Nov. 26, 1935. A. F. BREITENSTEIN 2,022,273

SELF OPENING DIE HEAD

Filed April 27, 1934

Fig. 1.

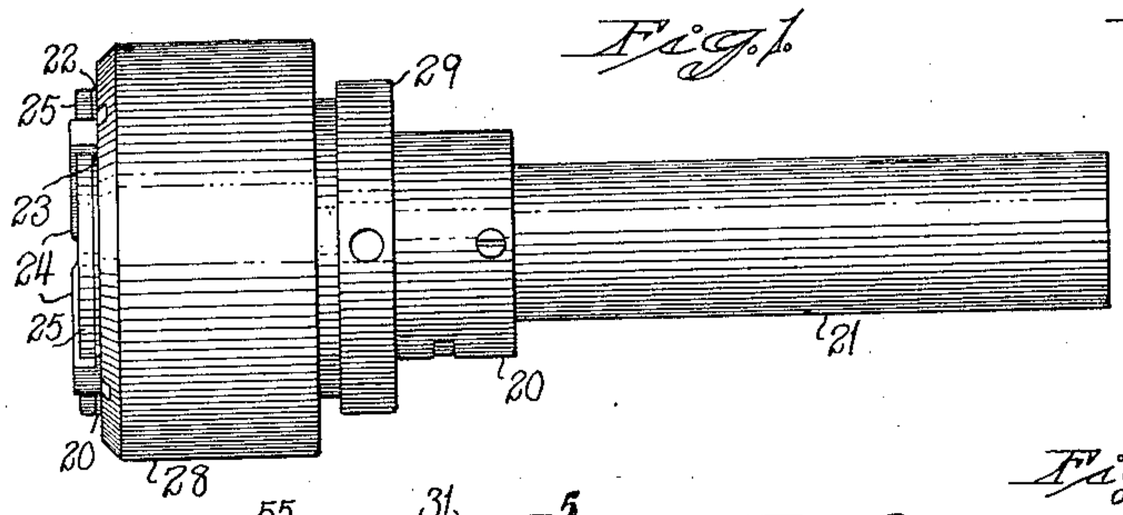


Fig. 2.

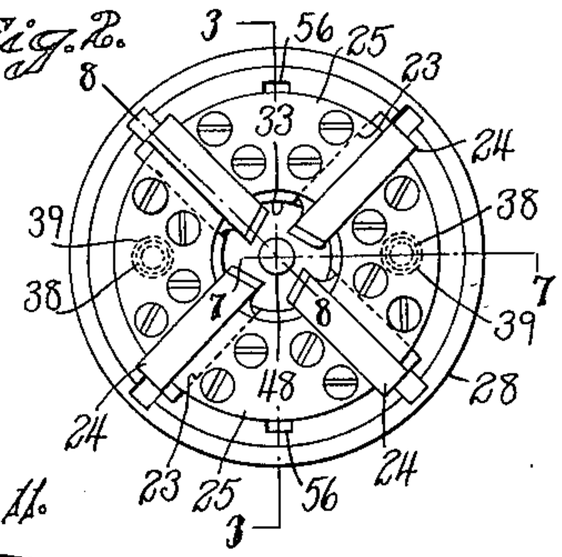


Fig. 11.

Fig. 3.

