June 19, 1923.

J. S. BLACK

1,459,085

KNIFE POLISHING MACHINE

Filed Aug. 8, 1921

4 Sheets-Sheet 1

Fig. 1

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4 Sheets-Sheet 2

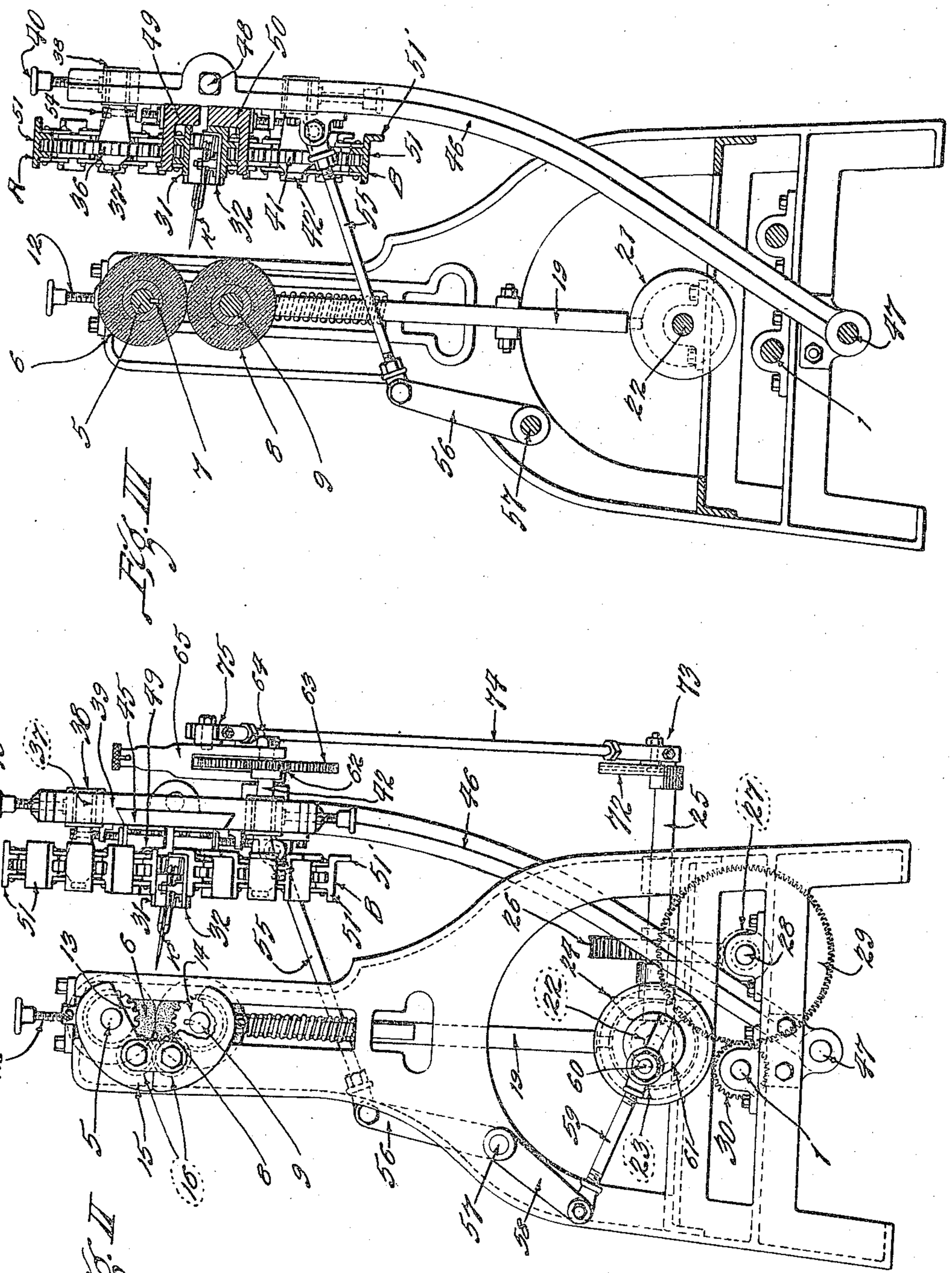

Fig. III

Fig. II

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4 Sheets-Sheet 3

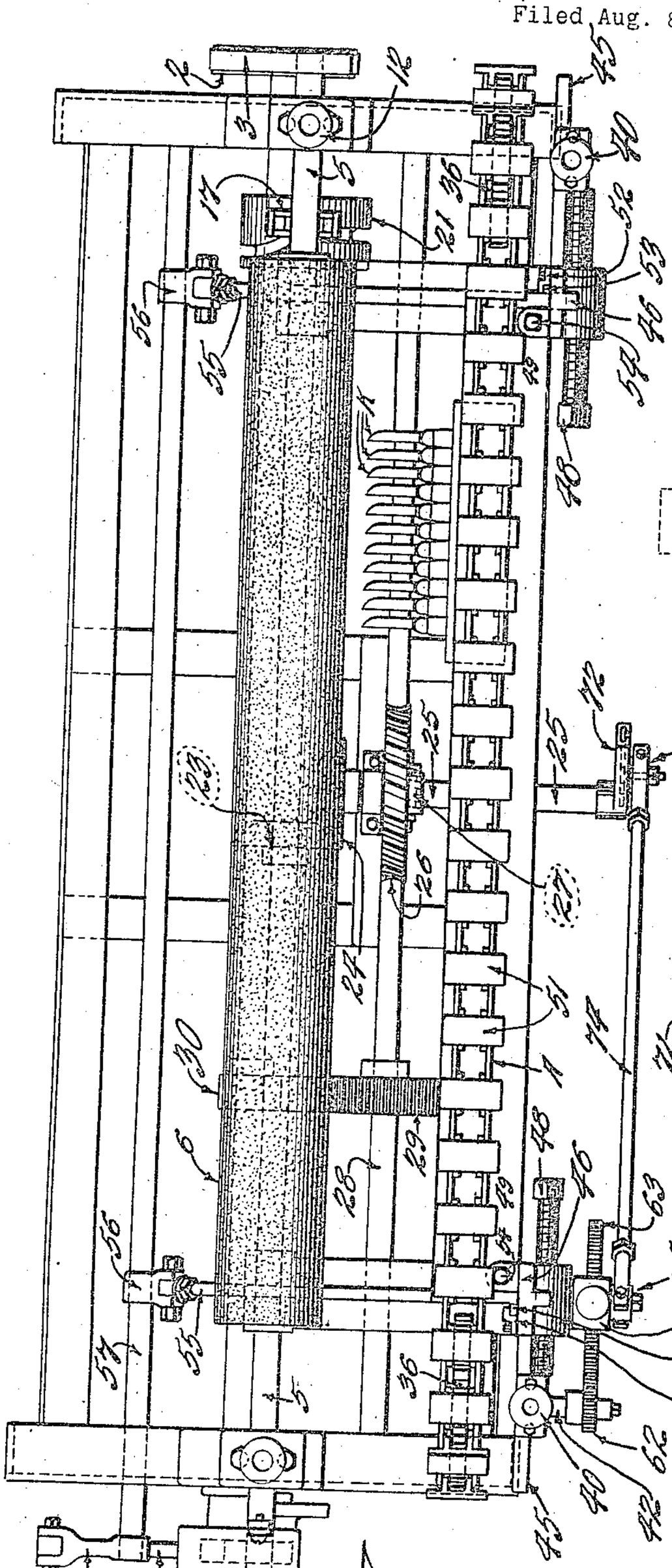

Fig. II.

