(No Model.) 4 Sheets—Sheet 1.

I. T. SMITH.

MACHINE FOR SWAGING NEEDLES.

No. 483,815. Patented Oct. 4, 1892.

Fig. 1

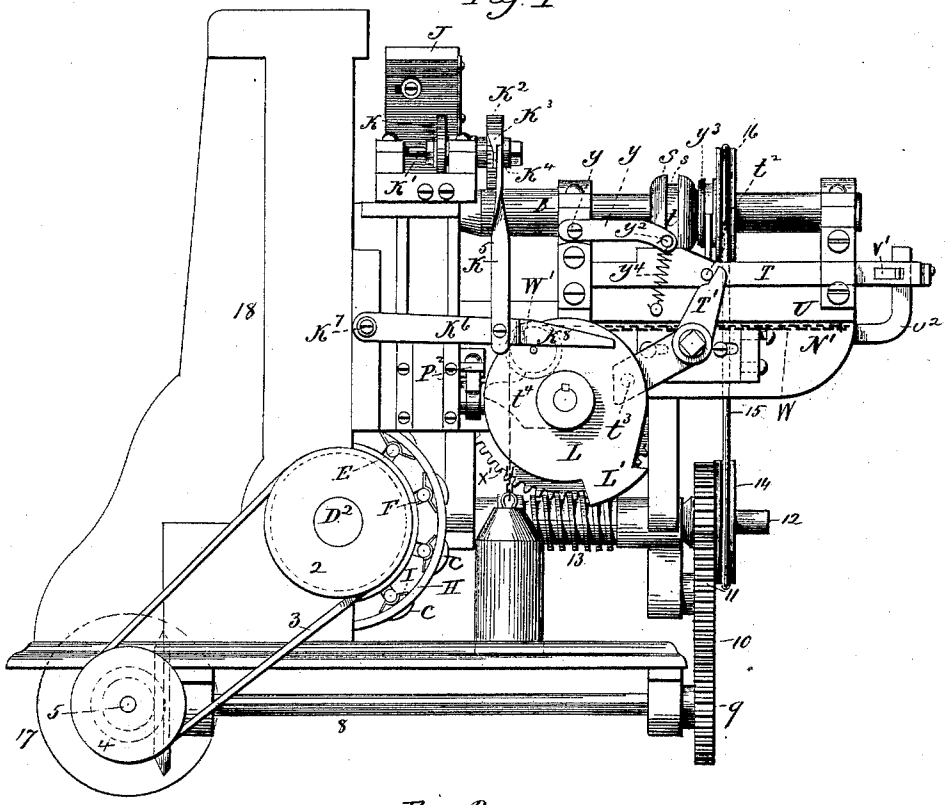
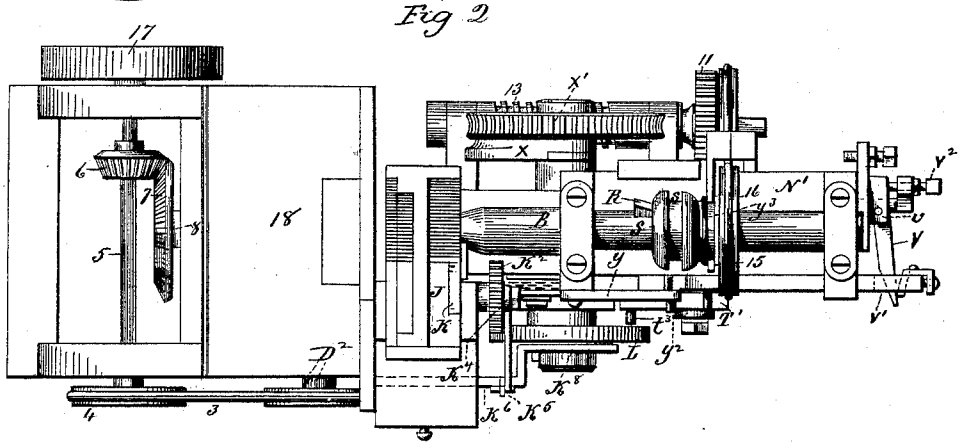


Fig. 2



Witnesses:
J. F. Shumway
Lillian D. Kelsey.

Ira T. Smith
Inventor
By Atty.
Earle & Seymour

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 2.

I. T. SMITH.

MACHINE FOR SWAGING NEEDLES.

No. 483,815. Patented Oct. 4, 1892.

