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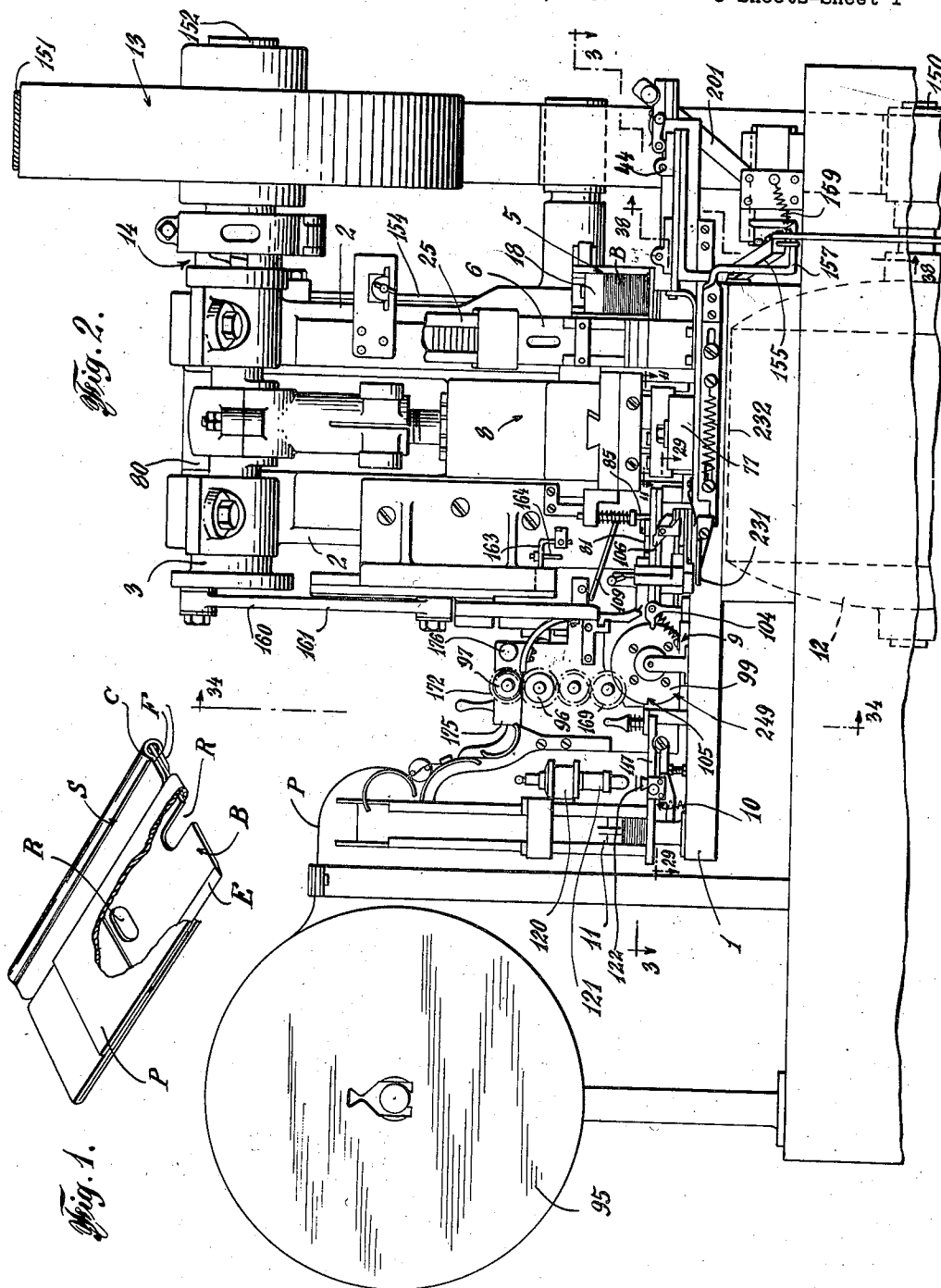
I. S. BODKIN

2,209,724

RAZOR BLADE ASSEMBLING MACHINE AND METHOD

Filed March 9, 1937

9 Sheets-Sheet 1



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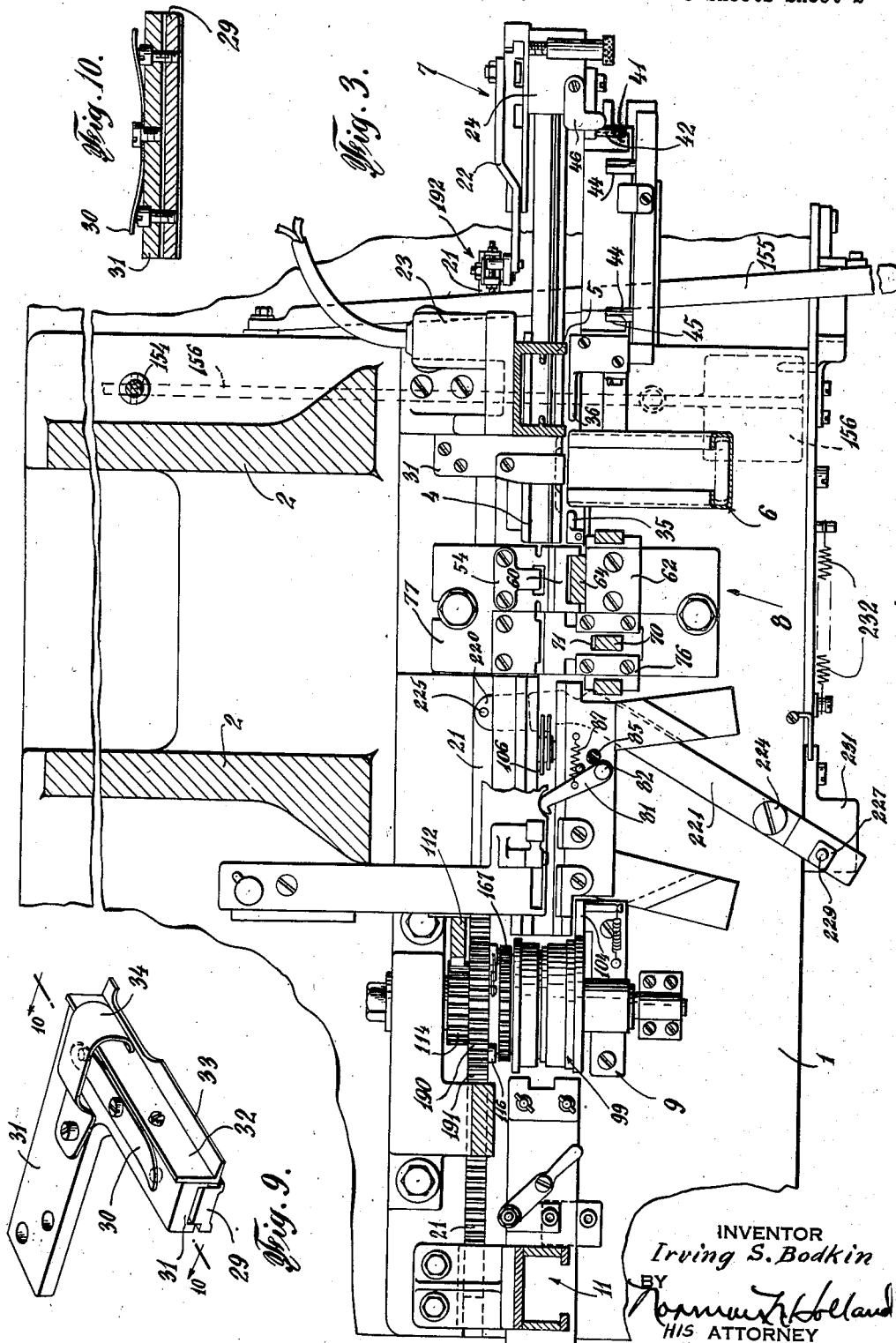
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RAZOR BLADE ASSEMBLING MACHINE AND METHOD

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9 Sheets-Sheet 2



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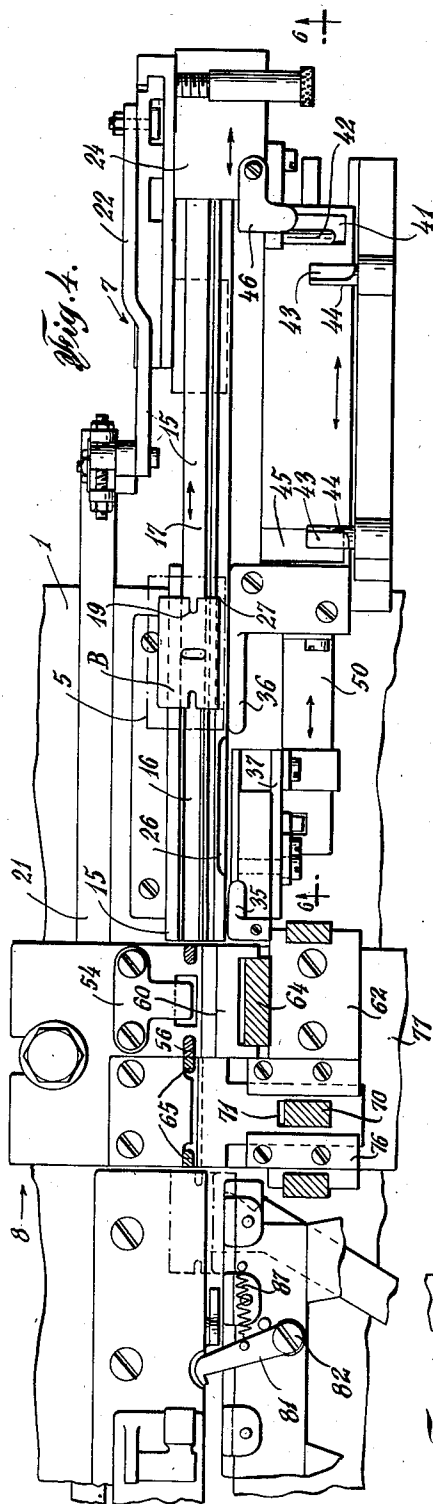
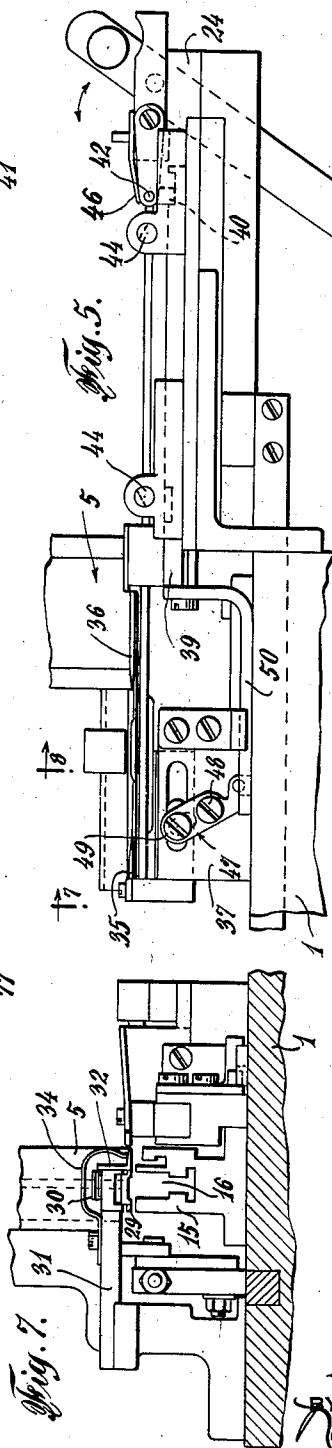
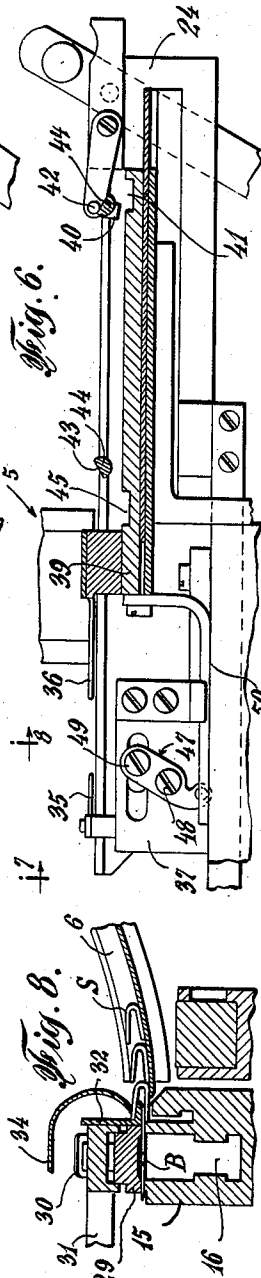
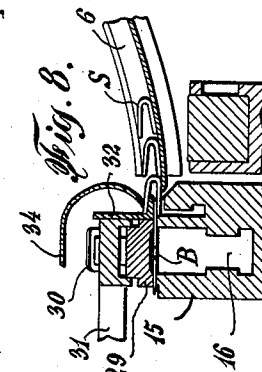
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RAZOR BLADE ASSEMBLING MACHINE AND METHOD