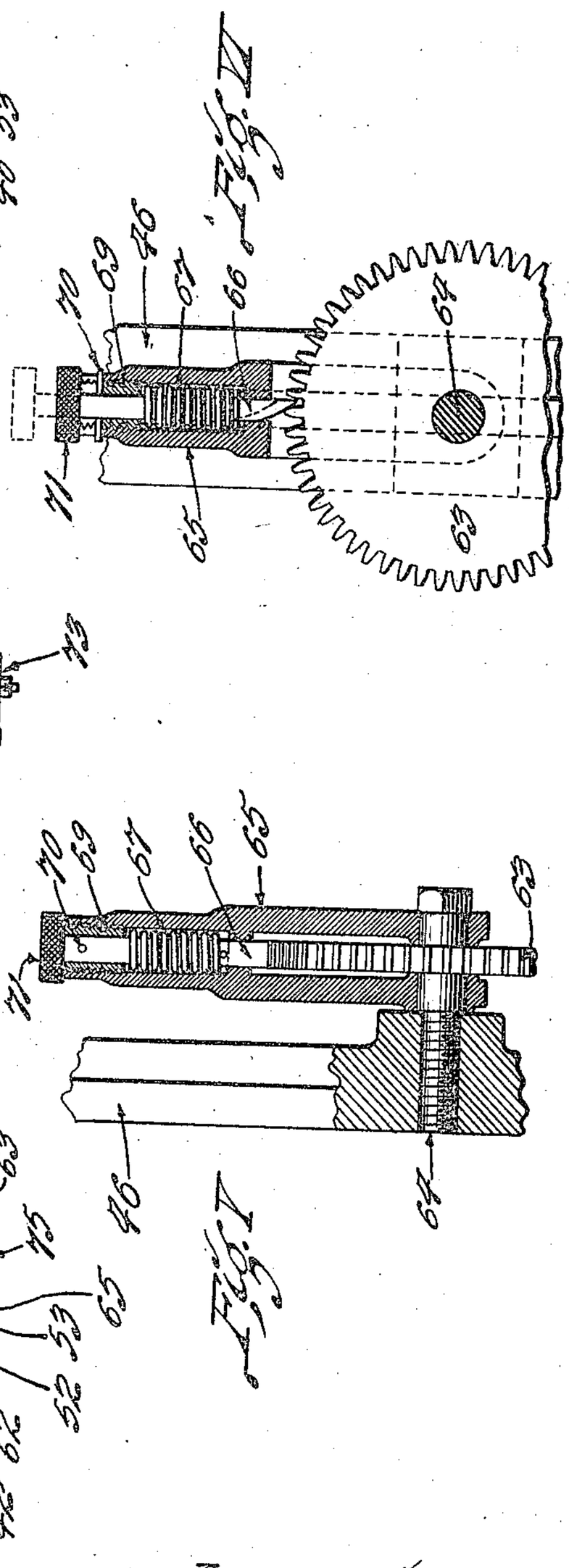

Fig. I.

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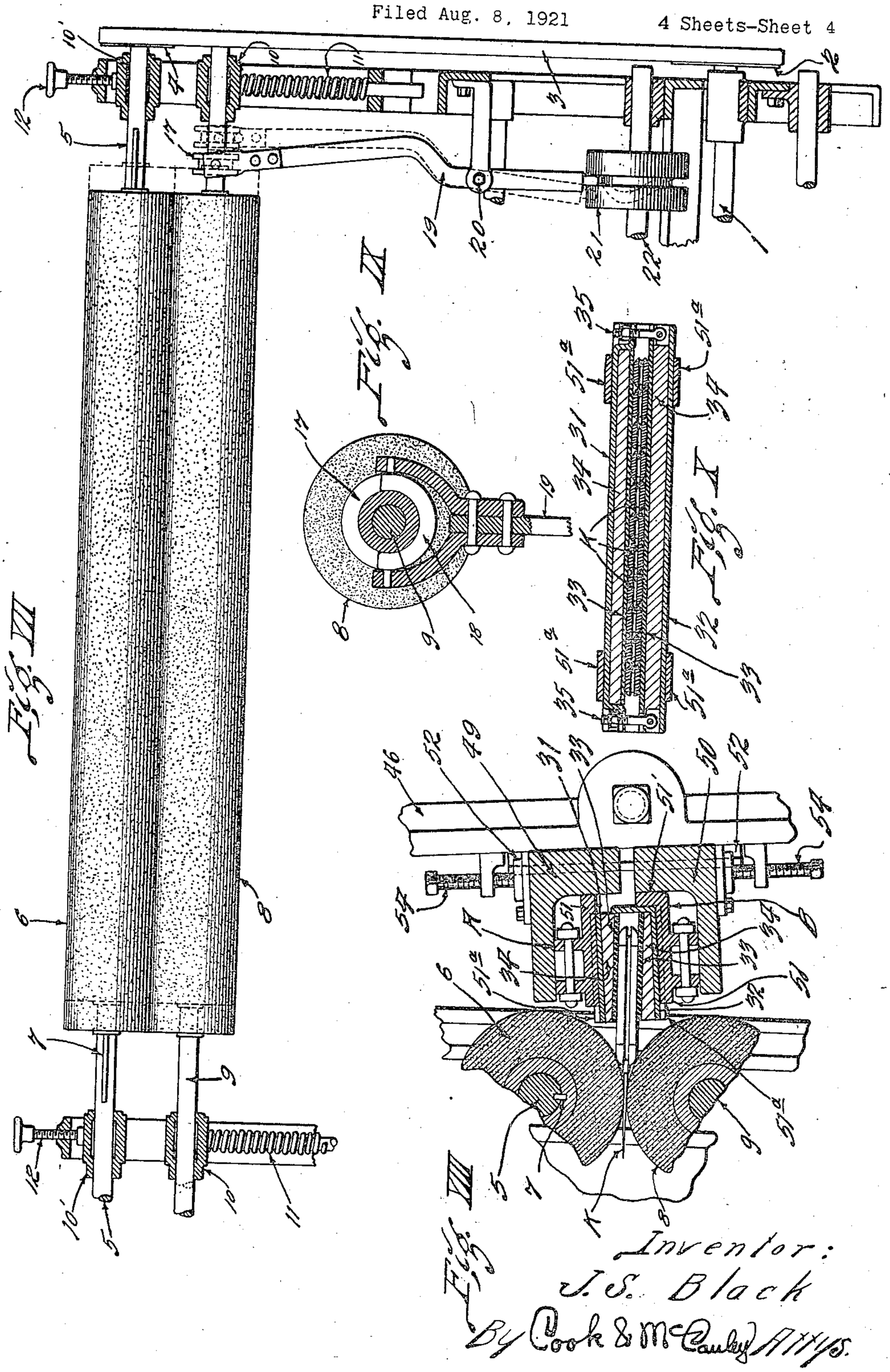
4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

