 30, as plainly shown in Fig. 4. An indexing cam 33 is secured to the cam shaft 18 in position to operate the plunger 31.

An important feature of my invention resides in such construction that what I term the "effective" movement is obtained by means of springs, and this is true of the indexing mechanism, the movement of the parts to position the pawls for feeding movement being obtained by means of the cam 33, and the actual feed or "effective" movement being obtained by means of a feed spring 34 attached to a spring supporting arm 35 secured to each of the pawl supporting arms 27, in the construction shown herein a single spring performing the function for each of the indexing mechanisms, the ends of the springs being secured to posts 91.

By reason of the peculiar arrangement of saws hereinafter to be described the carrier disk receives blanks in two of its blank

notches at each single movement of the disk, a pause occurring during such movement to allow a blank to be deposited in one of the notches, the other blank being deposited while the carrier is at rest, just before it starts its movement or just after it completes it. In order to effect this peculiar feeding movement the indexing wheel 23 is provided with half the number of notches as are in the periphery of the disk as hereinbefore described, so that two of the notches will be presented to receive a blank from a proper supply at each reciprocating movement of the indexing pawl. As hereinabove stated the return movement of the pawl is effected by means of the spring 34, but this movement is governed by means of the cam 33 which performs the double function of moving the pawl to its position to feed the carrier and also controlling the return or feeding movement under the pull of the spring 34. To accomplish this result a step 36 is provided in the cam which momentarily arrests the "fall" of the plunger 31 from the highest to the lowest part of the cam, which movement takes place abruptly, the movement of the parts to place the pawl in position to engage its proper notch taking place gradually and being effected by a gradual rise of the cam from its lowest to its highest point.

A locking bolt arm 37 is pivotally mounted on the frame of the machine and has a locking bolt 38 positioned to engage the notches 26 in the indexing wheel, these notches it will be noticed being so formed that they serve the double purpose of indexing notches and locking bolt notches. A locking bolt spring 39 draws the bolt into engagement with the notches, as shown in Fig. 4 a single spring operating upon the locking bolt appurtenant to each of a pair of disks. The lower end of each arm engages a locking bolt cam 40 secured to the cam shaft 18 and properly formed to withdraw the bolt from its notches and allow it to reëngage said notches at the proper time.

A pair of saws is mounted appurtenant to each carrier disk to slot the heads of the blanks carried thereby, these saws being caused to operate simultaneously in nicking the heads of blanks, and so positioned that they will operate upon different blanks, one saw operating upon every other blank carried by the disk and the other saw operating upon those not cut by the first mentioned saw. In the peculiar feed hereinbefore described a blank is carried past one saw at each movement of the carrier disk without being operated upon by that saw, but said blank will be located opposite the next saw and be operated upon thereby at some cutting movement.

While I have shown a pair of saws operating simultaneously upon every other blank in different sets in the carrier, and each single feed of the carrier presenting two blanks to be so operated upon, it will be understood that this idea may be extended so that more than a pair of saws may be employed, the number of blanks carried past a single point in each feed of the carrier being made to correspond with the number of saws employed.

In the construction herein shown the saws 41 are located almost but not quite upon diametrically opposite sides, but in such position that neither saw will operate upon a blank cut by the other saw. Each saw has a shaft 42 mounted on a saw slide 43 movable upon the bed 11. This bed is slotted as at 45 to permit movement of the saw shaft 42 which projects through said slot, and an opening 46 through the slide is also slightly greater in diameter than the diameter of the shaft in order to allow for adjustment of the saw base 47 on the slide 43. The shaft has a head 48 to receive a flanged bushing 49, between which and a clamp nut 50 the saw 41 is secured, the nut 50 being held in place as by means of a nut 51.

The saw base 47 sets within a flange 52 uprising from the slide 43, the latter having a dovetailed lip 53 engaging a similar shaped recess in the base. An adjusting screw 54 rotatably carried by the saw base 47 has its threaded end entering a threaded hole in the saw slide 43, and by means of which the saw base is held in its position on the slide.

As a means of adjusting the saw vertically I provide an adjusting arm 55 secured to a lip 56 projecting from the underside of the saw base 47, this arm extending downward and then horizontally into such position that the saw shaft may pass through it and be partially supported thereby. This arm is preferably slotted, said slot extending laterally into the opening through the arm, and a lock bolt 57 is employed to firmly hold a gear adjusting thimble 58 which is screw threaded into the opening through the arm. A gear supporting sleeve 59 surrounds the lower end of the saw shaft 42 and fits within the thimble 58 and has a nut 60 abutting against the thimble.

A saw adjusting nut 61 is threaded upon the shaft 42 and has screws 62 extending into an annular slot 63 in the sleeve 59. A saw driving gear 64 is mounted to slide freely on the sleeve 59, a set screw 66 passing through the gear hub and enlarged hole in the sleeve holding both in place on the shaft 42.

