No. 840,426. PATENTED JAN. 1, 1907.

O. BRIEDE.

METAL SWAGING APPARATUS.

APPLICATION FILED OCT. 3, 1904.

2 SHEETS—SHEET 1.

FIG. 1.

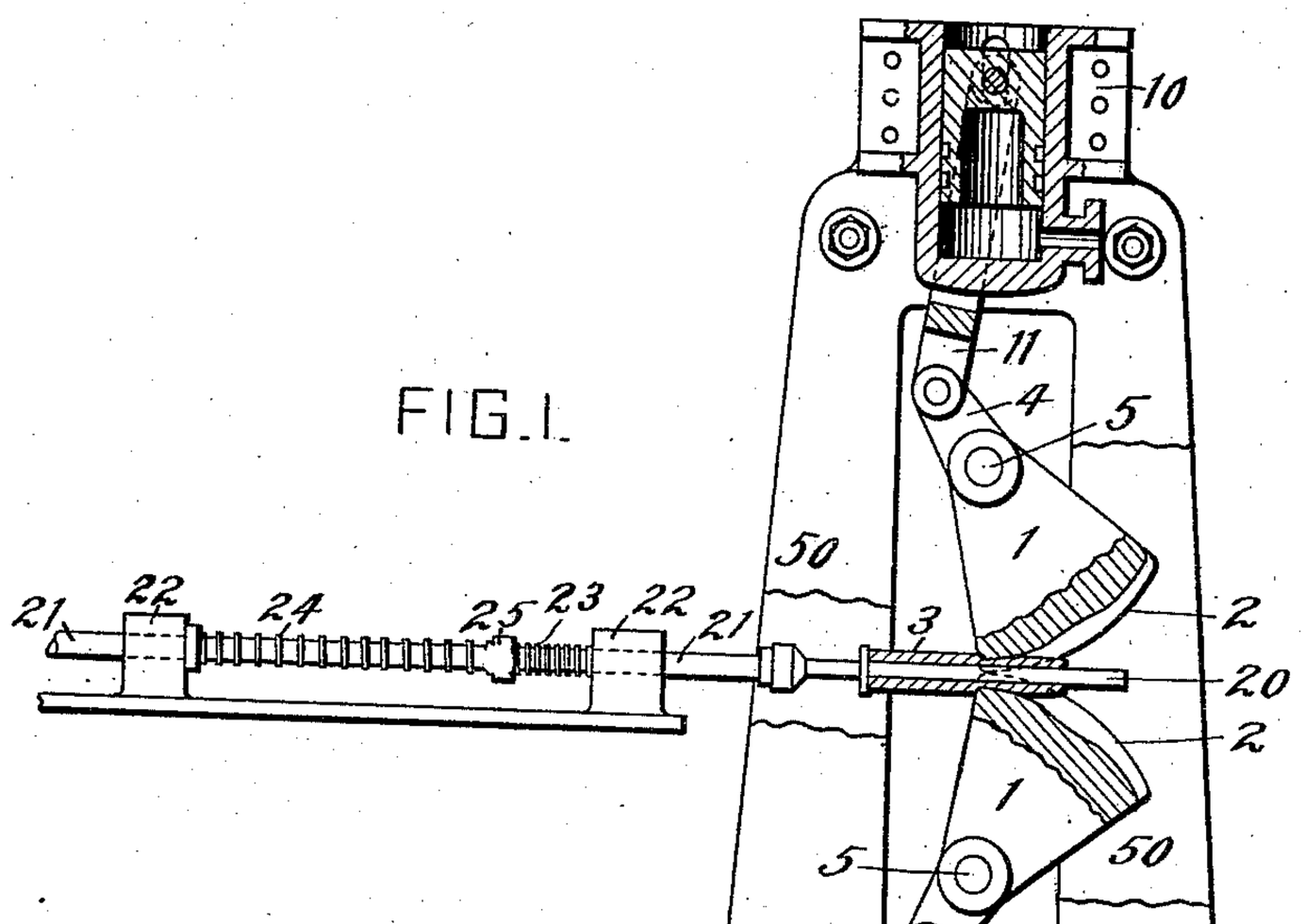
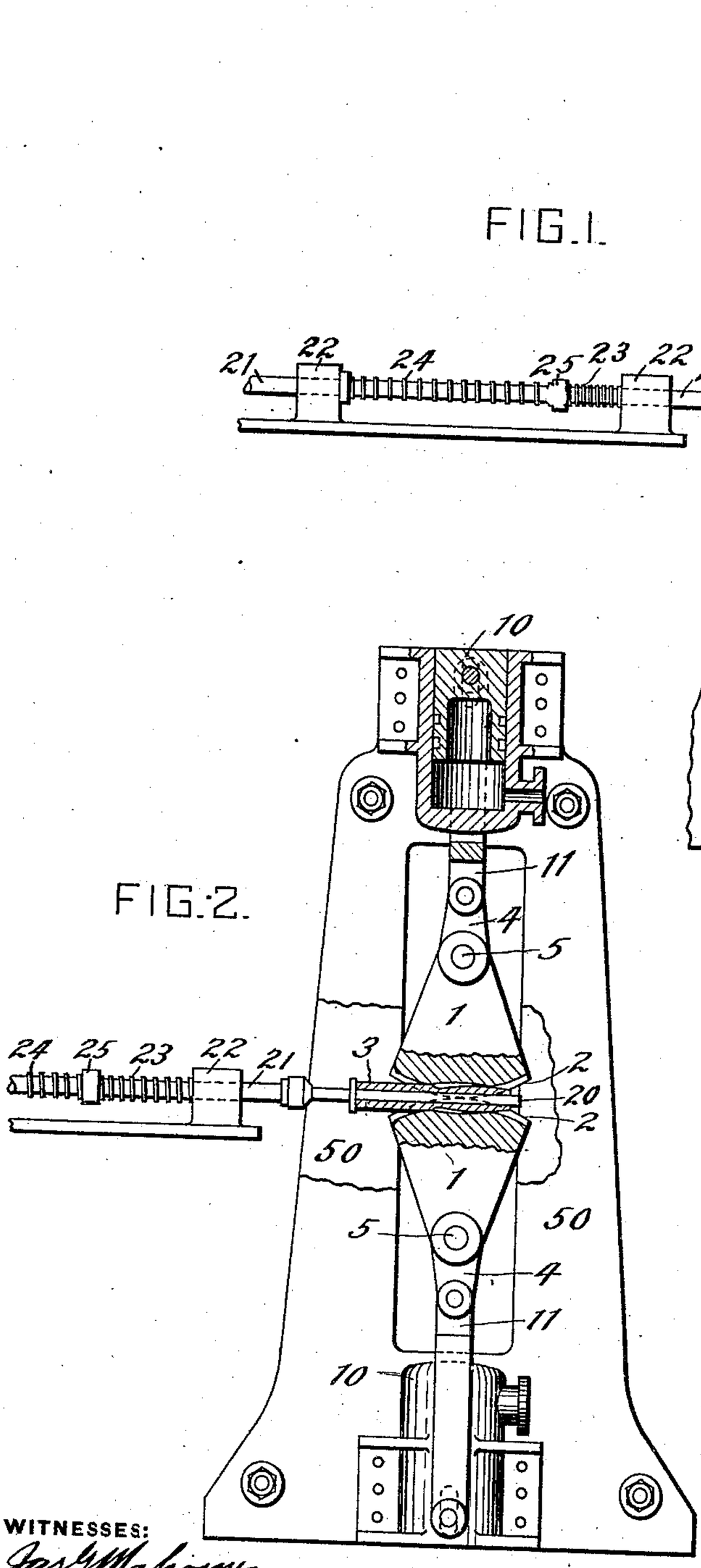