JOHN S. BLACK, OF OLIVETTE, MISSOURI, ASSIGNOR TO SIMMONS HARDWARE COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

KNIFE-POLISHING MACHINE.

Application filed August 8, 1921. Serial No. 490,553.

To all whom it may concern:

Be it known that I, JOHN S. BLACK, a citizen of the United States of America, and a resident of Olivette, in the county of St. Louis and State of Missouri, have invented certain new and useful Improvements in Knife-Polishing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to improvements in machines for polishing knives and similar articles, the main object being to produce a highly efficient automatic machine of this kind.

More specifically stated, an object is to avoid the labor heretofore incurred in securing the knives to an automatic polishing machine. According to the present invention, the knives may be fed into the machine without stopping the mechanism and without operating fastening devices to attach the knives to the machine. A group of knives may be mounted in a holder separate from the machine, and it is only necessary to feed this holder into the machine.

A further object is to subject the knives to successive polishing operations at different portions of the polishing device.

With the foregoing and other objects in view, the invention comprises the novel construction, combination and arrangement of parts hereinafter more specifically described and illustrated in the accompanying drawings wherein is shown the preferred embodiment of the invention. However, it is to be understood that the invention comprehends changes, variations and modifications which come within the scope of the claims hereunto appended.

Briefly stated, the machine about to be described includes a pair of rotary polishing rolls, and a knife carrier comprising a pair of endless chains traveling in lines parallel with the axes of the polishing rolls and separated from each other to receive and secure a knife holder between them. The chains travel step by step to move the knife holder longitudinally of the polishing rolls, thereby locating the knives opposite to different portions of the polishing rolls. To engage the knives with the polishing rolls, the chains and knife holder may be shifted toward and away from the rolls, and these operations are performed during the intervals of the step by step motion of the chains, so the chains are not advanced while the knives engage the polishing rolls.

Fig. I is a front elevation of a polishing machine embodying the features of this invention.

Fig. II is an end view of the machine.

Fig. III is a vertical section.

Fig. IV is a top or plan view of the machine.

Fig. V is an enlarged vertical section showing a ratchet and pawl through which motion is transmitted to the knife carrier.

Fig. VI is a front elevation, partly in section, of the elements shown in Fig. V.

Fig. VII is a fragmentary longitudinal section showing the polishing rolls and the means for operating the same.

Fig. VIII is an enlarged fragmentary section showing a knife engaged with the polishing rolls.

Fig. IX is an enlarged section showing a part of the means for reciprocating the polishing rolls.

Fig. X is an enlarged section showing a knife holder and a group of knives clamped therein.