The saw is adjusted vertically by means of the saw adjusting nut 61, which, being rotated and held against vertical movement by the sleeve 59, causes the shaft to be raised or lowered. The gear 64 is adjusted to

proper position by means of the adjusting thimble 58, it being noted that this construction affords a means whereby the saw may be adjusted independently of the gear, so that when the gear is placed in proper position the saw may then be properly placed independently of said gear. In thus adjusting the gear, when the thimble 58 has been positioned the nut 60 is turned up into a running fit against it, and the hub of the gear 64 is then placed against the nut 60 and forced into close contact therewith by the nut 92 on the end of the shaft 42. The saw is driven as by means of a saw driving pinion 67 on the main shaft 12 meshing with the gear 64.

The construction of the saw mount above described applies to each and all of the saws which may be employed, the two pinions being mounted on adjacent sides of the saw driving gears as shown in Fig. 1. The gears 64 mesh with the pinions on the upper sides thereof, so that the slight movement of said gears caused by the feed of the saw to engage the blanks will not appreciably affect the meshing of the gears.

A rock shaft 68 is mounted in the frame of the machine, a rocking arm 69 being secured thereto. Saw feed arms 70 are secured to the rock shaft 68, there being an arm appurtenant to each saw employed in the machine, four saws being shown herein. A feed adjusting screw 71 is mounted in the top of each arm to engage a strut 72 resting within a recess in the head of an abutting screw 73, the presence of this strut permitting lateral movement of the screw 71 caused by its movement on the arc of a circle. A spring 74 is employed to force the upper end of the saw feed arm and the saw slide 43 together to hold the strut 72 in place, and the screw 73 also locks the base 47 and slide 43 together.

One end of a plunger 75 engages the rocking arm 69 and the opposite end of the plunger engages within a recess 76 in a feed actuator 77 pivotally supported upon the frame part 20, there being a number of the recesses 76 located at different distances from the pivot 78. By locating the end of the plunger 75 in different recesses different degrees of feeding movement of the saw may be obtained. The free end of the feed actuator is in engagement with a saw feed cam 79 secured to the cam shaft 18, and a spring 80 secured to a stationary part of the frame at one end and to the arm 69 holds the parts in position to retain the plunger 75 in place.

When a rapid feed of the saws is given a great pressure is caused upon the shaft of the carrier disk, and in order that the saws may be rapidly fed without causing undue pressure upon the shaft of the carrier disk I provide means for supporting said disk during the cutting operation of the saws. This supporting means consists of supporting wedges 81 interposed between the disks 19 and an abutment 82 forming a part of the bed of the machine, or rigidly secured thereto. A wedge is located upon each side of the disk in proper position to resist the force of the cutting action of each saw. Each wedge is secured to a wedge supporting arm 83 secured to a wedge rock shaft 84 mounted in the frame parts. A wedge actuating arm 85 is secured to the rock shaft and projects in position to engage a wedge operating cam 86 secured to the cam shaft 18. A single cam may be employed for operating a number of wedges, in the construction shown herein four wedges, two appurtenant to each of two disks, being operated by a single cam. This is accomplished by means of connecting bars 87, each bar connecting two wedges located on the same side of each of the disks and, as shown in Fig. 3, the bar on the left hand side of the figure connecting the lugs 88 which receive the initial force and which is transmitted through intermeshing toothed segments 93 with the bar for operating the wedges on the right hand side of the disks.

The cam 86 is formed to operate wedges at the proper time, withdrawing them at the time when the disks are rotated. Springs 94 are employed to force the wedges into place to support the disks, a single spring, as shown in Fig. 3, being employed to operate each pair of wedges appurtenant to a single disk, and forcing them into place when the carrier disks come to a rest and during the time that the saws are cutting the blanks. In the preferred form of construction and as shown herein the wedges act against resilient members or spring holders 96, although this is not absolutely essential. The disks are thus firmly held during the cutting operation and the saws can be forced inward to their utmost cutting capacity, this greatly increasing the speed with which the machine may be operated.

A holder 95 may be employed if desired to retain the blanks in the notches in the disk, this holder extending along the side of the disk, as shown in Fig. 3. Any suitable means for supplying the blanks to the carrier disks may be employed, as shown herein a hopper 89 having a chute 90 being employed. As this forms no part of my present invention and may be of any suitable construction further description is omitted herein.

The spring holders 96 encircle each of the disks and exert a yielding hold upon the blanks in the notches, these spring holders being secured at each end to holder bases 98, shown in Fig. 1 of the drawings but omitted in Fig. 3. It will be noted, as seen in Fig. 3, that the wedges 81 act against these

spring holders in backing up the pressure upon the carrier in the operation of the tools, the holders, upon release of the wedges, retaining just sufficient hold upon the blanks to keep them in place. Extractors 99 project within the grooves 100 in the carrier disk, in the present form these extractors being secured to the side of the chute 90, each blank as it approaches the extractor being forced out of its recess in the edge of the disk.