FIG. 2.



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2 SHEETS—SHEET 2.

FIG. 3.

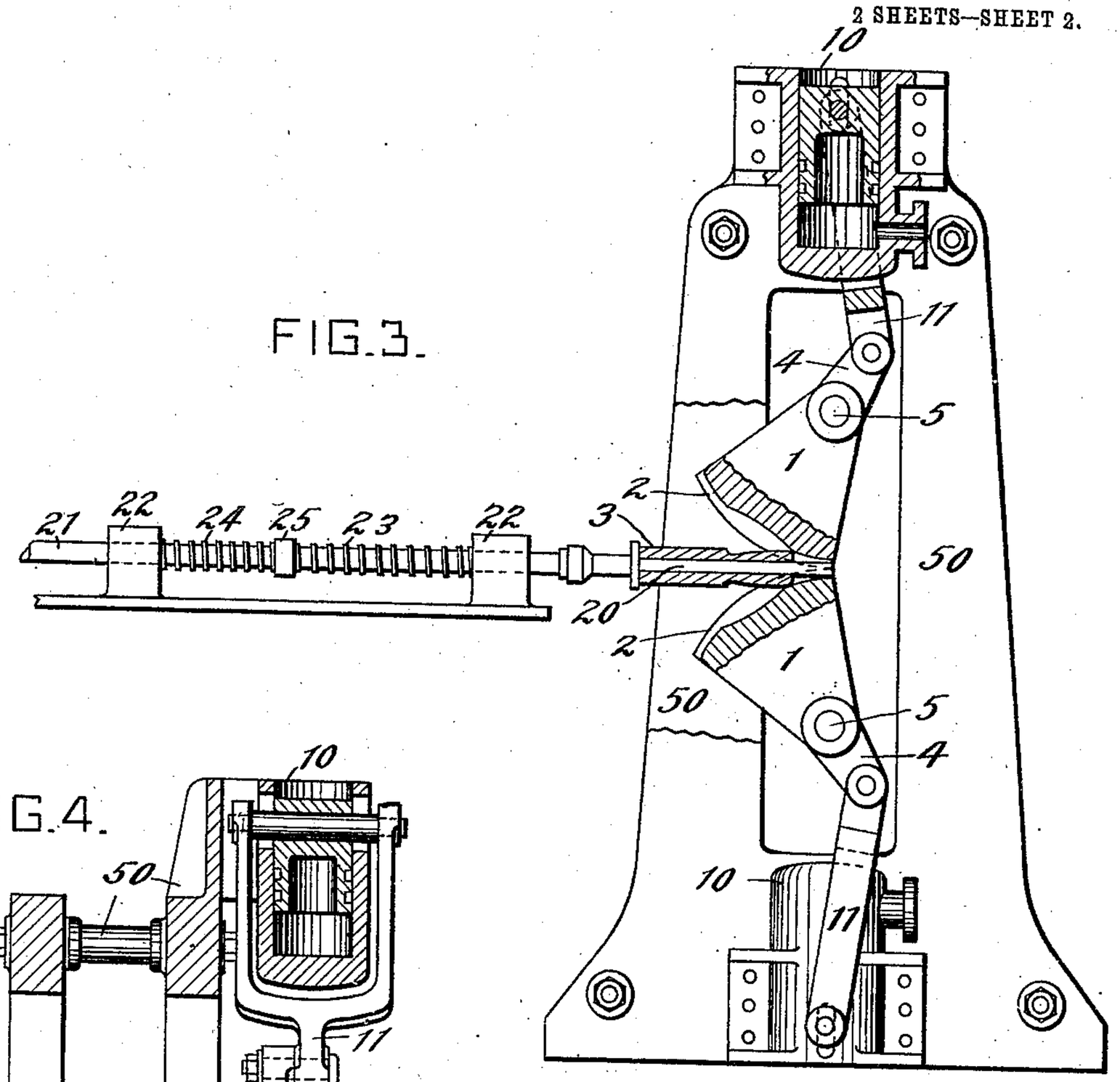


FIG. 4.

