

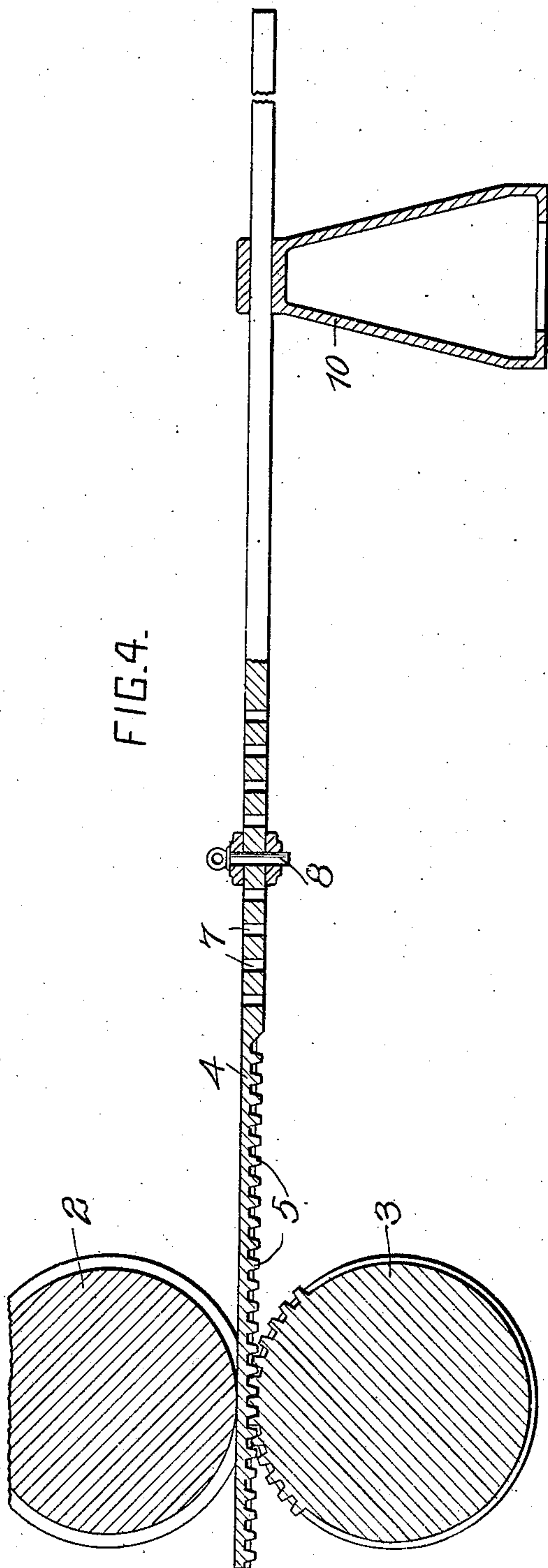
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S. E. DIESCHER.
SWAGING BILLETS.