Fig 3

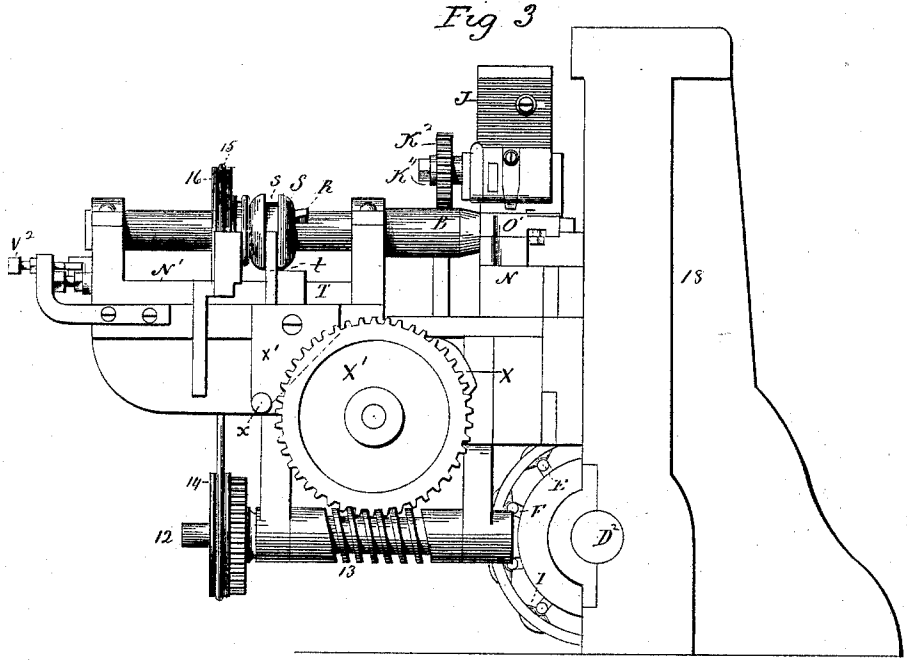


Fig 4

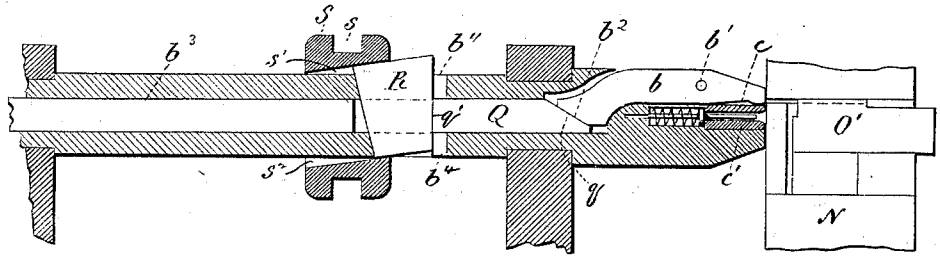
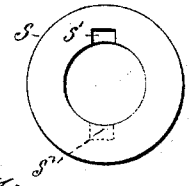


Fig 4ª



Witnesses
J. N. Shumway.
Lillian D. Kelsey.

Ira T. Smith
Inventor
By Attys
Earle & Seymour

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 3.

I. T. SMITH.

MACHINE FOR SWAGING NEEDLES.

No. 483,815. Patented Oct. 4, 1892.