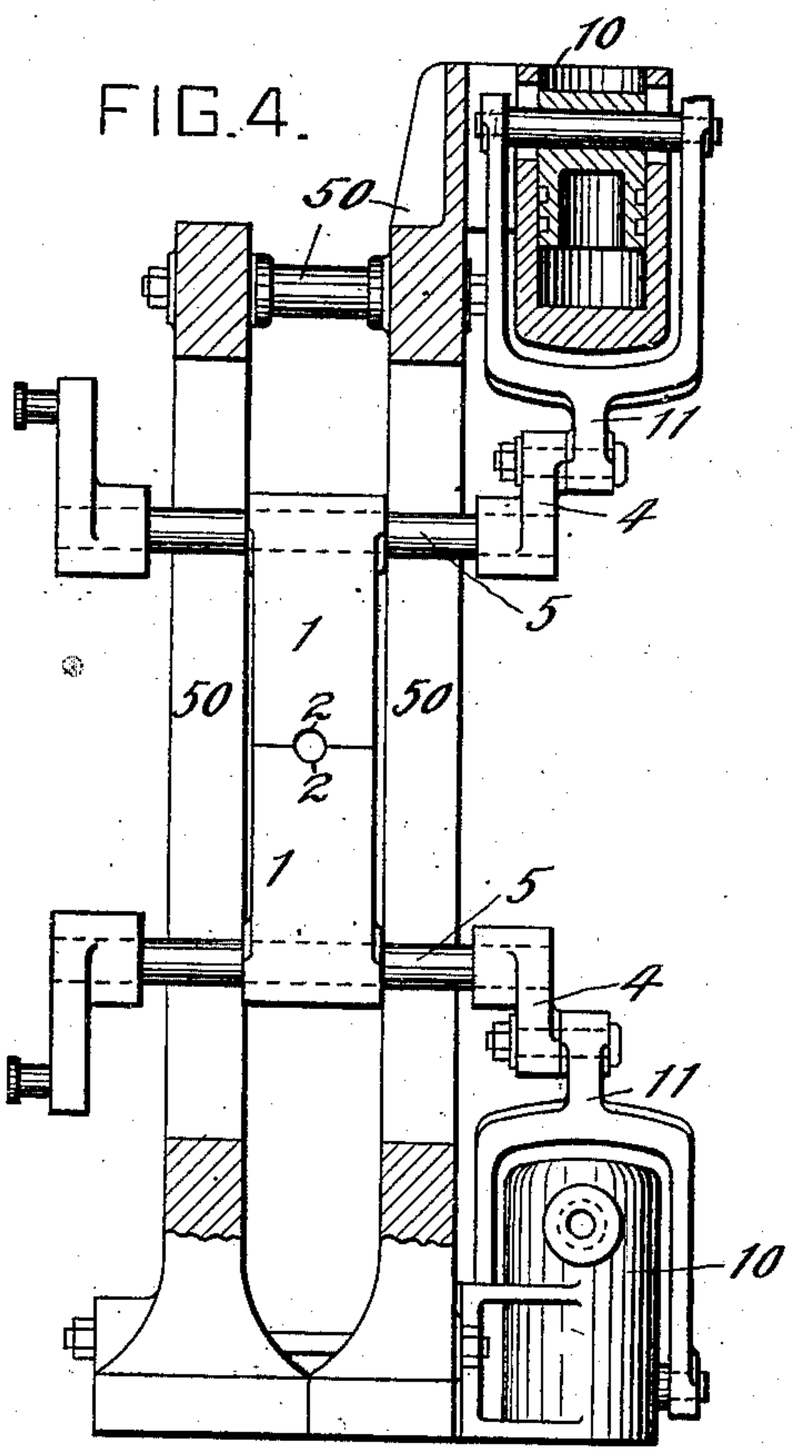
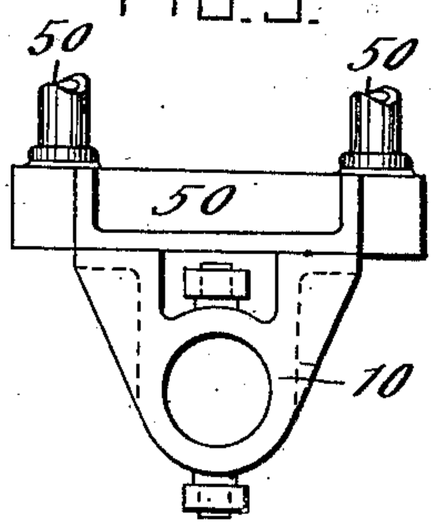


FIG. 5.



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OTTO BRIEDE, OF BENRATH, GERMANY.

METAL-SWAGING APPARATUS.

No. 840,426. Specification of Letters Patent. Patented Jan. 1, 1907.

Application filed October 3, 1904. Serial No. 227,073.

To all whom it may concern:

Be it known that I, OTTO BRIEDE, a citizen of the German Empire, residing at Benrath, in the Province of the Rhine and Kingdom of Prussia, Germany, have invented or discovered certain new and useful Improvements in Metal-Swaging Apparatus, of which improvement the following is a specification.

My present invention relates to the construction and combinations of certain appliances intended to facilitate the swaging of seamless tubes from hollow billets or ingots by means of oscillatory swaging-dies, which progressively act on the hollow billet from one end to the other while seated on a mandrel and work it down to a tube. In swaging-mills intended for such work it has been found that the swaging-dies, with the mandrel, mandrel-stem, &c., together with the billet, must move at high speeds and with quick reversal in opposite directions, and being necessarily somewhat heavy in construction they acquire in each movement a considerable momentum, the effects of which it is important to guard against. It has also been found that if the cushioning-springs heretofore ordinarily employed are adjusted as respects their tension so as properly or in the best manner to do their work of cushioning and feeding it is difficult to so proportion or adjust them that they shall also act with sufficient efficiency and at just the right time so as satisfactorily to check the momentum of the heavily-constructed swaging-dies which are employed in the work. Hence in the present invention, in addition to the usual cushioning-springs, (also employed for feeding,) I add to each of the swaging-dies a suitable mechanism, preferably of the dash-pot order, in such manner that it will furnish the proper resistance to momentum as each die comes to the end of its stroke in either direction and at the same time furnish little or at least a minimum resistance to the movement of the dies, while performing their intermediate swaging function. To this end the present invention consists in the features of construction and combination hereinafter set forth and claimed.