The machine shown in the accompanying drawings includes a suitable supporting frame provided with a main power shaft 1 which may be driven by any suitable mechanism. As shown by Fig. VII, a pulley 2 is mounted on one end of the power shaft and a belt 3 leads from this pulley to a pulley 4 on a shaft 5. A polishing roll 6 is secured to the shaft 5 through the medium of a long key, or spline, 7 shown in Figs. III and VII. The polishing roll 6 is driven by the shaft 5 and it is free to move longitudinally of said shaft. A lower polishing roll 8 is rigidly secured to a shaft 9 and this shaft is rotatably mounted in bearings 10 as shown in Fig. VII. Since the roll 8 is fixed to shaft 9 the roll cannot move independently of the shaft, but said shaft can be shifted longitudinally in its bearings 10. Compression springs 11 (Fig. VII) tend to elevate the bearings 10 which support the roll 8, thereby forcing said roll 8 into engagement with roll 6. Adjusting screws 12 engage the bearings 10′ in which shaft 5 is mounted, so the polishing rolls can be adjusted vertically

while the springs 11 are under compression, the bearings 10 and 10′ being adjustable vertically in the frame of the machine.

To transmit rotary motion from the shaft 5 to the shaft 9 (Figs. I, II and IV) a gear wheel 13 is fixed to the shaft 5 and a gear wheel 14 is splined to shaft 9. A gear housing 15 is provided with idle pinions 16 through which motion is transmitted from the gear 13 to gear 14.

To impart longitudinal motion to the polishing rolls, a collar 17, (Figs. VII and IX) is fixed to shaft 9, said collar having an annular peripheral groove in which a U-shaped yoke 18 is mounted. A lever 19, fulcrumed at 20, has a forked upper end secured to the yoke 18 as shown in Fig. IX, so the shaft 9 and its roll 8 can be reciprocated by the lever 19, as suggested by dotted lines in Fig. VII. The roll 6 should also be reciprocated longitudinally, but it is not absolutely necessary to provide a separate shifting device for the roll 6. This roll is splined to the shaft 7 and its periphery is in firm frictional engagement with roll 8, so longitudinal motions of roll 8 will be transmitted to the roll 6.

The means for operating the shifter lever 19 (Figs. IV and VII) comprises a cam 21 fixed to a shaft 22 and having a peripheral cam groove adapted to receive the lower end of lever 19. To transmit motion to shaft 22, said shaft is provided with a bevel gear 23 (Figs. II and IV) meshing with a bevel gear 24 on a shaft 25, the latter being provided with a worm wheel 26 meshing with a worm 27 on a shaft 28 provided with a large gear wheel 29 meshing with a pinion 30 on the constantly running power shaft 1.

Through the medium of the elements just described, the cam 21 is rotated constantly to shift the lever 19 whereby the polishing rolls 6 and 8 are intermittently reciprocated. These rolls are rotated constantly through the medium of mechanism previously described.

A group of the knives to be polished may be clamped in a knife holder as shown most clearly by Figs. VIII and X. The knife holder comprises an upper plate 31, a lower plate 32, yielding strips 33 adapted to engage the handles of knives K, and filler blocks 34 interposed between plates 31 and 32 and the respective strips 33. Screws 35 (Fig. X) pivoted to the lower plate 32, are provided with nuts engaging the upper plate 31. These nuts can be tightened to clamp the knives in the knife holder, and they can be loosened and swung on their pivots to release the knives.

I will now describe a knife carrier adapted to receive a plurality of the knife holders. A designates an endless chain mounted on sprocket wheels 36 secured to shafts 37 which extend from bearings 38, the latter being adjustably mounted in the upper ends of guide bars 39, as shown by Figs. I and II. 40 designates adjusting screws whereby the bearings 38 and sprocket wheels 36 can be forced downwardly from the positions shown in Fig. I. The knife carrier also includes an endless chain B located below and separated from the chain A. The lower chain B is mounted on sprocket wheels 41 secured to shafts 42 and 42′ extending from bearings 43, the latter being adjustable in the lower ends of guide bars 39. Adjusting screws 44 (Fig. I) may be manipulated to impart vertical movement to the sprocket wheels 41 and chain B.

As shown by Figs. I and II, the guide bars 39 are adjustably mounted on horizontal extensions 45 projecting from the upper portions of long upright arms 46. These long arms are pivotally supported on a rod 47 and they support the sprocket wheels 36 and 41 and the chains A and B. Through the medium of adjusting screws 48 (Fig. I), the guide bars 39 may be adjusted horizontally to tighten the chains A and B.