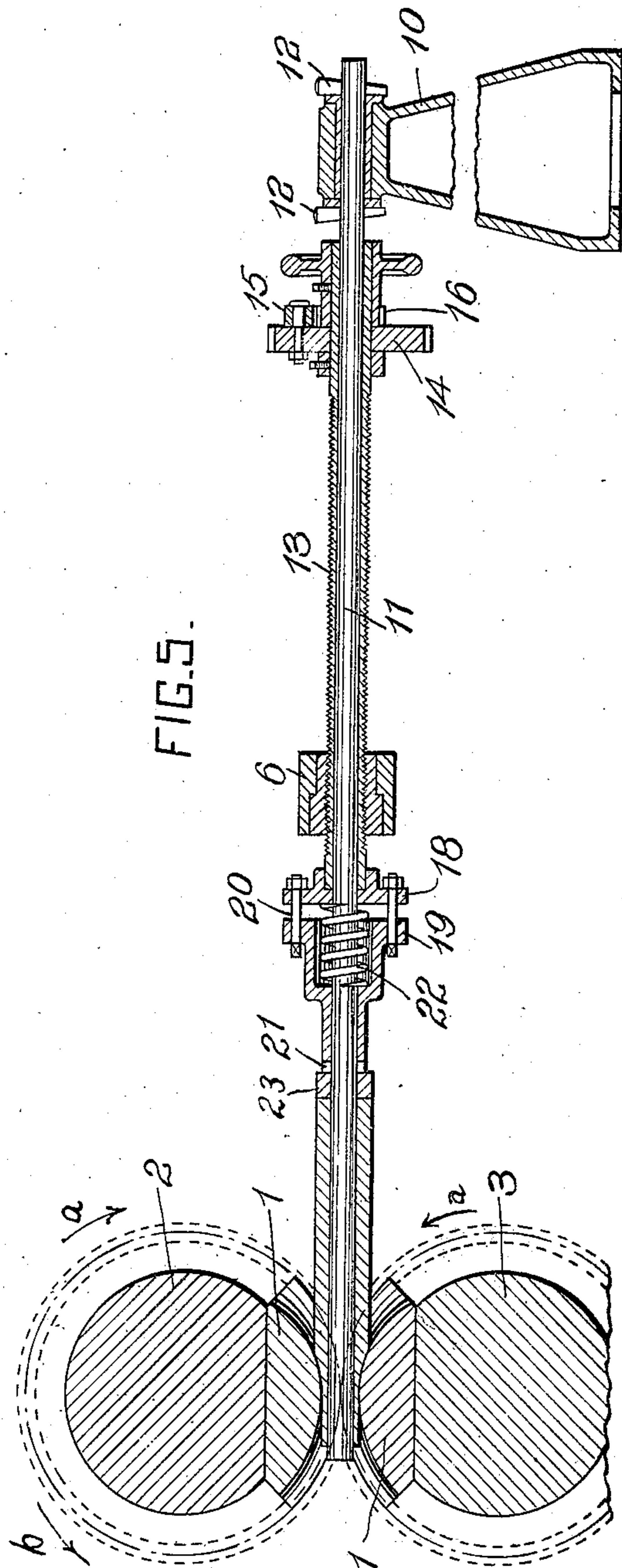
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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SWAGING BILLETS.

No. 844,334.

Specification of Letters Patent.

Patented Feb. 19, 1907.

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To all whom it may concern:

Be it known that I, SAMUEL E. DIESCHER, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Swaging Billets, of which improvements the following is a specification.

It is characteristic of the operation of reduction by swaging, wherein successive portions are brought to the desired shape or size without any considerable reduction of other portions, that there is always a considerable body of metal adjacent to the part to be reduced which will act as a reservoir of heat. It is also characteristic of swaging that there is no increase of radiating area except in such portions as have been reduced. As the matrices of the swaging-dies vary in size from the point of first contact with the metal—i. e., increase or diminish—and as the article moves to and fro with the dies, it is necessary to move the article independent of the dies after each reduction a distance equal to the reduction to be effected during the next operative movement of the dies—as, for example, if the dies have an operative swing or movement of six inches the article operated on will have similar movement, and if it is desired to make a half-inch reduction at each operation the article should be shifted, with the dies, during the return or non-reducing swing five and one-half inches, so that at the next operation the dies will have an area of action about half an inch farther along the article.

It is the object of the present invention to effect the feed of the billet by and in accordance with the oscillating dies and to provide a feed mechanism which, while having a movement of reciprocation equal to the oscillation of the dies, will effect a regular step-by-step advance of the billet into the dies equal to the reduction to be effected at each operation.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a top plan view of my improved swaging-machine. Fig. 2 is an end elevation. Fig. 3 is a detail view showing the pawl-and-ratchet connection between the feed-sleeve and its driving-wheel.

Figs. 4 and 5 are sectional elevations on planes indicated, respectively, by the lines IV IV and V V, Fig. 1; and Fig. 6 is a detail of a portion of the feed mechanism.