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9 Sheets-Sheet 3



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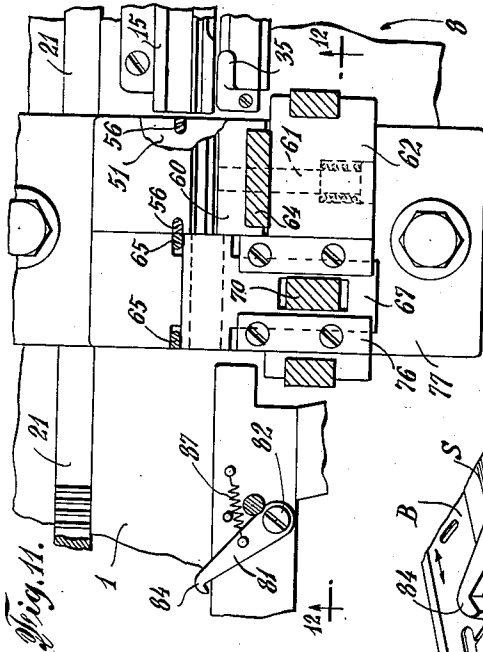
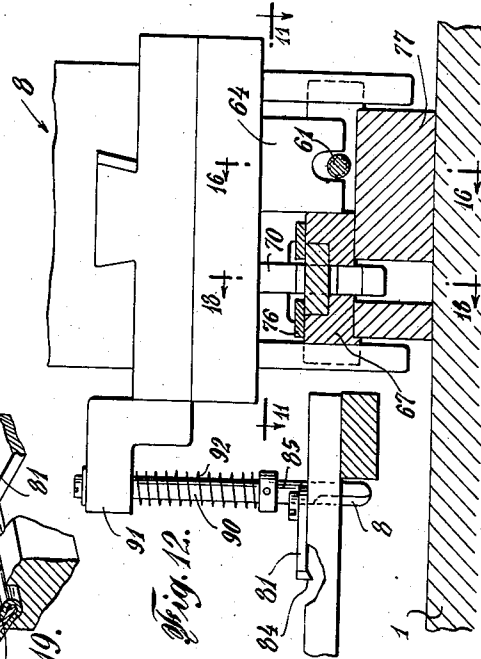
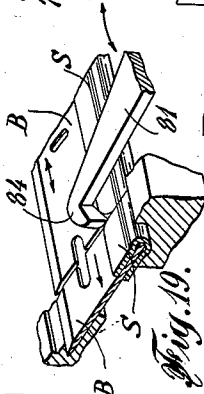
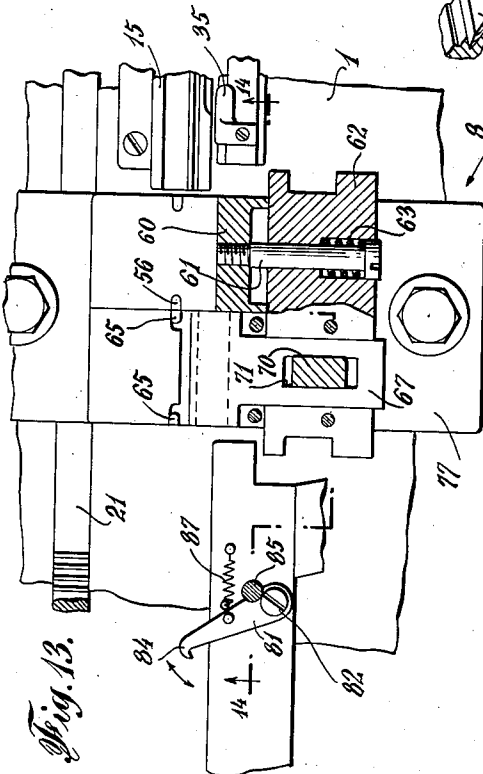
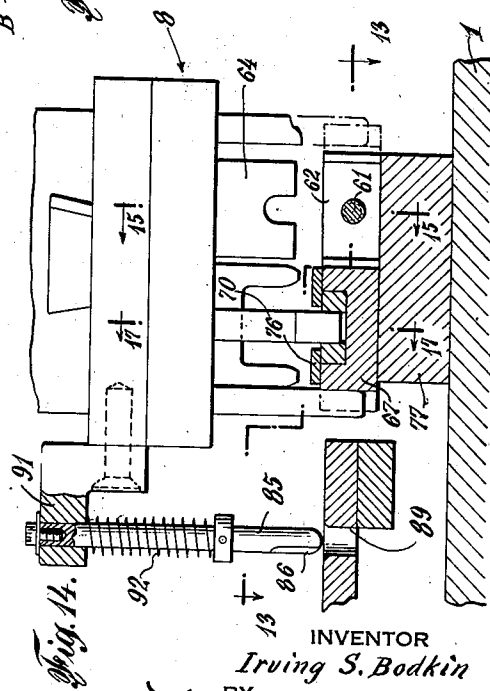
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RAZOR BLADE ASSEMBLING MACHINE AND METHOD

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9 Sheets-Sheet 4



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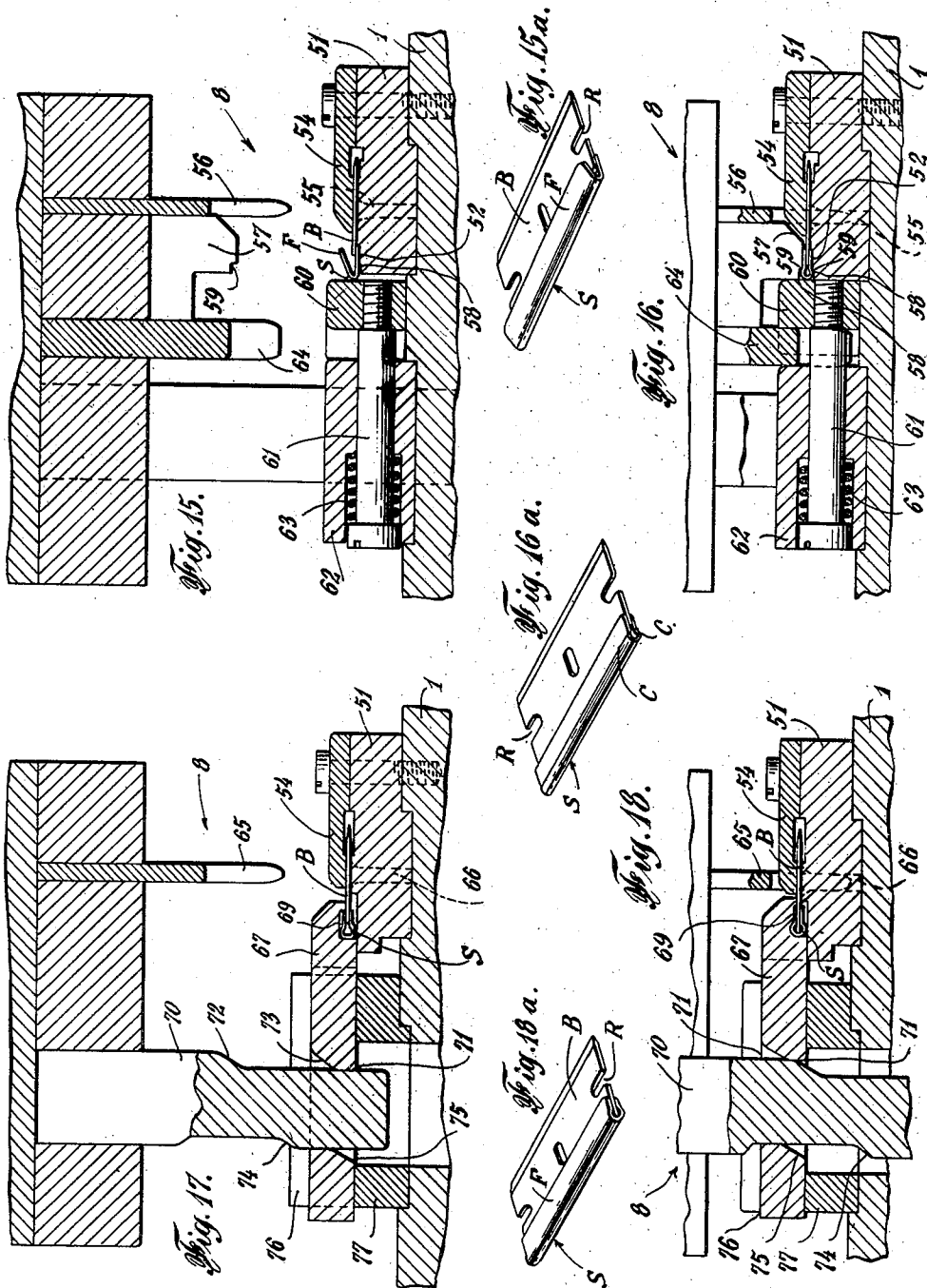
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RAZOR BLADE ASSEMBLING MACHINE AND METHOD