Fig. 5

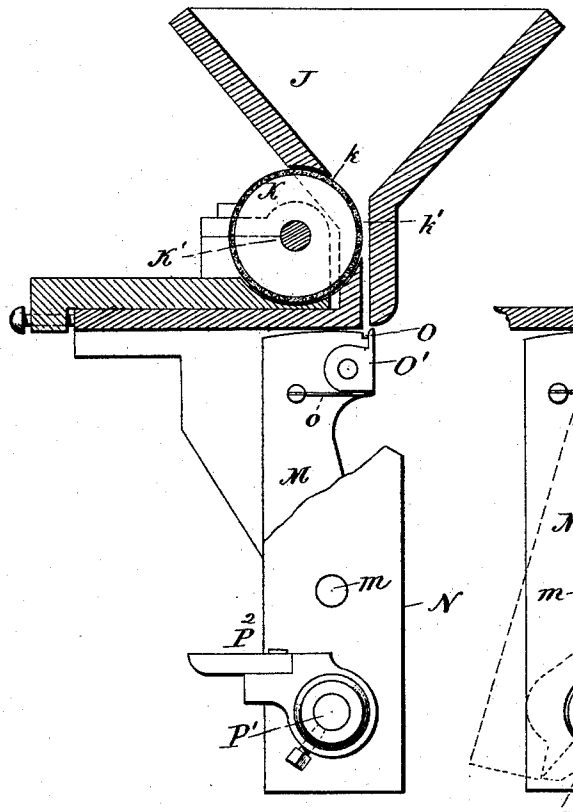


Fig. 5ª

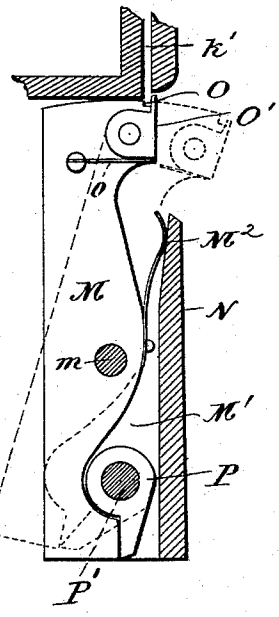
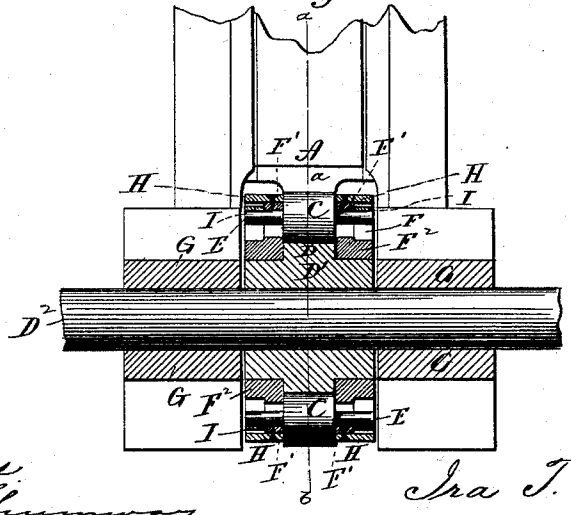


Fig 6



Witnesses
J. F. Shumway.
Lillian D. Kelsey.

Ira T. Smith.
Inventor.
By attys
Earle & Seymour

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 4.

I. T. SMITH.

MACHINE FOR SWAGING NEEDLES.

No. 483,815. Patented Oct. 4, 1892.

Fig. 7

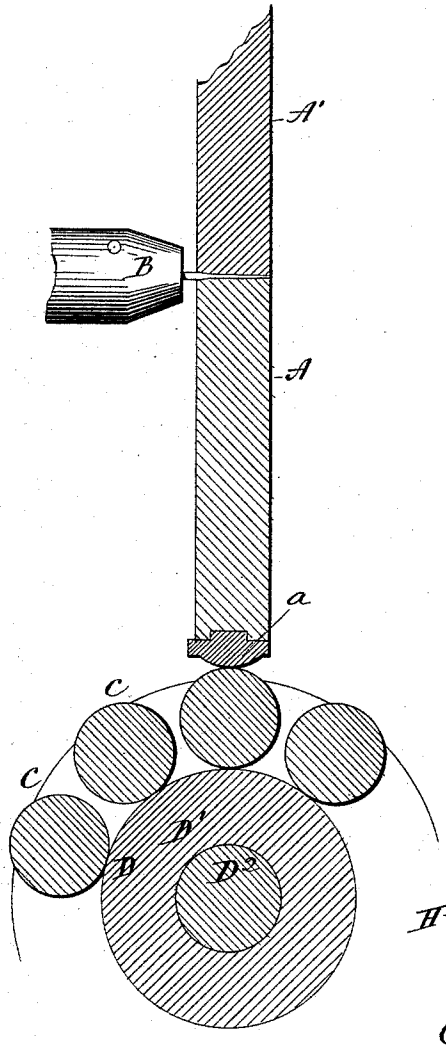
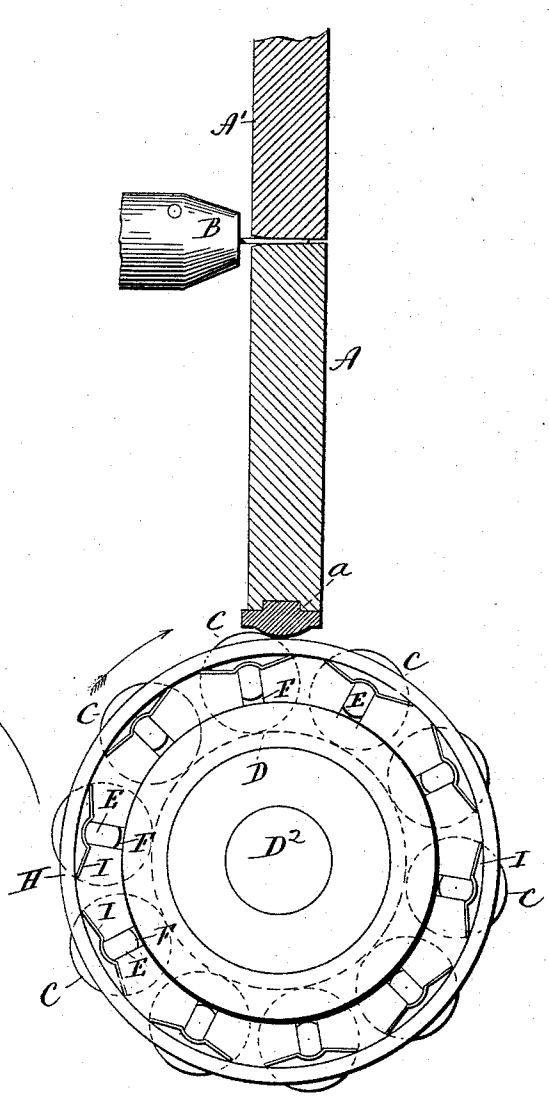