In the practice of my invention the swaging-dies 1, having suitably-formed matrices, are secured to the rolls 2 and 3, which are oscillated through suitable arcs by any means known in the art. As the billet should have a back-and-forth movement equal, except, as hereinafter stated, to the swing of the dies, provision is made for shifting the feed-rods 4 by the oscillating rolls. To this end one of the rolls, as 3, is provided with teeth adapted to intermesh with teeth on the feed-bars 4, which are held so as to prevent their disengagement from the teeth on the roll by the other roll. A cross-head 6 is adjustably secured to the feed-bars by any suitable means—such, for example, as that shown—consisting of a series of holes 7 in the feed-bars and pins 8, which secure the bars in the sockets 9 on the ends of the cross-head. The outer ends of the feed-bars are supported and guided by the abutment 10, to which the outer end of the mandrel 11 is detachably connected, as by keys 12. Suitable means are employed for causing the billet to advance step by step between the dies, each step or forward movement of this pushing mechanism being proportional to the reduction desired on each oscillation of the dies. A convenient construction to this end consists of a threaded member passing through the cross-head 6 and means for intermittently rotating the threaded member. In the construction shown this threaded member is formed by a sleeve 13, loosely mounted on the mandrel 11 and externally threaded to engage a threaded opening through the cross-head 6. A wheel 14, having angularly-arranged teeth, is loosely mounted on the sleeve, but is so connected, as by a pawl and ratchet 16, with the sleeve that the latter will rotate when the wheel is driven in one direction, but will not be affected by the movement of the wheel in the opposite direction. This wheel engages suitably-arranged teeth on the bar 17, which has one end connected to the abutment 10, while its opposite end is supported by the cross-head. A disk 18 is secured to the sleeve 13, and the

driving-head 19 is connected to the disk by any suitable means, as bolts 20, which are made sufficiently long to permit the driving-head to move back and forth along the mandrel while caused to rotate with the sleeve. The driving-head is provided at its inner end with prongs 21, adapted to engage the end of the billet and cause it to rotate with the sleeve.

It is characteristic of my improvement that a holder or support is provided for the billet and that such holder or support or a part or element thereof is caused to reciprocate synchronously with the oscillation of the dies and is also given a step-by-step forward movement proportional to the reduction to be effected by each oscillation of the dies. In the construction shown, where tubes are to be formed, the holder consists of a mandrel 11 and head 19, the latter forming the reciprocatory member of the holder, but it will be understood that other holders can be employed, dependent upon the character of the article to be operated on.

In the operation of my improved mechanism the cross-head is moved back away from the rolls 2 and 3 by the backward movement of the latter, and the rear wedge 12 pulled out, and the mandrel drawn into the sleeve. A heated billet is then held in line with the mandrel which is then pushed through the billet and locked in position by the wedge. The rolls are then set into operation, causing the dies to compress the billet which is forced to move along with the dies by the cross-head by the bite of the dies. As the rolls swing back, forcing the billet back, the cross-head is moved back, moving the sleeve with it, but during this backward movement the rack-bar 17 so rotates the wheel 14 and sleeve 13 that the latter will not move back the same distance as the cross-head, but will be turned in the cross-head, thereby preventing the billet from moving back equally with the dies. This rotation of the sleeve also serves to rotate the billet by the engagement of the driving-head with the latter.

It will be observed that the feed mechanism follows the back-and-forth movements of the dies, except the retardation or stoppage of the billet, due to the forward rotation of the sleeve. This feed of the billet represents the amount of reduction to be effected on each operative swing of the dies. During the return of the feed mechanism the billet will be pushed or kicked back by the dies. During the backward movement of the billet rotation is imparted thereto by the mechanism described, such rotation being possible for the reason that although the billet is between the dies or swages yet only the part previously reduced by the swages is between the latter, so that their grip is not sufficient to prevent the rotation of the billet. If for any reason the grip should at any time be too

great, the collar 23, against which the billet bears, will be rotated independent of the billet.