Filed March 9, 1937

9 Sheets-Sheet 5



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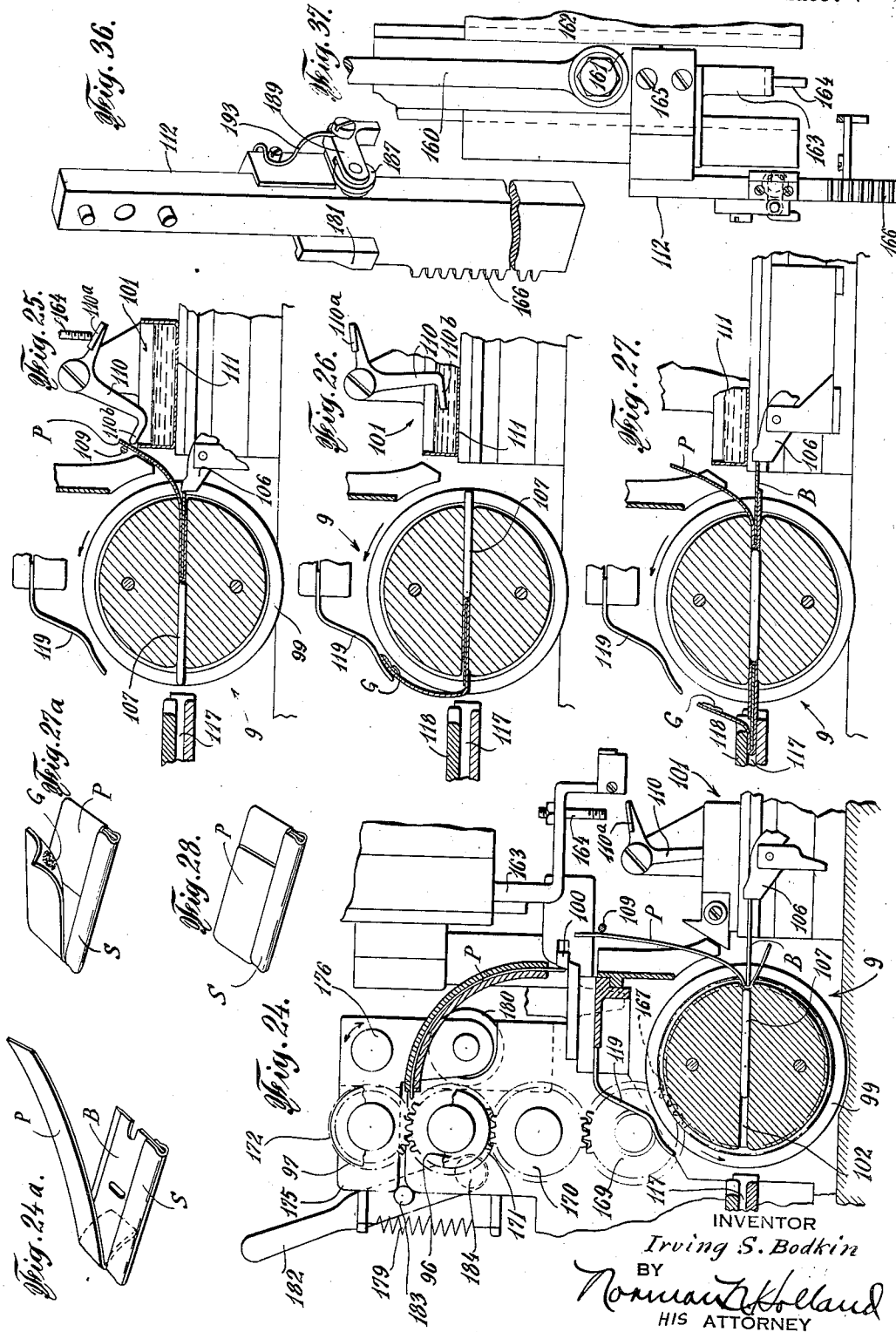
I. S. BODKIN

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RAZOR BLADE ASSEMBLING MACHINE AND METHOD

Filed March 9, 1937

9 Sheets-Sheet 7



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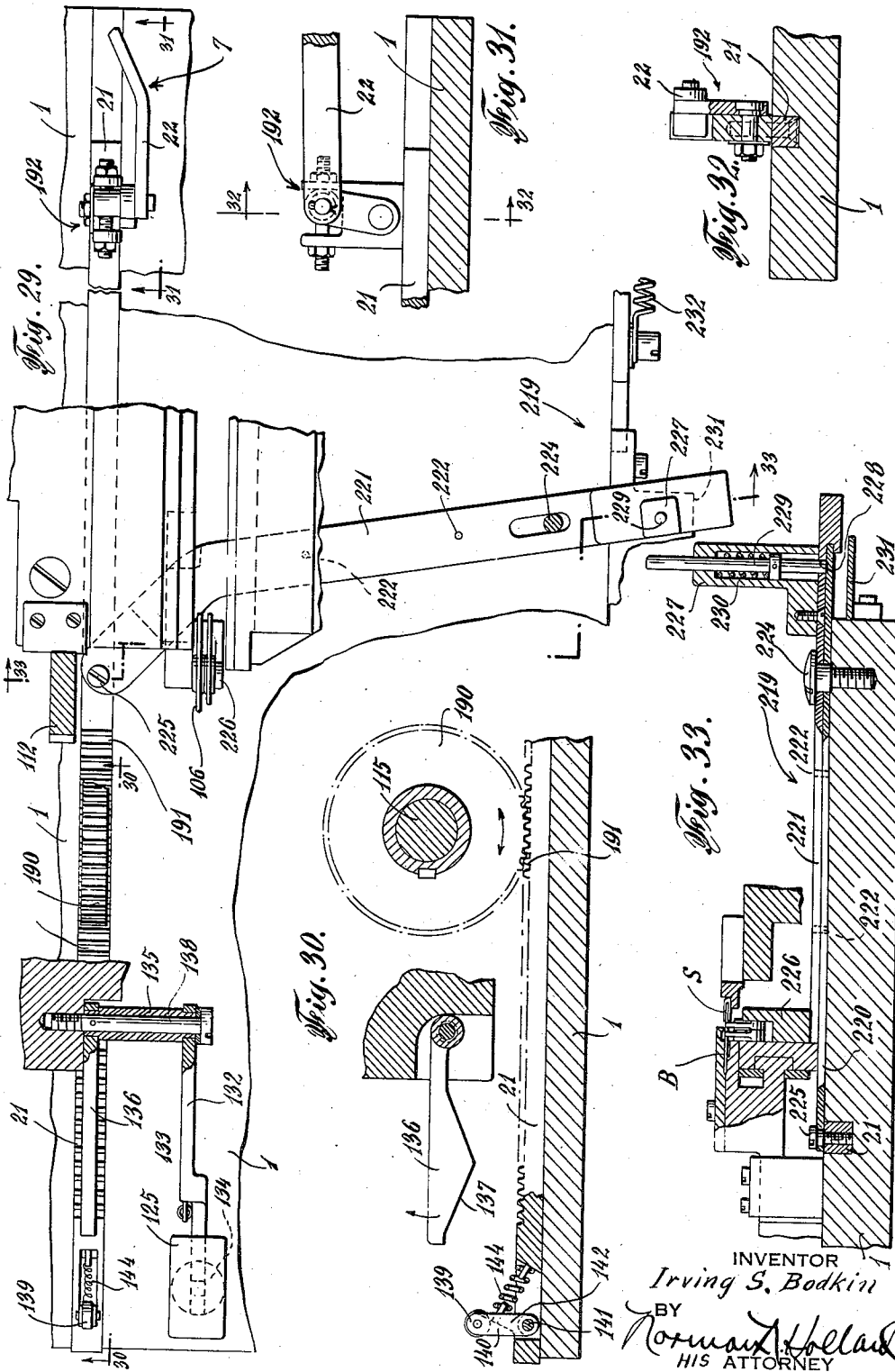
I. S. BODKIN

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RAZOR BLADE ASSEMBLING MACHINE AND METHOD

Filed March 9, 1937

9 Sheets-Sheet 8



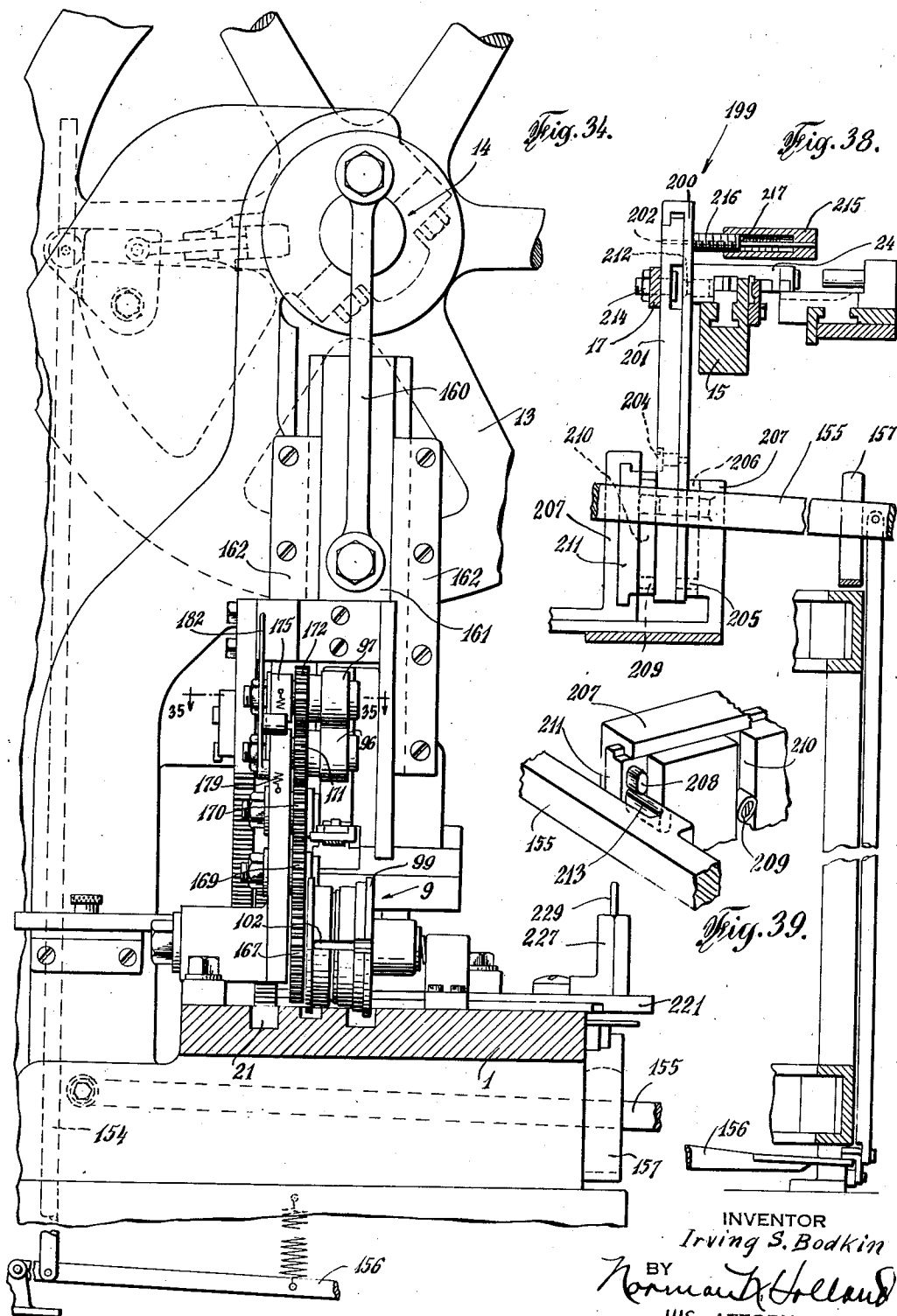
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RAZOR BLADE ASSEMBLING MACHINE AND METHOD

Filed March 9, 1937

9 Sheets-Sheet 9



UNITED STATES PATENT OFFICE

2,209,724

RAZOR BLADE ASSEMBLING MACHINE AND METHOD

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Application March 9, 1937, Serial No. 129,800

37 Claims. (Cl. 153—1)

The present invention relates to assembling machines and methods, and more particularly to a machine and method for assembling the parts of single-edged safety razor blades or similar articles.