Fig. 8



Witnesses
J. N. Shumway.
Lillian D. Kelsey.

Ira T. Smith.
Inventor.
By atty
Earle & Seymour

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

IRA T. SMITH, OF MOUNT CARMEL, CONNECTICUT.

MACHINE FOR SWAGING NEEDLES.

SPECIFICATION forming part of Letters Patent No. 483,815, dated October 4, 1892.

Application filed January 18, 1892. Serial No. 418,434. (No model.)

To all whom it may concern:

Be it known that I, IRA T. SMITH, of Mount Carmel, in the county of New Haven and State of Connecticut, have invented a new Improvement in Machines for Swaging Needles; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a view in side elevation of a machine constructed in accordance with my invention; Fig. 2, a plan view thereof; Fig. 3, a view in elevation on the side of the machine opposite the side shown in Fig. 1; Fig. 4, an enlarged view of the chuck-shaft in longitudinal section, showing a portion of the mechanism employed for closing the gripping-jaw of the chuck upon the needle-blank. Fig. 4ª is a detached face view of the sliding collar shown in the preceding figure; Fig. 5, a view in vertical section through the hopper of the machine, showing the friction feed-disk, which has a yielding surface. Fig. 5ª is a similar view with the hopper broken away and the oscillating block shown by broken lines in the tilting or feeding positions; Fig. 6, a view in longitudinal section through the revolving hammer; Fig. 7, a view thereof in transverse section on line *a b* of Fig. 6; Fig. 8, a similar view on line *c d* of the same figure.

My invention relates to an improvement in machines for swaging needle-blanks, the object being to produce a simple and compact machine having a large capacity of work and operating with the minimum of friction.

With these ends in view my invention consists in a machine having certain details of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

The first feature of the machine which I will describe is the revolving hammer for operating the vertically-movable slide A, (see Figs. 6, 7, and 8,) which is mounted in a suitable guide and co-operates with a similar fixed member A′, located directly above it, the needle-blanks being advanced between them by means of the horizontally-reciprocal chuck B. The lower end of the slide A is furnished with a steel shoe *a*, having its outer face curved to receive blows in rapid succession from a circular series of rollers C, which rest upon a broad rib D, (see Fig. 6,) corresponding in width to the length of the rollers and formed midway of the length of a hub D′, mounted on a shaft D^2. The said rollers are loosely mounted upon axles or pins E, having projecting flattened ends, which enter radial slots F, formed in the flanges F′ of rings F^2 F^2, corresponding to each other and frictionally fitted on the said hub upon the opposite sides of the rib D thereof, against the ends of which they abut. Collars G G, mounted on the said shaft on opposite sides of the hub, stand closely adjacent to the said rings and prevent them from lateral outward displacement thereon. Annular bands H H, respectively secured to the outer edges of the flanges F′ of the rings F^2, are provided for holding in place two circular series of springs I, a spring being interposed between each flattened end of the pins E and the opposite inner surface of the adjacent bands. These springs, acting upon the pins, press the rollers C against the rib D with so much force that normally the rings rotate with the hub. The friction thus developed is gaged, however, so that when any one of the rollers C strikes against the curved face of the shoe *a*, before mentioned, both of the rings and all of the rollers will be momentarily arrested, while the hub turns very slightly within the rings. As soon, however, as the force of the shock is spent and absorbed the friction between the rollers and rings and the hub rises superior to the resistance offered by the shoe and slide, so that the rings, rollers, and hub, virtually acting as one piece, again rotate, and the roller which struck the shoe passes under it and lifts the slide. It will be understood, of course, that the action of the revolving hammer, above described, is extremely rapid. I do not, however, claim this revolving hammer, except in combination with other features of the machine, and then only considered broadly as swaging mechanism.