To apply a knife holder and a group of knives to the machine, it is only necessary to locate the knife holder between the adjacent horizontal portions of the sprocket chains A and B, and this can be readily accomplished by inserting the knife holder between the sprocket wheels 36 and 41 at the left side of Fig. I, where the chains diverge in passing around the sprocket wheels, so as to provide a wide flaring inlet for the knife holders. As will be hereafter described, the adjacent parallel portions of the sprocket chains A and B travel to the right in Fig. I, and the knife holders are automatically discharged at the right side of Fig. I where the chains diverge in passing around sprocket wheels 36 and 41.

To firmly secure the knife holders between the flexible sprocket chains, long horizontal guide bars 49 and 50 (Figs. I and III and VIII) are secured to the upright arms 46. As shown by Fig. VIII, these guide bars are L-shaped in cross section to form channels for the chains A and B, the upper guide bar 49 being engaged with the top and outer sides of chain A and the lower bar 50 being engaged with the bottom and outer sides of chain B. Figs. I, IV and VIII show that alternate links of each sprocket chain are provided with flat plates 51 projecting beyond the other links and that the plates of chain B have extensions, or lugs 51′, forming abutments for the knife holder, as shown in Fig. VIII. These plates 51 engage the horizontal guide bars 49 and 50, respectively, as clearly shown in Fig. VIII. The knife-holding portions of the chains are confined between the guide bars to prevent displacement of the knives during the

polishing operations, and the guide bars can be adjusted toward each other.

As shown in Figs. IV and VIII, each upright arm 46 is provided with a guide member 52 adapted to receive lugs 53 on the guide bars 49 and 50. Adjusting screws 54 (Figs. IV and VIII), mounted in lugs on the upright arms 46, may be adjusted to force the guide bars 49 and 50 toward each other.

Figs. VIII and X show that the knife holder is provided on its top and bottom faces with lugs 51ª adapted to lie between and engage adjacent flat plates 51 on the respective sprocket chains. By means of these lugs 51ª and flat plates 51, the knife holder is interlocked with the sprocket chains, and the knife holder itself can serve as means for transmitting motion from one sprocket chain to the other.

I will now describe the means for shifting the knives toward and away from the polishing rolls. The sprocket chains and guide bars 49 and 50 are supported by the long upright arms 46 which are pivotally mounted on the rod 47 at their lower ends. These long arms 46 are swung on their pivot 47 to move the knives K from the position shown by Fig. II wherein they are separated from the polishing rolls, to the position shown by Fig. VIII wherein the knife blades lie between the polishing rolls. To accomplish this, links 55 (Figs. II, III and IV) are pivoted to the arms 46 and also to arms 56 on an oscillatory shaft 57 provided with an operating crank 58 to which one end of a connecting rod 59 is pivoted, the other end of said rod being pivoted to a crank pin 60 adjustably secured in a slot formed in a rotary disk 61, the latter being fixed to the constantly rotating shaft 22. Through the medium of this mechanism, the knife holders are oscillated to engage the knife blades with the polishing rolls.

The sprocket wheels 36 and 41 are oscillated with the knives, and during the intervals when the knives are disengaged from the polishing rolls, the sprocket wheels and chains are advanced step by step to gradually advance the knives from the intake end of the machine to the discharge end. A pinion 62 (Figs. I, II and IV) is fixed to a shaft 42 on which one of the sprocket wheels 41 is mounted, and this pinion meshes with a gear wheel 63 loosely mounted on a rod 64 screwed into one of the long arms 46, as shown by Fig. V. This gearing is driven through the medium of a pawl arm 65 loosely mounted on the rod 64 and containing a spring pressed pawl 66 (Figs. V and VI) which engages the gear wheel 63. The pawl-actuating spring 67 lies between a pin 68 on the pawl and a tube 69 in the upper end of the pawl-carrying arm 65. A pin 70 (Figs. V and VI) extends from pawl 66 and into notches in the pawl arm 65, so as to normally prevent rotation of the pawl. The upper end of this pawl is provided with a knob 71 which may be grasped and lifted to release the pawl from the gear teeth, thereby withdrawing the pin 70 from the notches of the pawl arm, and the pawl can then be turned one-half of a revolution and restored to provide for a reversal of the gearing 63 and 62.

The means for oscillating the pawl arm includes a crank 72 (Figs. I, II and IV) fixed to the constantly rotating shaft 25, a universal coupling at 73 connecting said crank to one end of a rod 74, and a universal coupling at 75 connecting the other end of said rod to the pawl-carrying arm 65. The crank 72 is supported independently of the pawl arm 65 which oscillates with the long arms 46, and for this reason the universal couplings are used between said crank and pawl arm.