Single-edged blades for safety razors usually comprise a blade member having a sharpened shaving edge at one side thereof, and a reinforcing strip or back formed of metal attached to the opposite side. The back stiffens the blade, serves as a gripping portion for handling the blade, and aligns the shaving edge with respect to the guard of a safety razor or blade holder. These blades are very popular and millions of them are used yearly. However, numerous difficulties are encountered in their manufacture, and every effort has been made to simplify the manufacture and to reduce the cost thereof. The customary method of making single-edged blades comprises stamping the outline of the blades from strips of steel or other suitable material, tempering and hardening the steel, and thereafter sharpening one edge of the strip. As the strips leave the sharpening machine the individual blade parts are cut therefrom, and these are fed to a machine for attaching back parts or reinforcing strips. The blades are then resharpened or honed, inspected and wrapped. The honing and inspecting steps are cumbersome operations because the blades must be handled individually and cannot be stacked. In addition, considerable difficulty has been encountered in attaching the reinforcing strip or back to the blade part. Heretofore, when U-shaped backs or folded reinforcing strips were pressed together to engage the back edge of the blade, they had a tendency to spring apart after clamping pressure was released. As a result, many backs or reinforcing strips were not properly secured in position and frequently separated from the blade part in subsequent manufacturing operations. This frequently caused machines to jam which necessitated shutdowns and repairs. Also, in many instances the improperly secured strips separated when used by the ultimate consumer, thus rendering the blade useless. In other cases, some strips were not properly aligned with respect to the back edge of the blade part causing the shaving edges to be out of alignment with the guard part of the razor. Such imperfect blades, if discovered upon inspection, were rejected and discarded. If they were marketed, they would fail to shave properly and in many cases injure the user, and consequently create dissatisfaction on the part of the user.

The present invention aims to overcome the

above difficulties by providing a simple inexpensive assembling machine for securely attaching backs or reinforcing strips to single-edged blade parts, and to simplify the manufacturing operations of the blades. The invention further aims to apply a wrapper or hood for protecting the sharpened edge of the blade immediately after the backs are attached to the blade parts so that the blades can be conveniently backed, wrapped with a protecting shell, and stacked in a single machine ready for delivery to a wrapping machine.

An object of the invention is to provide an improved method and a machine for manufacturing single-edged razor blades.

Another object of the invention is to provide an improved method and a machine for securely attaching reinforcing strips to safety razor blades or the like.

Another object of the invention is to provide an improved method and a machine for attaching reinforcing strips to blade parts in two stages.

Another object of the invention is to provide an improved method and a machine for automatically positioning razor blades or the like with respect to reinforcing strips or backs attached to the blades.

Another object of the invention is to provide an improved method and a machine for assembling and securing blades and reinforcing strips and thereafter applying a protective wrapper such as a hood or shell to facilitate handling the blades during subsequent wrapping and packaging.

Another object of the invention is to provide an improved method and machine for securely attaching a reinforcing strip to safety razor blades having one edge ground, honed and ready for shaving.

Another object of the invention is to provide a simplified and improved device for applying a protective wrapper or shell to razor blades.

Another object of the invention is to provide an improved device for applying a rust preventative to the reinforcing strips or backs of razor blades or the like.

Another object of the invention is to simplify and to improve the manufacture of single-edged razor blades.

A further object of the invention is to minimize the number of manufacturing operations and the expense of making single-edged razor blades.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various

advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, forming a part of the specification, wherein

Fig. 1 is a perspective view of a single-edged blade having a protective shell or wrapper applied thereto with part of the shell broken away to show the blade;

Fig. 2 is a front elevational view of a machine illustrating a preferred embodiment of the invention for applying the back and shell to the blade shown in Fig. 1;

Fig. 3 is a top plan view, partly in section, taken along the line 3—3 of Fig. 2 showing the guideway wherein the various operations are performed;

Fig. 4 is an enlarged top plan view, partly in section, of the guideway for the blades at the end of the machine where the blade parts are fed and assembled;

Fig. 5 is a front elevational view of a portion of the end of the machine shown in Fig. 4 showing the blade feeding mechanism;

Fig. 6 is a sectional view taken along the line 6—6 of Fig. 4 showing the blade feeding mechanism in another position;

Fig. 7 is a sectional view taken along the line 7—7 of Fig. 5 showing the guideway at the blade feeding station;

Fig. 8 is a sectional view taken along the line 8—8 of Fig. 5 showing the strips being fed to the guideway;

Fig. 9 is a perspective view of a device for holding the blade parts in the guideway;

Fig. 10 is a sectional view taken along the line 10—10 of Fig. 9;

Fig. 11 is an enlarged horizontal sectional view of a preferred form of a blade clamping and separating mechanism taken along the line 11—11 of Figs. 2 and 12;

Fig. 12 is a sectional view taken along the line 12—12 of Fig. 11 of the blade clamping mechanism;

Fig. 13 is a sectional view taken along the line 13—13 of Fig. 14, showing the clamping and separating mechanism in another position;

Fig. 14 is a sectional view taken along the line 14—14 of Fig. 13;

Fig. 15 is a sectional view taken along the line 15—15 of Fig. 14, illustrating the clamping mechanism prior to securing a back strip to a blade part;

Fig. 15a is a perspective view of a blade part and a back part prior to the clamping operation;

Fig. 16 is a sectional view taken along the line 16—16 of Fig. 12 illustrating the assembling mechanism while clamping the back to the blade part;

Fig. 16a is a perspective view of a blade part having a back or reinforcing strip secured thereto;

Fig. 17 is a sectional view taken along the line 17—17 of Fig. 14, showing the blade and back parts of Fig. 16a in the assembling mechanism prior to the second assembling operation;

Fig. 18 is a sectional view taken along the line 18—18 of Fig. 12, showing the blade parts in the machine being inserted further into the strip or back;

Fig. 18a is a perspective view, illustrating the blade and back parts after being subjected to the second assembling operation shown in Fig. 18;

Fig. 19 is a perspective view of a portion of

the blade separating mechanism shown in Figs. 11, 12, 13 and 14;

Fig. 20 is a side elevational view of a portion of the machine, illustrating a preferred form of mechanism for applying the protective shell and a device for stacking the blades;

Fig. 21 is a sectional view taken along the line 21—21 of Fig. 20;

Fig. 22 is an end view, partly in section, taken along the line 22—22 of Fig. 20;

Fig. 23 is an enlarged sectional view of a cutting knife taken along the line 23—23 of Fig. 20;

Fig. 24 is a sectional view illustrating the first step or operation of the shell applying device;

Fig. 24a is a perspective view of a blade with the shell partly applied by the device after the operation illustrated in Fig. 24;

Figs. 25 and 26 are sectional views illustrating subsequent steps or operations of the shell applying device;

Fig. 27 is a sectional view illustrating the shell applying device approaching the end of its operating cycle;

Fig. 27a is a perspective view of a blade with the shell applied by the device after the operation shown in Fig. 27;

Fig. 28 is a perspective view of a blade with the shell completely applied;

Fig. 29 is a sectional view taken along the line 29—29 of Fig. 2 illustrating a portion of the operating mechanism and a safety device;

Fig. 30 is a sectional view taken along the line 30—30 of Fig. 29;

Fig. 31 is an enlarged sectional view taken along the line 31—31 of Fig. 29;

Fig. 32 is a sectional view taken along the line 32—32 of Fig. 31;

Fig. 33 is a sectional view taken along the line 33—33 of Fig. 29;

Fig. 34 is an end elevational view, partly in section, taken along the line 34—34 of Fig. 2 showing means for operatively connecting certain of the devices to the drive mechanism;

Fig. 35 is a sectional view taken along the line 35—35 of Fig. 34;

Fig. 36 is a perspective view of a gear rack or slide for operating the shell paper feed, knife, wrapping tumbler and glue applying finger;

Fig. 37 is an end view showing a portion of a mechanism for operating the gear rack shown in Fig. 36;

Fig. 38 is a sectional view taken along the line 38—38 of Fig. 2 illustrating another safety device; and

Fig. 39 is a fragmentary perspective view illustrating details of the safety device shown in Fig. 38.

Referring again to the drawings, there is shown in Fig. 1 a single-edged blade after being subjected to the various operations of the present machine. The blade may comprise a blade part B having a sharpened shaving edge E, and slots or recesses R adapted to be engaged by suitable projections for transferring and positioning the blade during its manufacture. When the blades are placed in a razor, the recesses R are utilized for aligning the edge E with respect to the shaving guard of the razor. A folded strip or substantially U-shaped reinforcing back S having flanges F is clamped to the edge opposite the shaving edge and a protective shell or wrapping hood P is applied to the blade part to protect the shaving edge E. Preferably, the shell is made of paper or other fibrous material having substantially the same thickness as the

back strip S whereby the finished blade is of uniform thickness and substantially flat to facilitate stacking.

The present machine about to be described, to illustrate a preferred embodiment of this invention, automatically attaches the back S to the blade B and applies the shell P about the sharp edge thereof to form the completed blade shown in Fig. 1 of the drawings and described above. While various means may be utilized for practicing the method of the present invention, the machine herein described illustrates one way of practicing the method for explanatory purposes, but is not to be considered limited thereto.

Described generally, the present machine (Figs. 2 and 3) illustrating a preferred embodiment of the invention, comprises a base or table 1 upon which the various mechanisms are mounted. Suitable columns 2 extend upwardly from the base for supporting a main drive shaft 3 while a channel or guideway 4, for feeding the blades to the various mechanisms, extends substantially along the length of the base. A rack 5 for stacks of sharpened blade parts B is provided at one end of the guideway and a second rack 6 for backs or reinforcing strips S is provided adjacent to the blade rack 5. Suitable transferring devices 7 are associated with the racks for placing a blade part and a back in the guideway 4, assembling the blade part and the back, and presenting them in their assembled relation to a suitable press 8 for securing the back part to the blade part. A wrapping mechanism 9 applies the shell or protective wrapper P to the blade edge, and a suitable mechanism 10 applies a rust preventative, such as oil, to the back parts or reinforcing strips. The blades are then stacked by a device 11 and may thereafter be removed from the machine. The various parts are operated by movable members connected to the main drive shaft 3 which may be driven by a motor 12 or other source of power through the intermediation of a fly-wheel 13 and a clutch 14. Safety devices are provided for throwing out the clutch and stopping the machine if parts of the blade are not properly fed or transferred.