The next feature of the machine which I will describe is the hopper J, (see Figs. 1, 2, 3, 5, and 5ª,) which in its general construction may be of any approved form, and with the

customary provisions for adjusting it to needle-blanks of different sizes, my particular invention consists in providing it with a friction feed-disk K, which projects through a narrow vertical slot *k*, formed in one of its walls, into the narrow vertical passage *k'*, formed in its lower end. This disk has a yielding surfaces and may consist of a single piece of yielding material—such as leather or paper—mounted on a shaft K', as shown; or it may consist of a metallic disk having a narrow band or tire of some yielding material attached to it in a manner too obvious to require illustration. The projecting inner edge of the disk engages with the needle-blanks in the hopper, and uniformly and regularly feeds them downward through the narrow vertical passage *k'*, formed therein, the yielding surface securing just enough hold on the blanks to feed them very effectively. The disk is designed to be rotated step by step by any approved connections. As herein shown, the outer end of its shaft is furnished with a ratchet K^2, which is engaged by a pawl K^3, hung upon an arm K^4, the inner end whereof is loosely mounted upon the said shaft and bears against the outer face of the said ratchet-wheel. The outer end of the said arm has attached to it a link or bar K^5, the lower end whereof is pivoted to a horizontal lever K^6, having one end hung upon a stud K^7, projecting from the frame N of the machine, and the other end arranged in position to be intermittently lifted by a pin K^8, mounted in the outer surface of the feed-cam L. I do not limit myself, however, to any particular means for revolving the friction-disk.

The next feature that I will describe is my improved oscillating blank-carrier (see Figs. 5 and 5^a) which I employ in place of the reciprocal or sliding blank-carriers heretofore used. It comprises a block M, arranged vertically below the hopper and hung slightly below its center on a horizontal stud *m* in a chamber M', formed for it in the frame N of the machine. A heavy spring M^2, interposed between its inner face and the inner wall of the said chamber, holds the said block in its normal position, in which the pocket O, formed at the inner edge of its upper end, stands directly beneath the narrow passage *k'* of the hopper, the outer edge of this pocket being closed by a clearance-plate O', normally held in its closed position by a small spring *o*. The upper end of the said carrier is convexed or struck on a circle, whereby it is adapted to move in a circular path close under the hopper. The said block M is moved from its normal position to its tilted or feeding position in front of the chuck B, before mentioned, by means of an operating-cam P, located within the said chamber, engaging with its lower end, and mounted upon a short horizontal shaft P', journaled in the frame N and having its projecting outer end furnished with a strike-cam P^2, the projection whereof is intermittently engaged by the operating-finger L' of the feed-cam L, before mentioned. In Fig. 5 of the drawings the block M is shown in its normal position, while in Fig. 5^a its feeding position is indicated by broken lines. The blank-carrier thus constructed is well protected and simple in construction, may be operated very rapidly, and occupies the minimum of room. It will be understood that when the chuck has seized the blank fed to it by the blank-carrier the clearance-plate O' thereof is dragged open, so to speak, against the tension of its spring *o* by the blank fed, which it passes under, and thus permits the restoration of the blank-carrier to its receiving or normal position. It will also be understood that the blank-carrier stops the column of blanks when it is feeding a blank to the chuck.