From the foregoing it will be readily understood that the pawl arm 65 transmits an intermittent motion to the gearing 63 and 62 so as to intermittently actuate the sprocket chain B. The knife holders are interlocked with both sprocket chains to transmit motion from chain A to chain B, so both chains travel at the same time and at the same speed. The knife holding portions of the chains are parallel with the axes of the polishing rolls, and the knives are advanced longitudinally of the rolls. Immediately after each movement of the sprocket chains, the knife blades are inserted between the polishing rolls and then withdrawn, whereupon they are advanced another step and inserted between other portions of the rolls. Each knife is thus subjected to successive polishing operations at different portions of the rolls, so the finished knives will not be streaked by an irregular surface at any portion of a polishing roll. Furthermore, it is to be understood that instead of placing only one knife holder between the long chains, a long continuous row of knife holders can be maintained between the chains, and the long polishing rolls will then simultaneously act upon a very large number of knives. The knife holders can be very easily inserted into one end of the machine, and upon the completion of the successive polishing operations, the knife holder will be automatically released and discharged at the other end of the machine.

I claim:

1. A knife polishing machine comprising a flexible endless carrier, means whereby said flexible endless carrier is driven in a straight line and in lines diverging from the ends of said straight line, a knife holder adapted to interlock with said flexible endless carrier, a straight guide member cooperating with said carrier to retain the knife

holder in interlocking engagement therewith, said straight guide member being separate from said carrier and parallel with said straight line, and a rotary polishing roll adapted to engage the knives held by said knife holder.

2. A knife polishing machine comprising a flexible endless carrier, means whereby said flexible endless carrier is guided in a straight line and in lines diverging from the ends of said straight line, a knife holder adapted to interlock with said flexible endless carrier, a straight bar cooperating with said carrier to retain the knife holder in interlocking engagement therewith, said straight bar being separate from said carrier and parallel with said straight line, operating means whereby an intermittent motion is imparted to said endless carrier, and a polishing roll adapted to engage the knives held by said knife holder, said polishing roll being parallel with said straight line.

3. A knife polishing machine comprising a pair of endless carriers, a knife holder interposed directly between and detachably interlocked with said endless carriers, and a polishing member adapted to engage the knives held by said knife holder.

4. A knife polishing machine comprising a knife holder, a pair of flexible endless carriers separated from each other to clamp said knife holder between them, said carriers being movable in parallel lines and also in lines diverging from said parallel lines so as to receive and release said knife holder, parallel guide members whereby portions of said flexible endless carriers are held in said parallel lines to secure the knife holder, and a polishing member adapted to engage the knives held by said knife holder.

5. A knife polishing machine comprising a knife holder, a pair of flexible endless carriers separated from each other to clamp said knife holder between them said carriers being movable in parallel lines and also in lines diverging from said parallel lines so as to receive and release said knife holder, parallel guide members whereby portions of said flexible endless carriers are held in said parallel lines to secure the knife holder, said parallel guide members being adjustable toward and away from each other, and a polishing roll adapted to engage the knives held by said knife holder.

6. A knife polishing machine comprising a knife holder, a pair of flexible endless carriers separated from each other to clamp said knife holder between them, said carriers being movable in parallel lines and also in lines diverging from said parallel lines so as to receive and release said knife holder, parallel guide members whereby portions of said flexible endless carriers are held in said parallel lines to secure the knife holder, and a rotary polishing roll adapted to engage the knives held by said knife holder, said roll being parallel with said parallel lines and guide members.

7. A knife polishing machine comprising a pair of flexible endless carriers movable in parallel lines and separated from each other to hold the knives between them, said carriers being movable in lines diverging from said parallel lines to receive and release the knives, parallel guide members whereby portions of said flexible endless carriers are held in said parallel lines to secure the knives between the carriers, and a polishing member adapted to engage the knives held between said carriers.

8. A knife polishing machine comprising a pair of endless carriers, a knife holder interposed between and carried by said endless carriers, said knife holder being interlocked with both of said carriers, and a polishing member adapted to engage the knives held by said knife holder.

9. A knife polishing machine comprising a pair of endless carriers, a knife holder interposed between and carried by said endless carriers, each of said carriers being in the form of a chain provided with links which interlock with said knife holder, and a polishing member adapted to engage the knives held by said knife holder.