These various mechanisms will now be described in detail.

The blade and back feeding devices

The blade part and back feed devices are shown in detail in Figs. 2 to 10 (Sheets 1 to 3) and are adjacent to a channel member 15 mounted on the table 1 which provides a guideway for the parts of the blade. The channel member extends lengthwise along the base of the machine and has a longitudinal groove or recess 16 for slidably mounting a reciprocating member 17 having a projection 19 at one end adapted to register with the recesses R of the blade parts B. The finished blade parts B provided with a sharpened and honed edge E are preferably stacked in the rack 5 which is directly above the guideway and are held downwardly by a suitable weight 18 resting on the stack of blade parts (Fig. 2). The blade parts are fed one at a time by the reciprocating member 17 which separates the bottom blade part from the stack and moves it lengthwise along the guideway towards the rack for feeding the back parts. The reciprocating member 17 is operatively connected to a reciprocating gear rack or bar 21 by a link member 22, and a carriage 24. The gear rack 21 extends substantially along the length of the base and is reciprocated at predetermined intervals by suitable

operating devices which will be described in detail in connection with the drive mechanism.

If desired, a heater 23 (Fig. 3) such as an electrical heat resistance element may be provided adjacent to the stack of blade parts which is adapted to heat the blade parts to a temperature of about 250° F. By heating the blade parts, the grease which is customarily thereon is reduced to a liquid state to facilitate separation of the blades and to minimize any adhesive action thereof. The heater may be operated by the motor switch but if desired may be controlled by any suitable switch or rheostat adapted to regulate the temperature thereof independently of the operation of the motor.

The reinforcing strips or backs S are stacked in a suitable magazine 25 attached to the feed rack 6. Preferably, the rack 6 is adjacent to the blade feed rack 5 and has its lower end curved downwardly and inwardly towards the blade channel to feed the back strips in horizontal position. In order to place the lowermost strip in position to receive a blade part a slot or recess 26 is provided in the channel member 15 which permits the flanges F of the strip to project into the blade channel with the U-shaped opening between the flanges in horizontal alignment with the back edge of the blade. When the reciprocating member 17 separates a blade from the stack and feeds it along the channel the back edge of the blade is inserted between the flanges F of the back strip. When in proper alignment with the strip, a notch or projection 27 adjacent to the projection 19 on the reciprocating member 17 engages one end of the back strip and moves the back strip along with the blade part to the clamping mechanism or press 8.

In order to insure proper assembly of the blade and back parts and prevent jamming of the table channel or guideway, a presser bar or brush 29 (Figs. 9 and 10) extends over the blade channel at the assembly station. The presser bar is adapted to hold the blade parts in the channel and is resiliently urged downwardly by a spring member 30 secured to a suitable bracket 31 attached to the table. Preferably, the spring member is adjustable to provide any desired downward pressure. The back strips are guided into proper position by a stop member 32 attached to the bracket 31 having a projecting ledge 33 (Fig. 9) for preventing the flanges of the back strips from extending too far into the channel while a spring or resilient clip 34, adjustably secured to the bracket (Figs. 7, 8 and 9), engages the top flange of the back strips and exerts downward pressure thereon to hold the strips in proper position.

A suitable device for separating the lowermost back strip and the succeeding strip may be used in connection with the feed rack 6. Such device is illustrated more particularly in Figs. 4, 5 and 6 and preferably comprises a pair of reciprocating fingers 35 and 36 adapted to extend into the lower end of the back strip feed rack 6. The fingers engage the back strip next to the bottom and arrest downward movement thereof while the lowermost strip is at the assembling station. In this manner, the succeeding strip cannot interfere with the assembly of the bottom strip and cause jamming of the machine.

While any suitable devices may be utilized for reciprocating the fingers 35 and 36 to alternately engage and release a strip in timed relationship with respect to the blade feed member 17, a preferred mechanism for performing this function 75

is illustrated herein. This mechanism preferably comprises a slide 37, mounted on the table, which carries the finger 35, and a second slide 39 which carries the finger 36. The slide 39 is reciprocated lengthwise along the table by a resiliently retained pawl 40 pivotally mounted on the reciprocating carriage 24. The pawl is adapted to engage a slot 41 in the slide 39 to move the slide and place the finger 36 into its strip arresting position as shown in Fig. 6. After the slide has been so moved, a pin 42 connected to the pawl 40 engages a cam surface 43 on a cooperating pin 44 associated with the slide and raises the pawl out of the slot 41 to stop further movement of the slide. The pawl 40 then moves with respect to the slide 39, and, substantially at the end of the feed stroke of the carriages, engages a second slot 45 formed in the slide 39. As the carriage is returned to its initial position, the finger 40 moves the slide back again to retract the arresting finger 36 from the strip rack. In order to permit the slide 39 and finger 36 to remain in this position momentarily, a second pin 44 having a cam surface 43 engages the pin 42 and releases the pawl 40 from the slot 45 whereby the pawl is moved back to the slot 41. Preferably, a spring 46 is adjustably attached to the carriage for exerting downward pressure on the pawl to insure engagement of the slots 41 and 45.

The finger 35 mounted on the slide 37 is reciprocated in opposite directions with respect to the finger 36 during the movement of the slide 39 by a lever or link 47 pivoted at 48 to the table, linked to a slide at 49 and oscillated by a bracket 50 connected to the slide 39 (Figs. 5 and 6).

The back and blade assembling mechanism

A suitable clamping or pressing mechanism for attaching the backs or reinforcing strips to the blade parts in two steps or operations is illustrated more particularly in Figs. 2 and 11 to 18 (Sheets 1, 4 and 5). The first step comprises feeding a blade and back in predetermined assembled position (Fig. 15a) to a pressing or clamping device which forces the flanges F securely against the portions of the blade part adjacent to the back edge thereof and forms a constricted portion or rib C on the flanges F in proximity to the base of the U-shaped fold of the back strip (Fig. 16a). After clamping pressure is released, the flanges of the strip S grip the blade slightly, but not sufficiently to hold it rigidly in place. To firmly secure the back strip to the blade, the blade and the back strip attached thereto are subjected to the second step which comprises holding the blade part in a predetermined position and pushing the flanges F further over the back edge of the blade until the constricted portions C grip the blade (Fig. 18a). The parts as thus assembled, are very securely attached and cannot come apart in spite of slight yielding of the flanges after the initial clamping step.

A preferred embodiment for carrying out the above operations comprises a guide plate 51 (Figs. 15 to 18), forming a part of the blade guideway 4, bolted to a table 1 adjacent to the delivery end of the channel member 15 (Fig. 11). The plate 51 is provided with a recess 52 (Fig. 15) for receiving the bottom flange F of the back strip and a cover plate 54 for protecting the shaving edge E of the blade. Suitable apertures 55 are formed in the cover plate and guide plate which register with the recesses R of the blade and are adapted to receive prongs or projecting fingers 56 associated with the press for holding the blade stationary

with respect to the guide plate 51 while the press is effective.

The blade and back parts are presented or delivered to the guide plate 51 in assembled relation (Fig. 15a) by the transfer arm 17 which at the end of its stroke places the blade and back under the press with the recesses R in register with the aperture 55 of the guide plate. A pressing anvil 57 carrying the projections 56 is then moved downwardly to cause the projections 56 to extend through the recesses R and apertures 55 and hold the blade part in position (Fig. 16) while the anvil 57 engages the top flange of the back strip and forces it downwardly to flatten the flanges against the blade. The anvil 57 and guide plate 51 preferably are provided with complementary recesses 58 adapted to receive the U-shaped fold of the strips and suitably shaped portions 59 adapted to form the ribs or constricted portions C.

In order to prevent the back strips from moving away from the back edge of the blade or out of position during the clamping step, a suitable strip holding device is provided. This device may comprise a transversely slidable member 60 adapted to engage the back edge of the reinforcing strip and push the strip toward the back edge of the blade. The member 60 preferably is mounted on a bolt or rod 61 seated in a stationary sleeve 62 containing a spring 63 for normally moving the bolt 61 and member 60 away from the back strip. In order to render the strip pushing member 60 effective while the strip is being clamped, a cam or wedge 64 is associated with the press which is adapted to engage the pushing member 60 and move it forwardly to push the strip toward the blade. When the press is raised and the cam 64 is moved away from the member 60, the spring 63 retracts the member 60 (Fig. 15).

After the strip has been attached to the blade part and the press is raised to move the projecting fingers 56 out of registry with the recesses R and the apertures 55, the transfer arm 17 moves the succeeding strip and blade under the press which, in turn, moves the clamped strip and blade part along the guide plate a distance corresponding to the length of the blade. At this station, a suitable device for inserting the blade part further into the strip is provided (Figs. 17 and 18).

Such a device preferably comprises downwardly extending pins or fingers 65 associated with the press and adapted to register with the recesses R of the blade and apertures 66 in the guide plate 51 to hold the blade stationary. A suitable pushing member 67 having a groove 69 for receiving the back or reinforcing strip, is provided at the side of the blade channel adjacent to the strip. This member 67 is adapted to be moved toward the blade channel when the press is moved downwardly and the pins 65 hold the blade part to push the strip flanges F further over the blade part until the constricted portions C engage and clamp the blade between them (Figs. 18 and 18a).

While any suitable mechanism may be utilized to move the strip pushing member, such a device preferably comprises a bar 70 movable with the press adapted to extend through a slot 71 in the member 67 and having a cam surface or wedge 72 adapted to engage a corresponding cam surface 73 on the member 67 to move the member 67 horizontally a predetermined distance toward the blade upon downward movement of the press. In order to retract the strip pushing member positively, the bar 70 is provided with a second cam

surface 74 adapted to engage a corresponding cam surface 75 on the member 67 and move the member 67 away from the back strip when the press is raised. Preferably, the pushing member 67 is in the form of a substantially flat bar slidably fitted in a guide slot 76 in a suitable stationary mounting member 77 bolted or otherwise secured to the table.

The press mechanism may be reciprocated vertically by any suitable means but preferably is operated by a crank shaft 80 on the drive shaft 3 supported by the columns 2. The fly-wheel gives the crank shaft sufficient inertia to operate the press effectively.

A feature of the above described mechanism is that the two attaching steps are both performed during a single operation of the clamping press, that is, the first strip is further secured to its blade part while the succeeding strip is clamped to its blade part. In this manner, the attaching operations are greatly simplified. Another feature is that the pushing member 67 performing the second step, accurately positions the strip with respect to the edge of the blade a predetermined distance in every instance. This insures the production of perfect blades without further inspection.

The blade separating means

When a third strip and blade part are delivered to the clamping station, the second blade advances to the back positioning station and the finished blade is pushed forwardly along the guideway and away from the press. In order to prevent the blades from jamming and to eliminate the necessity of the transfer arm 17 pushing a great number of blades along the blade channel, a suitable device (Figs. 11, 12, 13, 14 and 19—Sheet 4) is provided for quickly separating the finished blade from the succeeding blade about to be ejected from the press.