I claim—

1. A carrier having means to receive blanks, a single feed device for feeding blanks to the carrier, tools positioned to operate simultaneously each upon a blank different from that operated upon by another tool, and means for operating the carrier to receive a plural number of blanks at each operation of the feeding means.

2. A carrier having means to receive blanks, means for feeding blanks to the carrier, a pair of tools positioned each to operate upon a blank different from that acted on by the other tool, and means for operating the carrier at each step a distance twice that between each of the blank receiving means to receive a plural number of blanks at each operation of the feeding means.

3. A carrier having means to receive blanks, a plural number of tools positioned each to operate upon a blank different from that acted upon by another tool, means for operating the carrier at each step a distance equal to that between each of the blank receiving means multiplied by the number of tools, and a single feed device for delivering blanks into each blank receiving means as it passes the feeding device, whereby a number of blanks equal to the number of tools are placed in the carrier at each movement of feed thereof.

4. A carrier having means spaced to receive blanks, means for feeding blanks to the carrier, a plural number of tools positioned to operate upon blanks in the carrier, means to move the carrier at each single feeding movement a distance equal to that between a plural number of blank receiving means, and means to cause a dwell in the movement of the carrier between the starting and stopping of each feeding movement thereof.

5. A carrier having means evenly spaced to receive blanks, means for feeding blanks to the carrier, a tool positioned to operate upon a blank in the carrier, means to move the carrier at each single feed movement a distance equal to that between a plural number of blank receiving means, and means to cause a dwell in the movement of the carrier for the feed of a blank to each of the blank receiving means.

6. A carrier having means evenly spaced to receive blanks, means for feeding blanks to the carrier, a plural number of tools each to work upon a blank different from that acted upon by another tool, means for moving the carrier at each feeding movement a distance the product of that between the blank receiving means multiplied by the number of tools, and means to cause a dwell of the carrier to receive a blank each time a blank receiving means arrives in position for that purpose.

7. A carrier having means evenly spaced to receive blanks, means for feeding blanks to the carrier, a plural number of tools each to operate upon a blank different from that acted upon by another tool, means to feed the carrier to present a new blank to each tool, and a cam shaped to control the movement of the feeding means and cause a dwell thereof between the extremes of each feeding movement to permit the placing of a blank during such dwell.

8. A carrier having means to receive blanks, tools positioned to operate simultaneously each upon a blank different from that operated upon by another tool, means for operating the carrier, and a single feed device for delivering blanks into each blank receiving means as it passes the feeding device, whereby a plural number of blanks are deposited in the carrier at each feeding movement thereof.

9. A carrier having means to receive a blank, means for feeding blanks to the carrier, a plural number of tools each to operate upon a blank different from that acted upon by another tool, means for imparting feeding movement to the carrier and including a plunger, and a cam against which said plunger rests, said cam being shaped to move the plunger in one direction and having a dwell to permit feed of a blank to the carrier between its extreme feeding movements.

10. A pair of carriers each having means to receive blanks, means for feeding blanks to the carriers, tools to operate upon blanks in each carrier, means for operating each of the carriers, and means for actuating said operating means and including a cross arm arranged to engage each of said operating means.

11. A pair of carriers each having means to receive blanks, means for feeding blanks to the carriers, tools to operate upon blanks in each carrier, means for moving the carriers, a cross arm to operate said moving means in one direction, and a cam connected to operate said cross arm and shaped to govern the movement thereof.

12. A carrier disk arranged to receive blanks, means for feeding blanks to the disk, means for rotating the disk, a tool adapted to operate upon a blank held by the disk, means for supporting the disk at its periphery against the pressure exerted

by said tool upon the article held therein and upon the opposite side of said disk from that at which the tool is located, and means for moving said support into engagement with and out of engagement from said disk.

13. A carrier disk arranged to receive blanks, means for feeding blanks to the disk, means for rotating the disk, an abutment for the disk, a wedge, and means for moving the wedge between the abutment and disk to support the latter during operation of a tool.

14. A carrier disk having means to receive blanks, means for feeding blanks to the disk, a tool to operate upon blanks in the disk, abutments located upon opposite sides of the disk, wedges located between the disk and abutments, and means for moving the wedges into the space between the disk and abutments to rigidly support the disk during operation of a tool.

15. A carrier disk having means to receive a blank, means for rotating the carrier disk, means for feeding blanks to the disk, abutments located upon opposite sides of the disk, wedges located between the disk and abutments, means for feeding a tool to operate upon a blank in the disk, and means for moving the wedges into place to support the disk before the beginning of operation of the tool and to withdraw the wedges after the completion of this operation.