In the accompanying drawings, in two sheets, Figure 1, Sheet 1, represents, partly in side elevation and partly in section, the principal operative mechanisms involved herein with the swaging-dies at or near the end of their forward stroke. Fig. 2 is a like view illustrative of the position of the devices at the middle of the stroke. Fig. 3, Sheet 2, by a like view, illustrates the condition of things at or near the end of the back stroke. Fig. 4 is an end view, partly in section, of the machine; and Fig. 5 is a detached top view of the dash-pot and a part of the housing attachment.

In a suitable housing or frame 50 and by means of shafts and bearings of the ordinary or any desired construction are mounted a pair of swaging-dies 1, each having a grooved face 2, which may taper in one direction, as in Patent No. 741,301 granted to me, or, as illustrated in the drawings, may taper from the middle each way. The hole formed by the grooves 2 at the delivery end should be of the exterior diameter of the tube to be made, and the hole at the other end is of preferably somewhat greater diameter. The middle portion of the grooves should give an opening somewhat greater yet, but preferably less than that of the unreduced part of the billet 3; otherwise the grooves should be made and proportioned with reference to the work to be done—that is, to the reducing of the hollow billet 3 to a tube by the progressive or step-by-step action of the dies thereon as the billet is fed forward at the end of each stroke, and for this purpose of feed suitable provision should be made, as by slightly enlarging or rounding off the corners of the grooves at their extreme ends, just enough temporarily or for an instant to relieve the bite, as set forth in other pending applications.

Each billet 3 being properly heated is slipped onto a mandrel 20, and the latter is coupled to a mandrel-stem 21, which latter plays back and forth through suitable guides or bearings 22 and carries cushioning-springs 23 24, one on each side of a fixed collar 25, these springs abutting against the guides 22. The rear spring 24 should also have the capacity of effecting the forward feed of the billet at the ends of the die-strokes. Mechanisms for advancing and intermittently rotating the mandrel-stem are to be employed, as set forth in other pending applications, but are not illustrated here, as they form no part of the present invention. The back-and-forth movement of the billet, mandrel, and mandrel-stem is effected by the dies, which normally have and retain a bite on the billet except at the very brief moments of feed.

The dies 1 are heavy and normally moving at high speed acquire in each stroke a considerable momentum. Necessarily the springs

23 24 check a portion of this momentum; but it has been found in practice that instead of relying solely on these springs for such work it is better to provide the dies by direct connection with a momentum-checking mechanism which in doing this work shall be auxiliary to the cushioning-springs. To this end I have provided each of the dies with a dash-pot 10, the moving member of which is coupled in any suitable way, as by a stem 11, to an arm 4, connected to or made integral with the die and projecting in such direction from the die-shaft 5 as under dash-pot action will give the desired check on the momentum of the dies at or toward the ends of their strokes, along with a materially lessening or disappearing effect at the middle.

As the construction of suitable dash-pots and the proper materials to be used therein are well known in the mechanical arts, I do not need to describe them in detail. Any one suitable for the purpose may be employed, and I include herein its known mechanical equivalents.

I claim herein as my invention—

1. In a machine for swaging metal tubes from hollow billets, the combination of grooved oscillatory swaging-dies a mandrel reciprocated in both directions by the dies, and dash-pots coupled to the dies at points movable to and fro past a plane passing through the centers of oscillation of the dies, substantially as and for the purposes set forth.

2. In a machine for swaging metal tubes, the combination of oscillatory swaging-dies, a mandrel movable back and forth in both directions synchronously with the dies, and momentum-checking mechanism connected directly to the dies at points movable to and fro past a plane passing through the centers of the oscillations of the dies, substantially as described.

In testimony whereof I have hereunto set my hand.

OTTO BRIEDE.

Witnesses:

WILLIAM ESSENWEIN,

FRANK HESSENBRUCH.