This device preferably comprises an oscillating finger 81 pivoted at 82 to the table and having a hook-shaped portion 84 adapted to extend between the ends of the back strips of adjacent blades (Fig. 19). The finger may be oscillated by a vertically reciprocating rod or pin 85 mounted on the press having a cam surface 86 which engages one side of the finger to move it quickly away from the press and separate the adjacent blade (Fig. 11). The finger may be returned by a spring 87 which is effective to pull the finger towards the press when the pin 85 is raised upwardly out of engagement with the finger. Preferably, the pin 85 upon its downward stroke, passes through a guide aperture 89 in the table and is resiliently mounted on a rod 90 attached to the press by a bracket 91. A spring 92 coiled about the rod 90 permits the rod 90 to move downwardly without moving the pin in the event that the pin strikes the separating finger or misses the guide aperture 89. By connecting the finger operating means to the press, the separating finger is operated in timed relation with the press.

The shell applying mechanism

After the strips are attached to the blade parts, the blades are difficult to handle and cannot be stacked, due to the thickness of the blades at the strips being three or four times greater than the thickness of the blade parts B. Since the blades need not be inspected again, the present invention aims to deliver the blades from the machine in a suitable form to be stacked and fed to a packaging machine. To accomplish this, a suitable

mechanism 9 (Fig. 2) is provided adjacent to the press which applies a protective shell, hood or wrapper P (Fig. 1) to the exposed portions of the blade part. This shell protects the shaving edge E and at the same time gives the finished blade a uniform thickness throughout.

A preferred device for applying the shells is illustrated more particularly in Figs. 2, 20 to 27 and 35 (Sheets 1, 6 and 7) and comprises a rotatable reel 95 (Fig. 2) mounted on the table 1 for supplying a roll of paper strips P to suitable feed rollers 96 and 97 (Figs. 24 and 35) adapted to deliver a strip P of predetermined length to a rotatable wrapping drum or tumbler 99 (Figs. 20 and 24) for folding the strips about the blades. A knife mechanism 100 (Fig. 23) severs the strips P from the roll while a gluing device 101 (Figs. 25 and 26) applies a spot of glue G to the shell strips as they are fed to the wrapping tumbler 99. These devices will now be described in detail.

As the blades are moved forwardly by the separator finger 81, they engage a strip of material P (Figs. 24 and 24a), fold one end thereof and insert the folded portion into a slot or guideway 102 provided in the tumbler 99. The slot 102 extends diametrically through the tumbler and preferably is twice the length of the blades. The tumbler slot is held in horizontal alignment with the blade feed channel by a resiliently mounted finger 104 (Fig. 2) adapted to engage recesses 105 in the tumbler and arrest rotation of the tumbler when in its proper position. A suitable transferring finger 106 (Figs. 25 and 27) moves the blade forwardly to insert it, together with the strip P, into the tumbler slot and causes a dummy blade or slug 107 (Figs. 24 and 25) to be pushed from one end of the slot 102 to the other.

When the blade has been inserted into the tumbler slot, one end of the strip P projects outwardly from the tumbler, and is supported momentarily by a holder 109 (Fig. 25) while a finger 110 passes through a glue receptacle 111 and applies a spot of glue to the underside of the strip. The tumbler is then rotated one-half of a revolution or 180 degrees in a counterclockwise direction by a vertical gear rack 112 (Figs. 21, 22 and 36) which meshes with a gear 114 on a shaft 115 adapted to rotate the tumbler through the intermediation of a suitable ratchet mechanism 116 (Fig. 20) associated with the tumbler.

After rotation of the tumbler, a second blade (Fig. 27) is inserted into the tumbler slot and displaces the dummy 107 which, in turn, ejects the partially wrapped blade and inserts it into a horizontal guide slot 117 forming a part of the blade channel. During rotation of the tumbler and insertion of the blade into the guide slot 117, a finger 119 guides the unfolded end of the strip P so that upon insertion of the blade this strip portion is folded downwardly against the other end of the strip (Fig. 27a) and causes the spot of glue G to join the respective ends of the strip to provide a completely wrapped blade (Fig. 28).

If desired, a plate or cover 118 may form the top of the guide slot 117. This cover preferably is mounted resiliently by a spring or other resilient means 123 (Fig. 20) adapted to hold the cover downwardly against the blades with any desired amount of tension. As the blades are forced under the cover, the glued end of the strip is securely pressed against the other end of the strip.

The strip feed, knife, glue finger tumbler and holder preferably are operated in timed relationship by the vertically reciprocating gear rack

112 and suitable connecting devices which will be described in connection with the drive mechanism.

The rust preventative applicator

5 Since the reinforcing strips or backs S are subjected to relatively severe pressure and bending strains while being formed and also while being attached to the blade parts, the metal consequently is strained or slightly scratched to
10 form minute surface cracks invisible to the naked eye. Such cracks, together with the inherent characteristic of metal being corrosive, expedite the formation of rust. In order to prevent rust or corrosion of the blades before they reach the
15 ultimate consumer, it is desirable to apply a thin film of oil or other rust preventative material to the surface of the reinforcing strips. This film of oil covers the cracks and protects the metal against the corrosive action of air and moisture.

20 While any suitable device may be utilized for applying a small amount of oil to the back strips, a preferred device for this purpose is shown in Fig. 2, which comprises a storing cup or receptacle 120 having a dripping attachment 121 at the
25 bottom thereof for supplying oil, drop by drop, to a funnel 122 mounted on the guide slot or channel 117. The cup feeds oil into the guideway at the side where the back strips pass so that the oil is spread or wiped along the strips. If desired, suitable pads may be provided in the channel to facilitate wiping the oil on the strips.

The blade stacking device

35 After the blades have been oiled they are preferably stacked in suitable racks so that they may be removed from the machine and fed to a wrapping machine. A preferred device for stacking the blades is illustrated more particularly in Figs. 2, 20, 29 and 30 (Sheets 1, 6 and 8), which comprises a presser foot or elevating platform 125
40 adapted to receive the blades one at a time and move them upwardly into a rack 126. The lower end of the rack is provided with a pair of pivoted fingers 127 (Fig. 20) each having a cam surface 129 at the lower ends thereof, which causes the
45 fingers to spread apart when a blade is pushed upwardly between them. Suitable springs or resilient members 130 move the fingers towards each other when the blade is pushed past the cam surfaces and a hook-shaped portion 131 on the
50 fingers serves to support the lowermost blade of the stack. As more blades are inserted, the stack gradually rises and moves upwardly after each stroke of the blade elevating platform. The
55 stacking rack may be of any desired height or shape and if desired may be arcuate at the top thereof and joined to a horizontal magazine for receiving the blades.

The mechanism for operating the blade elevating platform preferably comprises an arm 132
60 (Fig. 20) held in downwardly position by a spring member 133, linked to the elevating platform at 134 and connected at its other end to a rotatable sleeve or shaft 135 (Fig. 29) pivoted to the table by a bolt or rod 138. A second arm 136
65 is connected to the shaft and is provided with a cam surface 137 adapted to be engaged by a roller 139 on the horizontal gear rack 21 (Fig. 30). The roller 139 preferably is mounted on an
70 upwardly extending link member 140 pivoted to the gear rack 21 at 141, while a stationary dog 142 adjacent to the member 140 and a spring 144 hold the member 140 to prevent oscillation of the link member 140 during movement of the gear
75 rack towards the left end of the machine. This

causes the roller to swing the cam arm upwardly which in turn rocks the shaft 135 and imparts corresponding upward movement to the elevator arm. Upon movement of the gear rack 21 towards the right of the machine, the roller engages the cam and swings the link 140 downwardly in opposition to the spring 144. In this manner, the roller rides under the cam arm and does not impart upward movement thereto.

The drive mechanism

10 The present machine is operated by a suitable drive mechanism and connecting devices for automatically actuating the various mechanisms in timed relationship. Such a drive and related
15 devices are illustrated more particularly in Figs. 2, 3, 22, 24, 25, 29 to 32, and 34 to 38 (Sheets 1, 2, 6, 7, 8 and 9), and preferably comprise a motor 12 or other source of power for rotating a pulley 150 carrying a belt 151 (Fig. 2) adapted to rotate the fly-wheel 13 mounted on a shaft 152
20 which imparts rotation to the main drive or operating shaft 3 through the intermediation of the clutch 14. The clutch may be operated by a rod 154 having a hand lever 155 connected
25 thereto which may be moved into clutch engaging position by a foot treadle 156 (Figs. 2, 3 and 38) and which may be held in its operating position by a slidable bracket 157 retained by a spring 159 (Figs. 2 and 38). The bracket 157 is adapted
30 to release the clutch lever in response to the operation of automatic safety devices which will be described in detail hereafter.

The main drive shaft 3 is provided with the crank shaft 80 for reciprocating the assembling
35 press 8 in a vertical direction which in turn operates the blade clamping and positioning devices and the blade separating finger 81 (Fig. 11).

40 At one end of the shaft 3 a connecting rod 160 is eccentrically mounted to operate a vertically reciprocating slide 161 mounted in a slide guideway 162 (Figs. 34 and 37). The slide 161 has a suitable bracket 163 at its lower end provided with a pin 164 which upon downward
45 movement of the slide engages a trip portion 110a on the glue applying finger 110 and causes the applicator portion 110b of the glue finger to move through the glue receptacle and apply a spot of glue G to the paper strip. The bracket 163 is also adapted to engage the strip holder
50 109 upon downward movement to place it in strip supporting position while the glue finger is effective (Figs. 20 and 26).

55 A second bracket 165 is attached to the slide 161 carrying the vertically reciprocating gear rack 112 (Figs. 36 and 37) having teeth 166 adapted to mesh with the gear 114 on the wrapping tumbler shaft 115. Preferably, the shaft by means of the ratchet device 116 rotates the
60 tumbler one half a revolution during the upward stroke of the rack 112. While the tumbler is rotated, the shell paper feed is operated by a gear 167, rotatable with the tumbler, which rotates the paper feed rollers 96 and 97 through
65 idling gears 169 and 170 and gears 171 and 172 rotatable with the feed rollers 96 and 97 respectively (Fig. 24).

In order to stop the rollers when a wrapping strip of predetermined length has been fed, the
70 upper feed roller 97 is mounted on a bell crank or arm 175 pivoted at 176 and held downwardly at one end thereof by a spring 179 to urge the roller against the paper strip. The other end of the bell crank 175 has a roller 180 mounted
75

thereon which is adapted to be engaged by a cam 181 on the gear rack 112 to cause the bell crank to oscillate in opposition to the spring 179 and raise the bell crank 175 upwardly to separate the rollers. If desired, the feed rollers may be stopped manually by a lever 182 carrying a pin 183 adapted to raise the bell crank and separate the feed rollers 96 and 97.

The knife mechanism (Figs. 23 and 36) comprises a blade member 184 pivoted at 185 and provided with an arm 186 adapted to be engaged and oscillated by a roller 187 mounted on the gear rack 112. The blade member may be returned by a spring 188 while the roller 187 may be mounted on a pivotally mounted member 189 adapted to yield in resistance to a spring 193 upon upward movement of the rack 112, whereby the knife will not be operated.