The next feature to be described is the gripping mechanism which I have invented for causing the gripping-jaw *b* (see Fig. 4) of the chuck to cause the needle-holders *c c* to firmly take hold of the needle-blanks. This jaw, which is hung toward its forward end on a horizontal pivot *b'* in a longitudinal radial slot b^2, formed in the forward end of the chuck, is constructed at its rear end with a bevel b^2, which co-operates with a corresponding bevel *q*, formed upon the outer end of a slide Q, which is free to reciprocate in a longitudinal opening b^3, formed for it in the chuck, and is moved back and forward therein by means of a sliding wedge R, extending through a transverse opening *q'*, formed in the said slide and projecting at its opposite ends from a transverse clearance-space b^4, formed in the chuck, beyond the outer surface thereof, the said ends of the wedge being parallel to each other and inclined with respect to the surface of the chuck. The sliding collar S, Fig. 4^a, mounted on the chuck, has slots S' and S^2, leading out of its central opening at opposite points therein, the said slots being conformed in transverse section to the corresponding conformation of the wedge and having their end walls conformed to the inclined ends thereof. It is obvious, under this construction, that when the sliding collar is moved toward the outer end of the chuck the wedge will be pushed downward, whereby the slide Q will be moved forward and the inner end of the gripping-jaw be lifted, so as to cause its outer end to be thrown down upon the needle-holders *c c*, because the wedge R is widest at its upper end. When, on the other hand, the collar is moved back, the wedge will be lifted, whereby the slide will be retracted or moved rearward and the gripping-jaw relieved. The collar is moved, as described, by means of a finger *t*, entering a groove *s*, formed in its periphery for that purpose, the said finger *t* (see Fig. 3) being carried by a slide T, Fig. 1, mounted for horizontal reciprocation in the carriage U of the chuck, the said carriage being moved back and forth upon a suitable bed N', forming part of the frame of the machine. The slide T, before mentioned, is fur-

nished with an outwardly-projecting pin t^2, which is engaged for moving the slide forward by the upper end of a bell-crank lever T', Fig. 1, the lower end whereof is provided with a pin t^3, which is engaged by a cam-finger t^4, formed upon the inner face of the feed-cam L. The reverse movement of the slide is effected, for causing the gripping mechanism to permit the gripping-jaw to release the needle-blank, by means of a pivotal arm V, hung in a bearing v, projecting from the rear end of the carriage U and having one of its ends passed through a slot v', formed in the outer end of the slide, and its other end arranged to be engaged by the adjustable set-screw v^2, mounted in the upper end of an arm v^3, extending outward and upward from the bed N'. When the carriage makes its outward movement, the short end of the said pivotal arm V comes in contact with the screw v^2, causing the pivotal arm to turn on its center and retract the slide, and hence move back the sliding collar S. I may here explain that the carriage is moved forward for causing the chuck to present the needle-blank in it to the action of the swaging-dies by means of a chain W, attached to its extreme outer end, running over a small grooved roll W' and having a heavy weight suspended from it, while, on the other hand, the carriage is moved back to retract the swaged needle-blank from the dies and to bring the chuck into position to receive another needle-blank by means of a cam X, (see Fig. 3,) secured to the inner face of a worm-gear X' and engaging with a pin x, projecting outwardly from an arm x', depending from the said carriage. I do not limit myself, however, to any particular way for moving the carriage back and forth.

Another feature of the machine is a tension-arm Y, pivotally hung upon a stud y, projecting from the inner upright of the carriage U and having its outer end furnished with an inwardly-projecting pin y^2, which engages with a bevel y^3, formed upon the upper edge of the inner end of the slide T, when the sliding collar S is in its forward or gripping position, the pin being held down upon the bevel, which inclines rearwardly by means of a spring y^4, which in this way exerts a constant tendency to move the slide inward, and therefore to hold the sliding collar in the position in which it maintains the clamping-jaw in an effective clamping adjustment. When the slide is retracted, the pin rides up over the bevel against the tension of the spring y.

Although my improved machine operates on the same general principles with other machines of its class, I will briefly set forth the mode of its operation.

The needle-blanks having been thrown in bulk into the hopper are fed down one by one through the narrow vertical passage in the lower end thereof into the small pocket formed to receive them in the upper end of the blank-carrier, which is oscillated to present the blank in front of the chuck, then in its retracted or retired position. The chuck, advancing, grips the adjacent end of the blank by the action of the gripping mechanism described, after which the blank-carrier returns to its normal or receiving position, its spring-actuated clearance-plate being thereto depressed against the tension of its spring and dragged under the needle-blank held by the chuck, which, the blank-carrier being out of the way, now moves forward and presents the needle-blank to the action of the swaging-dies. The blank being by them swaged, the chuck is retracted and another blank presented to it, and so on.