16. A carrier disk having means to receive a blank, means for feeding blanks to the disk, a tool to work upon a blank in the disk, abutments located on opposite sides of the disk, wedges located between said abutments and disk, supports for the wedges operatively connected to simultaneously move the wedges between the disk and abutments, and a cam operating upon one of the supports to actuate both wedges.

17. A carrier disk having means to receive a blank, means for feeding blanks to the disk, a tool to operate upon blanks in the disk, abutments located at opposite edges of the disk, wedge rock shafts located on opposite sides of the disk and having wedge supporting arms projecting toward each other, wedges supported on said arms and located between the disk and abutments, connection between said arms to operate them to force the wedges simultaneously between the abutments and disk, and means for operating said shafts.

18. A pair of carrier disks each having means to receive blanks, means for feeding blanks to the disks, a tool to operate upon the blanks in each disk, abutments located at opposite sides of each disk, wedges located on opposite sides of each disk and in the space between the disk and the abutments, connections between all of the wedges to simultaneously move them into place to support the disks and to withdraw them, and a single means for operating said wedges.

19. A pair of carrier disks each having means to receive blanks, means for feeding blanks to the disks, means for rotating the disks, abutments located at opposite edges of each disk, wedge rock shafts located on the same side of each disk, wedges supported by said shafts, a connection between each of said shafts to move them in the same direction, wedge rock shafts supported on the opposite side of each of said disks, wedges supported by each of said latter rock shafts, a connection between each of the last mentioned rock shafts to rotate them simultaneously in the same direction, a connection between two of the rock shafts located on different sides of the two disks whereby all of the wedges are simultaneously moved into place to support each of the disks, and means for acting upon one of the rock shafts to operate all.

20. A pair of carrier disks each having means to receive blanks, means for feeding blanks to the disks, a tool to operate upon the blanks in each disk, an abutment located at the periphery of each disk, a wedge located to engage each disk in the space between it and said abutment, connections between said wedges to simultaneously move them into place to support the disks and to withdraw them, and a single means for operating said wedges.

21. A carrier disk having recesses for blanks in its edge, means for feeding blanks to the disk, means for rotating the disk, tools to work upon blanks held in the disk, an abutment, a wedge located in the space between the abutment and edge of the disk, a yielding member interposed between the wedge and the disk, and means for moving the wedge against the disk to support the latter.

22. A carrier disk having recesses for blanks, means for feeding blanks to said recesses, means for rotating the disk, tools to operate upon blanks in the disk, a holder including a spring band encircling the disk to exert a yielding hold upon blanks in said recesses, an abutment, a wedge located in the space between the abutment and said holder, and means for moving the wedge into said space and against said holder to support the disk.

23. A carrier disk having means to receive blanks, means for feeding blanks to the disk, means for rotating the disk, a saw shaft positioned to support a saw for operation on the blanks in the disk, a gear secured to said shaft, means for driving said gear, means for adjusting the shaft and saw longitudinally of the shaft, and means for independently adjusting the gear in the same direction.

24. A carrier disk having means to receive

blanks, a saw shaft mounted on a sliding support, the support, a saw secured to one end of the shaft, a gear secured to the opposite end of the shaft, means for sliding the support, and a driving gear in mesh with the gear on said shaft, the latter having feeding movement independently of said driving gear.

25. A carrier disk having means to receive blanks, a sliding support, means for sliding the support, a shaft mounted in said support, a saw secured to one end of the shaft, a gear secured to the opposite end of the shaft, and a driving gear meshing with said gear on the shaft, the latter moving tangentially of the former in the feeding operation of the saw.

26. A carrier disk, a feeding slide, a shaft supported on the slide, a saw secured to the shaft, means for rotating the shaft, a pivoted lever, a cam for operating said lever, and a connection between the slide and pivoted lever including a rod having its ends loosely engaging recesses in its supporting members.

27. A carrier disk, a feed slide, a shaft mounted on the slide, a saw secured to the shaft, means for rotating the shaft, a rock shaft, a rocking arm pivotally connected with the slide, a pivoted lever, means for moving the lever on its pivot, and a rod connecting said arm and lever and having means for engagement therewith at variable distances from a pivot whereby a variation of the feed of the saw is obtained.

28. A feeding device for slotting machines including a carrier having means spaced to receive blanks, means for feeding blanks to the carrier, means to move the carrier at each single feeding movement a distance equal to that between a plural number of blank receiving means, and means to cause a dwell in the movement of the carrier between the starting and stopping of each feeding movement thereof.

JAMES MONKS.

Witnesses:
ARTHUR B. JENKINS,
EVA L. STOUGHTON.