The shaft 115 also carries a gear 190 which is alternately rotated in opposite directions by the movement of the gear rack 112 (Figs. 3, 22, 29 and 30). This gear meshes with teeth 191 on the horizontal gear rack 21 and causes the rack to reciprocate horizontally. The horizontal rack 21 preferably is connected to the carriage 24 by a pitman or ball and socket connection 192 (Figs. 31 and 32), which operates the feeding arm 17 to move the blade and back parts under the press. The rack 21 also operates the blade stacking device at the end of the table and reciprocates the blade transferring finger 106 (Fig. 24) for moving the blades into the wrapping tumbler.

The safety devices

In Figs. 2, 3, 29, 33, 24 and 38 (Sheets 1, 2, 8 and 9) suitable devices are shown adapted to stop the machine by automatically throwing out the clutch if the feed or blade channels become clogged. Preferably, a safety device 199 (Fig. 38) connects the blade separating and feeding member 17 to the feed carriage 24. The safety device may comprise a pair of arms 200 and 201 secured together as an integral member by a shear pin 202 at the upper ends thereof and pivot member 204 adapted to permit the arms to oscillate with respect to each other when the safety pin is broken. The lower end of the arm 200 preferably has a pin or projection 205 seated in a groove 206 of stationary member 207 secured to the table or base 1, while the arm 201 carries a similar projection 209 seated in a groove 210 of a member 211 slidably mounted in the stationary member 207. In this manner, while the blade feed functions properly, the pins 205 and 209 act as a pivot for the arms 200 and 201 to permit them to oscillate with the carriage as an integral member. The slidable member 211 is provided with a projection 208 adapted to hold a bifurcated portion 213 of the clutch lever 155 downwardly while the arms 200 and 201 are connected by the safety pin. Upon breaking of the pin the projection 240 moves out of engagement with the portion 213 to permit the lever to move upwardly. Preferably, the arm 200 is connected to the carriage by a bolt 212 or the like while the arm 201 is connected to the feed member 17 by a bolt 214 or the like.

If the blade feed channel 15 should become jammed, movement of the feed member 17 is resisted or stopped and oscillation of the arm 201 about the pivot pin 205 ceases. The arm 200 connected to the carriage, however, continues to be oscillated and tends to impart movement to the arm 201. This tends to oscillate the arms

with respect to each other about the pivot member 204 and causes shearing of the safety shear pin 202. When the pin 202 is broken, the upper and lower ends of the arms swing apart like the blades of scissors. As this occurs, the arm 201 is retained in the groove 206 by the pin 205 and the pin 209 on the arm 200 moves the slidable member 211 sidewise. The member 211 by sliding to either side causes the projection 208 to release the clutch lever portion 213 to throw out the clutch and stop the machine. This action is simultaneous with the jamming of the machine, and hence stops the machine before any damage can be done.

The safety shear pins may be formed of any suitable material adapted to resist a predetermined amount of force. They may be conveniently inserted into the arms by a threaded sleeve 215 carrying a suitable length of pin material. The sleeve may be threaded progressively over a stud 216 having an aperture 217 in registry with the aperture of the arms adapted to receive the pin material and guide it to the arms. By replacing the pins in this manner a supply of pin material is always on hand and the pins need not be handled separately.

A second safety mechanism 219 may be located along the blade channel at any suitable point, but preferably is stationed where the blades leave the clamping press 8 (Figs. 3, 29 and 33). This mechanism may comprise a pair of arms 220 and 221 mounted one on top of the other and secured together as a unit by safety pins 222. The arms are pivotally mounted at 224 to the table and the lower arm 220 is pivoted to the horizontally reciprocating rack 21 at 225 adapted to rock the arms. The upper arm 221 carries a detector slide 226 which forms the bottom of the blade channel as the blades leave the assembly press 8 and is adapted to resist oscillation of the upper arm when the blade channel is clogged. The upper arm at the front end of the machine (Fig. 33) carries a sleeve 227 having a plunger or pin 229 therein urged downwardly by a spring 230 into an aperture 228 in the upper arm 221 but retained by the upper surface of the lower arm 220 while the arms are secured by the safety pins.

When movement of the detector slide is prevented by clogging of the blade channel, movement of the upper arm is stopped and the pins 222 are broken to permit the arms to move with respect to each other. The front end of the lower arm is then oscillated away from the upper arm and releases the pin or plunger 229 in the sleeve 227 which permits the pin to be forced downwardly by the spring 230 through the aperture 228 to contact a plate 231 (Fig. 2). The plate 231 is moved by the plunger 229 to release the clutch lever retaining bracket 157 which is moved towards the right side of the machine by a spring 232 to throw out the clutch lever 155 and stop the machine. After the blade channel is cleared the pins 222 may be replaced and the plate 231 may be reset to retain the clutch lever bracket 157.

The plate 231 may also be used to stop the machine in an emergency if the operator is not in position to reach the clutch lever quickly. This may be done by manually pressing the plate downwardly.

Operation of the machine

After determining that all the parts move freely, the motor 12 is started and the clutch is moved into engaging position by placing the lever 155 in the retaining bracket 157 or by

stepping on the treadle 156. When several cycles of operation have been completed, the machine functions in the following manner. Upon downward movement of the vertical gear rack 112 the gear 190 is rotated to move the horizontal gear rack 21 towards the left of the machine. The carriage then causes the feed slide to place a blade part into a back strip and operates the strip retaining fingers to hold the succeeding strip in the rack 6. At the completion of the movement of the horizontal rack towards the left of the machine, the blade and back parts are under the clamping press which thereafter descends and clamps the back part on the blade.

When the rack 21 is moved towards the left again, the assembled blade and back are moved into the positioning device which upon right hand movement of the rack and downward movement of the press 8 pushes the blade part further into the back. During the next stroke of the rack towards the left, the blade is ejected and upon downward movement of the press is engaged by the separating finger which moves it along the guideway.

The shell or hood strip feed rollers are rotated upon upward movement of the vertical rack 112 and feed a strip of paper to the tumbler. When the vertical rack moves down it operates the knife 100 to cut the strip P, trips the glue finger to apply a spot of glue and moves the horizontal rack towards the left carrying the transferring finger 106 which simultaneously inserts the blade and paper into the tumbler. When the blade is inserted into the tumbler, the dummy 107 is displaced and the preceding blade is removed. Thereafter, the vertical rack moves up again, rotates the tumbler to wrap the shell about the blade and feeds a strip of paper for the succeeding blade. As the blades are ejected, they are pushed under a pressure pad to apply pressure to make the glued portions of the paper adhere and are then moved past the rust preventatives applicator to the bottom of the stack. At the completion of each stroke of the horizontal rack towards the left, the stack elevator platform is raised to force a blade upwardly into the stack.

During the operation of the machine, it will be noted that the various parts cooperate in the following timed relationship. When the vertical rack moves down, the press 8 is raised and the horizontal rack 21 moves towards the left. The horizontal rack then moves the arm 17 to feed a blade and back to the press, operates the back strip retaining fingers 35 and 36, causes the transfer finger 106 to insert a blade into the tumbler to eject the preceding blade, and operates the stacking device. The vertical rack during downward movement operates the paper cutter and the glue finger. When the vertical rack moves upwardly, the press is moved downwardly to clamp and position a set of blade parts. The press during its downward movement operates the separating finger. At the same time, the horizontal rack is moved to the right to retract the back strip retaining fingers from the feed magazine 6. Upward movement of the vertical rack also affects rotation of the tumbler and feeding of a strip of paper.

If at any time during the operation of the machine the blade channel should jam at the feeding and assembling stations or at the pressing station, the safety mechanisms 199 (Fig. 38) and 219 (Figs. 29 and 33) respectively, are adapted to cause the clutch to disengage instantly to prevent damage to the operating parts.

It will be seen that the present invention pro-

vides an improved machine and method for assembling the parts of single edged razor blades and for applying shells to the blades to facilitate handling the blades during subsequent operations. By clamping the back strips to the blades and then resetting or positioning the blades, a tighter fit is provided. Also, the blades can be sharpened, honed, and inspected prior to attaching the back parts because the backs are applied accurately and the machine handles the blades so carefully that subsequent inspection is not necessary. The machine is rugged in construction, simple in operation, and constructed of a minimum number of parts fully capable of withstanding the rough usage to which they may be subjected.

As various changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. The method of assembling the parts of safety razor blades, which method comprises feeding a stack of reinforcing strips one at a time to a guideway, holding the lowermost strip of the stack in the guideway and holding the succeeding strip out of contact with the lowermost strip, inserting the back edge of the blade into the strip, and feeding the blade and strip in their assembled relation to a clamping mechanism for securing the strip to the blade.
2. The method of assembling the parts of safety razor blades, which method comprises feeding a blade and a reinforcing strip extending about the back edge of the blade to a clamping mechanism, clamping portions of the strip against the blade to secure it to the blade, and clamping other portions of the strip, which are out of contact with the blade, further inward than the portions engaging the blade and thereafter forcing said other portions into engagement with the blade to increase the grip thereon.
3. The method of assembling the parts of safety razor blades, which method comprises placing a substantially U-shaped strip over the back edge of a razor blade, pressing portions of the strip against the blade and pressing other portions of the strip, which are out of contact with the blade, further inward than the portions engaging the blade, and increasing the grip of the strip on the blade by moving the strip and blade with respect to each other to force the blade into engagement with said other inwardly pressed portions.
4. The method of assembling the parts of safety razor blades, which method comprises partially placing a reinforcing strip over the back edge of a razor blade, clamping the strip to the blade, holding the blade in a predetermined position, and thereafter moving the strip into a predetermined position with respect to the back edge of the blade.
5. The method of assembling the parts of safety razor blades, which method comprises partially inserting the back edge of a blade into a partially folded backing strip, clamping the folded strip against the blade to secure it to the blade, and pushing the strip further over the back edge of the blade to increase the clamping action.
6. The method of assembling the parts of safety razor blades, which method comprises clamp-

ing a partially folded strip about the back edge of a razor blade, simultaneously forming a depression in the strip, and positioning the strip with respect to the blade to cause the depression to engage the blade and provide a tighter grip.

7. The method of assembling the parts of safety razor blades, which method comprises, partially inserting the back edge of a blade into a backing strip, compressing the free edges of the strip into engagement with the blade, compressing a portion of the strip intermediate the back of the strip and the back edge of the blade, and forcing the compressed portion over the blade to provide a tighter grip.

8. The method of assembling the parts of safety razor blades, which method comprises, partially inserting the back edge of a blade into a folded metallic reinforcing strip, forcing the free edge portions of the strip into engagement with the blade, forcing portions of the strip closer together than the thickness of the blade, and forcing the blade between the portions closer together than the thickness of the blade.

9. The method of assembling the parts of safety razor blades, which method comprises presenting a folded reinforcing strip, partially inserting the back edge of a blade therein, moving the strip and blade in their above relation to a clamping mechanism, clamping the free edges of the strip into engagement with the blade, simultaneously forming portions in the folded strip having less clearance than the thickness of the blade, holding the blade against movement, and causing the blade to be further inserted into the strip so that the portions having less clearance than the thickness of the blade engage the blade.

10. In a machine for assembling razor blades and the like, the combination of guide means for holding a reinforcing strip in a predetermined position, resilient means for holding the strip against said guide means, means for inserting the back edge of a razor blade into the strip, means for moving the unassembled blade and back to a clamping means without disturbing their relative positions and means for clamping the strip to the blade.