As is well known the amount of reduction which the dies can effect is largely dependent upon the temperature of the article. Hence to prevent injury to the feed mechanism in case the billet should become too cool to permit of normal reduction, a spring 22 is interposed between the driving-head 19 and the disk 18, so that the billet may be forced back. The spring is made sufficiently strong to insure the desired feed under normal conditions. As the forward movement of the sleeve is positive and as differences of temperature will prevent the dies from effecting exactly the same reduction on every operative swing the spring 22 will yield sufficiently to prevent injury to the dies.

It will be understood by those skilled in the art that the mechanism can be so operated that either the small or large end of the dies will act first to effect reduction. When the dies swing in the direction of the arrows *a* to effect reduction, the feed effected by the rotation of the sleeve will occur when the rolls swing in the direction of the arrow *b*; but when reduction is effected during the swing of the rolls in the direction of the arrow *b* the feed of the billet is effected when the rolls swing in the direction of the arrow *a*. In such case the feed mechanism could be modified as by reversing the pitch of the teeth on the rack 17 and pinion 18 or in other suitable way, which would readily suggest itself to those skilled in the art.

The inner end of the driving-head 19 is made sufficiently small to pass between the dies without injury, and, if desired, a heated sleeve 23 may be placed at the end of the billet so that the whole of the latter may be reduced.

It will be noted that in the swaging apparatus herein described the oscillatory swaging-dies engage or have a bite on the ingot or billet, which except at the brief moment of feed is practically continuous, as a result of which the dies at the time when a feed is desired put the billet in position for such feed and also determine or fix a limit to the amount of feed. In other words, the feed movement of the billet is determined and controlled by the operative faces of the oscillating swages. Although the feed mechanism may be ready for operation at any time it does not become practically operative to shift the billet forward until the swages reach a position in their oscillation where their bite is relaxed or entirely loosened. When the grip of the swages is relaxed, the billet is moved forward until a portion thereof abuts against the operative faces of the swages. This forward or feed movement will be dependent to a large extent on the reduction previously effected,

and will be largely independent of the movement of the feed mechanism itself.

I claim herein as my invention—

1. In a swaging apparatus, the combination of oscillating rolls carrying swaging-dies, a mandrel extending through between the dies, a cross-head operated by the rolls, a sleeve surrounding the mandrel and connected to the cross-head, and means for adjusting the sleeve in the cross-head, substantially as set forth.

2. In a swaging apparatus the combination of oscillating rolls carrying swaging-dies, a mandrel extending through between the dies, a cross-head operated by the rolls, a threaded sleeve arranged in a threaded opening in the cross-head, and provided with means for engaging the article operated on and automatic means for rotating the sleeve, substantially as set forth.

3. In a swaging apparatus the combination of oscillating reducing-dies, a cross-head, means for oscillating the cross-head synchronous with the dies and feed mechanism operated by the oscillations of the cross-head, substantially as set forth.

4. In a swaging apparatus the combination of oscillating reducing-dies, a cross-head, means for oscillating the cross-head synchronous with the dies, feed mechanism and means for rotating the article, means where-

by the feed mechanism and rotating means may be operated by the oscillations of the cross-head.

5. In a swaging-machine the combination of oscillatory dies or swages, a cross-head, rods connected to the cross-head and engaged by the dies or swages, a billet-holder movable by the cross-head, a feed mechanism having a stationary member and a member in engagement therewith and movable by the cross-head and adapted to be operated by such engagement during the movement of the cross-head.

6. In a swaging-machine the combination of oscillating dies or swages, a cross-head operated by and synchronous with the dies or swages, a billet-holder movable by the cross-head, a mechanism for feeding forward and rotating the holder having relatively movable and stationary interengaging members, the movable member being arranged to be shifted by the cross-head and operated by its engagement with the stationary member to effect the feed and rotation of the holder.

In testimony whereof I have hereunto set my hand.

SAMUEL E. DIESCHER.

Witnesses:

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