I do not of course limit myself to any particular connection for driving my improved machine. As herein shown, the shaft D^2, carrying the revolving hammer, is furnished at one of its projecting ends with a grooved pulley 2, receiving a belt 3, also running over a grooved pulley 4, which is mounted upon one end of a shaft 5, carrying a bevel-gear 6, meshing into a larger bevel-gear 7, mounted on one end of a shaft 8, the opposite end whereof carries a pinion 9, meshing into an idle-pinion 10, which in turn meshes into a pinion 11, mounted upon the outer end of a shaft 12, having a worm-gear 13, which meshes into the worm-gear X'. The shaft 12 also carries a grooved pulley 14, which drives a belt 15, passing over a pulley 16, mounted on the chuck B and revolving the same. Power is communicated to the machine through a belt-pulley 17, Fig. 2, mounted on the shaft 5. The slides A and A' are mounted within a housing 18, closed at its top and having its upright sides bolted to the bed of the machine. It will be understood that the adjacent ends of the slides A A' are hardened and form the swaging-dies.

In view of the changes and alterations suggested herein I would have it understood that I do not limit myself to the exact construction herein shown and described, but hold myself at liberty to make such changes and alterations therein as fairly fall within the spirit and scope of my invention.

I am aware that a friction feed-disk having a yielding periphery is old, and that I am not the first to invent an oscillating blank-carrier nor the use of a transversely-movable wedge to operate the jaw of a chuck. I do not therefore claim any of these features, broadly, but only my particular construction herein shown and described.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for swaging needle-blanks, the combination, with a hopper having a narrow vertical passage formed in its lower end and constructed with a slot leading into the said passage, of a friction feed-disk having a yielding periphery which projects through the said slot into the said passage, means for rotating the said disk, a blank-carrier located below the hopper and adapted to remove nee-

dle-blanks therefrom one at a time and to stop the column in the said passage while it is feeding them, a chuck to receive the blanks from the said blank-carrier, and swaging mechanism, substantially as set forth.

2. In a machine for swaging needle-blanks, the combination, with a hopper, of an oscillating blank-carrier located below the same to successively remove the needle-blanks therefrom and having a pocket formed in the inner edge of its upper end, a spring-actuated clearance-plate pivoted to the said upper end of the carrier and co-operating with the said pocket to hold the blanks while being fed, means for actuating the said carrier, a chuck to receive the blanks from it, and swaging mechanism, substantially as set forth.

3. In a machine for swaging needle-blanks, the combination, with a hopper, of an oscillating blank-carrier located below the same to remove the blanks therefrom one by one and consisting of a block having its upper end convexed to move under the hopper in close proximity thereto and constructed with a pocket formed in the inner edge of its said convexed upper end, a spring-actuated clearance-plate attached to the upper end of the carrier to coact with its said pocket to hold the blanks while they are being fed, means for actuating the said carrier, a chuck to receive the blanks from it, and a swaging mechanism, substantially as set forth.

4. In a machine for swaging needle-blanks, the combination, with a hopper, of an oscillating blank-carrier located below the same, hung between its upper and lower ends on a horizontal pivot and having its upper end adapted to remove the blanks from the hopper one by one, a spring-actuated clearance-plate pivoted to the upper end of the hopper and coacting with its said pocket, an operating-cam adapted to engage directly with the said carrier below its pivot for actuating it, a chuck to receive the blanks from it, and a swaging mechanism, substantially as set forth.

5. In a machine for swaging needle-blanks, the combination, with a sliding carriage, of a chuck mounted therein and containing a gripping-jaw, means for operating the said jaw, including a slide mounted in the carriage and furnished with a bevel, and a tensional retaining-arm engaging with the said bevel to hold the slide forward, and thus sustain the gripping-jaw in its active position, substantially as set forth.

6. In a machine for swaging needle-blanks, the combination, with a sliding carriage, of a chuck mounted therein and containing a gripping-jaw, means for operating the said jaw, including a slide mounted in the carriage, a device for moving the slide inward to aid in the actuation of the gripping-jaw, a pivotal arm hung at the rear end of the said carriage and connected at one end with the outer end of the said slide, and a buffer arranged to engage with the other end of the said pivotal arm in the outward movement of the carriage, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

IRA T. SMITH.

Witnesses:
CHARLES WHEELER,
WILLIAM HITCHCOCK.