11. In a machine for assembling razor blades and the like, the combination of means for holding a reinforcing strip in a predetermined position, means for holding a razor blade with the back edge thereof partially inserted in the strip, and a device for clamping the strip to the blade, said device including a pair of members having surfaces for forming constricted portions in the strip spaced from the back edge of the blade and having less clearance than the thickness of the blade and means for thereafter forcing the blade further into the back.

12. In a machine for assembling razor blades and the like, the combination of means for holding a reinforcing strip in a predetermined position, means for holding a razor blade with the back edge thereof partially inserted in the strip, a device for clamping the strip to the blade, said device being provided with means for forming gripping portions in the strip, and means for inserting the blade further into the strip to cause the gripping portions to engage the blade.

13. In a machine for assembling razor blades and the like, the combination of means for partially inserting the back edge of a razor blade in a U-shaped strip, means for clamping the free ends of the strip into engagement with the blade, and means for moving the strip to insert the edge of the blade further into the strip.

14. In a machine for assembling razor blades and the like, the combination of means for partially inserting the back edge of a razor blade into a U-shaped strip, means for clamping the free edge portions of the strip into engagement with the blade, said clamping means having portions for forming blade gripping portions intermediate the free edges and the back of the strip, and means for changing the relative position of the blade and the strip to cause the blade gripping portions to engage the blade.

15. In a machine for assembling razor blades and the like, the combination of a die member for supporting a reinforcing strip, a member adjacent said die member for holding the strip in a predetermined position, members adapted to register with recesses in a razor blade to hold the blade in a predetermined position with respect to the strip, and a second die member for folding the strip into engagement with the back of the blade.

16. In a machine for assembling razor blades and the like, the combination of a die member for supporting a partially folded reinforcing strip, a member adjacent said die member for holding the strip in a predetermined position, projecting members adapted to register with recesses in a razor blade to hold the blade in a predetermined position with respect to the strip, and a second die member for folding the free ends of the strip into engagement with the back of the blade, said die members being provided with a contour for forming a depression in the strip adjacent the back thereof.

17. In a machine for assembling razor blades and the like, the combination of a guideway for razor blade parts having the back edge thereof partially inserted between a partially folded reinforcing strip, members adapted to hold the blade part in a predetermined position with respect to the guideway, a movable member forming the side of the guideway adjacent to the strip, and means for moving said movable member to engage the strip and move the strip towards the back edge of the blade part to insert the blade part further into the folded strip.

18. In a machine for assembling razor blades and the like, the combination of a guideway for blades having one edge thereof partially inserted into a U-shaped reinforcing strip, members adapted to register with a recess in the blade to hold the blade in a predetermined position with respect to the guideway, a movable member forming the side of the guideway adjacent to the strip, said movable member having a cam portion associated therewith, and a reciprocating member having a cam portion adapted to engage the cam portion of said movable member to move said movable member and cause it to engage the strip and move it towards the back edge of the blade.

19. In a machine for assembling razor blades and the like, the combination of a guideway for a razor blade having its back edge partially inserted into a U-shaped reinforcing strip, members adapted to hold the blade in a predetermined position with respect to the guideway, a movable member forming the side of the guideway adjacent to the strip, said movable member having a cam portion thereon, and a reciprocating member having a cam portion adapted to engage the cam portion of said movable member to move said movable member and cause it to engage the strip and move it towards the back edge of the blade, said movable member having a second cam

portion adapted to be engaged by a second cam portion on said reciprocating member to move said movable member into its initial position.

20. In a machine for assembling razor blades and the like, the combination of a guideway for folded backs for single-edged razor blades, a spring member adjacent the end of the guideway for resiliently holding the lowermost back and presenting it to a razor blade, means at the end of the guideway adapted to retain the succeeding backs until the first back has been removed, and means for moving a blade into the innermost back and removing the blade and back from the guideway to a clamping means without disturbing their relative positions, and means for thereafter clamping the back to the blade.

21. In a machine for assembling razor blades and the like, the combination of a channel for delivering razor blades, a chute for a stack of backs or folded strips adapted to be applied to one edge of said blades, said chute having its lower end adjacent to said channel, means at the lower end of said chute for inserting a blade delivered along said channel into the bottom back of the stack, means for retaining the back succeeding the bottom back of the stack, and devices for operating said retaining means to release said succeeding back when the bottom back has been removed.

22. In a machine for assembling razor blades and the like, the combination of a channel for delivering razor blades, a guideway for a stack of backs adapted to be applied to one edge of said blades, said guideway having its lower end adjacent to said channel, means at the lower end of the guideway for inserting a blade delivered along said channel into the bottom back of the stack, means for removing the back and inserted blade in their assembled relation, a pair of fingers for retaining the back following the bottom back, and devices operating in timed relationship with said removing means for moving said fingers to release the following back when the bottom back has been removed.

23. In a machine for assembling razor blades and the like, the combination of a device for feeding a stack of substantially U-shaped back member for single-edged razor blades one at a time, means for partially inserting one edge of a blade into the back, means for removing the assembled blade and back from said device and presenting them to a clamping mechanism, a clamping mechanism for folding the free edges of the back into engagement with the blade, and means for further inserting the blade into said back.

24. In a machine for assembling razor blades and the like, the combination of a mechanism for clamping a back member to the back edge of a razor blade to assemble said back and blade as an integral unit, means for delivering backs and blades to said clamping mechanism, the assembled blade and back being removed from said clamping mechanism by said delivering means, a guideway for receiving the removed blade and back, and means extending along said guideway for separating the removed blade and back from the succeeding blade and back.

25. In a machine for assembling razor blades and the like, the combination of a mechanism for clamping a back member to the back edge of a razor blade, the blade and back clamped thereto being ejected from said clamping mechanism by the succeeding blade and back, a guideway for receiving the ejected blade and back, a finger ad-

jacent said guideway for engaging the back of said ejected blade, and means for moving said finger to separate the ejected blade and back from the succeeding blade and back.

26. In a machine for assembling razor blades and the like, the combination of a mechanism for clamping a back member to the back edge of a razor blade, means for delivering backs and blades to said clamping mechanism in end to end relation, the blade and back clamped thereto being removed from said clamping mechanism by the succeeding blade and back delivered to said clamping mechanism, a guideway for receiving the removed blade and back, means for separating said blades from their end to end relation and individually forcing them into a protector applying means, and protector applying means for placing a protective member about the shaving edge of the blade to facilitate stacking the finished blades.

27. In a machine for assembling razor blades and the like, the combination of means for inserting the back edge of a razor blade into a substantially U-shaped reinforcing strip, means for clamping the strip into engagement with the blade, said inserting means being adapted to move said assembled blade from the clamping means in end to end relation with a preceding blade, means for separating said blades from their end to end relation and individually forcing the blades into wrapping means, and means for wrapping a strip of material about the portion of the blade which is not engaged by the reinforcing strip.

28. In a machine for assembling razor blades and the like, the combination of means for moving a series of severed blades in end to end relation in a lineal direction and for passing the back edge of a razor blade propelled by preceding blades of the series into a partially folded reinforcing strip, means for clamping the strip into engagement with the blade, means for separating the assembled blade from the preceding blade of the series and for forcing the assembled blade into a wrapping means adjacent said clamping means, and means for wrapping a strip of material about the portion of the blade which is not engaged by the reinforcing strip.

29. In a razor blade assembling machine, the combination of a blade assembling press, a feeding member for presenting blade parts to said press, means for moving said member, a pair of arms operatively connecting said member to said means, a safety means connecting said arms as a unit and adapted to break when movement of the blade feeding member is stopped to cause said arms to move with respect to each other, clutch means, and means connected to one of said arms and movable therewith upon breaking of said safety means to effect disengagement of said clutch means to stop the machine.

30. In a razor blade assembling machine, the combination of a blade assembling press, a blade channel for guiding blades to and from said press, means for detecting improper feeding of blades in said channel, safety means operatively connected to said detecting means, and a drive mechanism for said press adapted to be stopped by the functioning of said safety means.

31. In a razor blade assembling machine, the combination of a blade assembling press, a blade channel for guiding blades to and from said press, a detector slide adapted to be stopped upon clogging of said channel, an arm for moving said slide, a second arm for moving said first

arm, safety means for normally connecting said arms as a unit and adapted to break when movement of said slide is stopped to separate the arms, a clutch, means for retaining said clutch in operating position, and means associated with said arms for causing said clutch retaining means to become ineffective and release said clutch when said safety means are broken to stop the operation of the press.

32. In a machine for assembling razor blades and the like, the combination of means for inserting the back edge of the razor blade in a folded strip with the back edge of the blade spaced a substantial distance from the apex of the fold, a supporting member having a recess for receiving the strip to hold it in said spaced position with respect to the back edge of the blade, means for delivering the strip and blade in their above relation to said supporting member, means for clamping the strip into engagement with the blade, and means on said clamping means positioned with respect to the recess for holding the back edge of the blade spaced from the apex of the strip while said clamping means are effective.

33. In a machine for assembling razor blades and the like, the combination of means for delivering a folded reinforcing strip and a razor blade with the back edge thereof spaced a substantial distance from the apex of the fold in the strip, to a clamping anvil, an anvil for supporting the strip and blade having a recess for holding the reinforcing strip in a predetermined position, means on the clamping anvil for holding the razor blade with the back edge thereof spaced from the apex of the fold in the strip, and a clamping anvil movable with respect to said supporting anvil for clamping the strip to the blade in spaced relationship.

34. In a machine for assembling razor blades and the like, the combination of a lengthwise extending channel having an opening in the side thereof, means for moving severed single edge blades along said channel, a guideway for a stack of folded backs for single-edged razor blades extending laterally from said channel and having its bottom adjacent the opening, recipro-

cating means in said channel for removing the lowermost back laterally from the guideway and along said channel together with a blade prior to clamping the strip to the blade, means adjacent the discharge means adapted to retain the succeeding back until the lowermost back has been removed and means for clamping the folded strip on said blade.

35. In a machine for assembling razor blades and the like, the combination of a channel, a guideway for a stack of razor blades, a chute for a stack of backs adapted to be applied to one edge of said blades, said chute having its lower end adjacent to said channel, means for permitting removal of one back and for restraining the movement of the other backs in the stack, reciprocating means in said channel for singly delivering a blade and inserting the blade into the bottom back of the stack and for removing the blade and back from alignment with the stack to a clamping means and a clamping means for subsequently clamping the back to a blade.

36. In a machine for assembling razor blades and the like, the combination of means for partially inserting the back edge of a blade member in a U-shaped strip member, means for clamping the free ends of the strip member into engagement with the blade member, and means for moving one of said members with respect to the other to insert the edge of the blade member further into the strip member.

37. The method of assembling the parts of safety razor blades, which method comprises moving a series of severed blades endwise in a lineal direction, presenting one of a series of folded reinforcing strips so that the fold thereof embraces the edge of the blade, restraining the movement of the rest of the series of folded strips from movement toward the presented strip to permit endwise movement of the presented strip, moving the unassembled blade and back in their embracing relationship out of line with the series of folded reinforcing strips and thereafter clamping the folded strip on the edge of the blade.

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