10. A knife polishing machine comprising a knife holder, a pair of flexible endless carriers separated from each other to clamp said knife holder between them, said carriers being movable in parallel lines and also in lines diverging from said parallel lines so as to receive and release said knife holder, both of said carriers being removably interlocked with said knife holder, and a polishing member adapted to engage the knives held by said knife holder.

11. A knife polishing machine comprising a polishing member, an endless traveling knife-carrying member adjacent to said polishing member, means whereby knives are secured to said endless traveling knife-carrying member, a movable support for said endless traveling knife-carrying member, means for shifting said support toward and away from said polishing member to engage the knives with the polishing member, a ratchet and pawl carried by said movable support, a flexible connection through which motion is transmitted to said ratchet and pawl, and means for transmitting motion from said ratchet and pawl to advance said endless traveling knife carrier.

12. A knife polishing machine comprising a knife carrier movable in a straight line and also movable in lines diverging from said straight line to receive and release the knives, a movable support for said knife carrier, a polishing member approximately parallel with said straight

line, a power shaft, means for shifting said movable support toward and away from said polishing member, and means whereby an intermittent motion is transmitted from said power shaft to said knife carrier, the last mentioned means including a ratchet and pawl carried by said movable support and a universal connection between said power shaft and the ratchet and pawl.

13. A knife polishing machine comprising a knife holder, a carrier movable in a straight line and also movable in lines diverging from said straight line so as to receive and release said knife holder, means cooperating with said carrier to secure the knives thereto while the carrier is moving in a straight line, a polishing roll adjacent to said knife holder, an oscillatory support for said knife holder and carrier, means for oscillating said support to engage the knives with said polishing roll, and means whereby an intermittent motion is transmitted to the knife holder and carrier to advance the knives longitudinally of said roll, the last mentioned means including a ratchet and pawl carried by said oscillatory support and a universal connection through which motion is transmitted to said ratchet and pawl.

14. A knife polishing machine comprising a rotary polishing member, a knife carrier, means whereby said knife carrier is automatically shifted toward and away from said polishing member to move the knives across said polishing member, and intermittent feeding means whereby said knife carrier is shifted in a line approximately parallel with said polishing member to locate the knives opposite to different portions of the polishing member, said intermittent feeding means being effective while the knives are separated from said polishing member.

15. A knife polishing machine comprising a rotary polishing member, an endless knife-carrying member movable through a straight path parallel with the axis of said rotary polishing member, intermittent operating means whereby said endless knife-carrying member is advanced step by step along said straight path, and means whereby said endless knife-carrying member is shifted toward and away from said rotary polishing member to engage the knives therewith.

16. A knife polishing machine comprising a pair of constantly rotating polishing rolls, means whereby said rolls are reciprocated in lines parallel with their axes, a knife carrier comprising a pair of endless chains and a knife holder carried between said chains, means whereby said chains are guided in lines parallel with said axes, intermittent feeding means for imparting an intermittent motion to said chains to locate said knife holder in different positions opposite said polishing rolls, and means whereby said chains and knife holder are shifted toward and away from said polishing rolls to insert the knives between the rolls, said intermittent feeding means being effective while the knives are separated from the rolls.

17. A knife polishing machine comprising a knife holder, a pair of flexible endless carriers separated from each other to clamp said knife holder between them, said carriers being movable in parallel lines and also in lines diverging from said parallel lines so as to receive and release said knife holder, both of said carriers being removably interlocked with said knife holder, and means whereby one of said carriers is driven to transmit motion through the knife holder to the other carrier.

18. A knife polishing machine comprising a knife carrier movable in a straight line and also movable in lines diverging from said straight line to receive and release the knives, a movable support for said knife carrier, a polishing member approximately parallel with said straight line, a power shaft, means actuated by said power shaft for shifting said movable support to move the knives into and out of engagement with said polishing member, and means whereby an intermittent motion is transmitted from said power shaft to said knife carrier.

19. A knife polishing machine comprising a knife-holder, a carrier movable in a straight line and also movable in lines diverging from said straight line so as to receive and release said knife holder, means cooperating with said carrier to secure the knives thereto while the carrier is moving in a straight line, a polishing roll adjacent to said knife holder, an oscillatory support for said knife holder and carrier, operating means for oscillating said support to move the knives into and out of engagement with said polishing roll, and means whereby an intermittent motion is transmitted to the knife holder and carrier to advance the knives longitudinally of said roll while they are separated from the roll.

In testimony that I claim the foregoing I hereunto affix my signature.

JOHN S. BLACK.