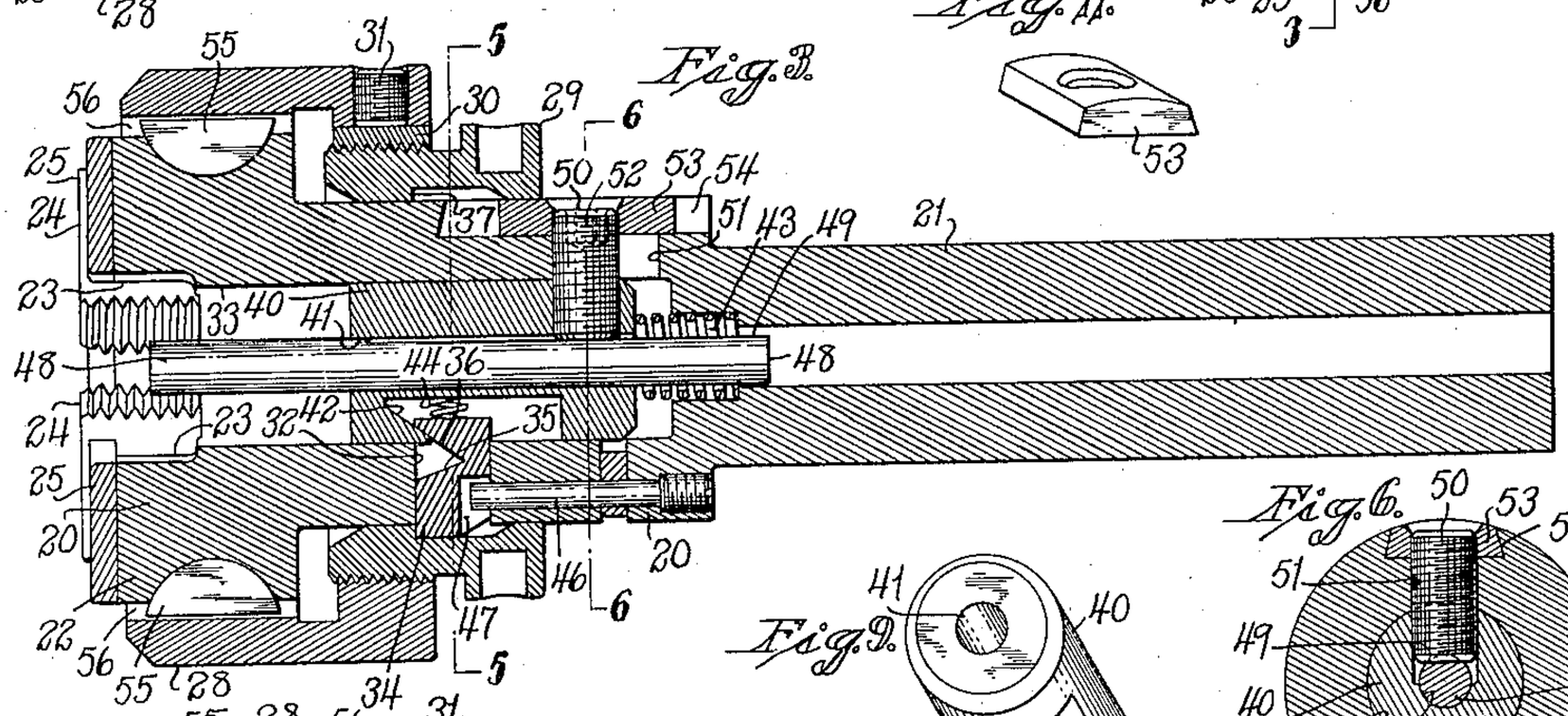


Fig. 6.

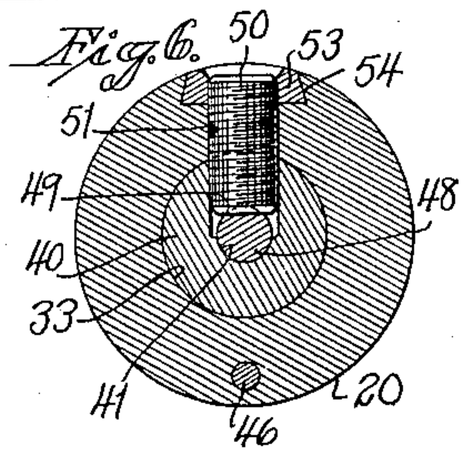


Fig. 9.

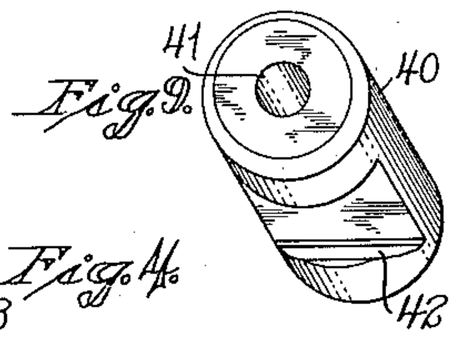


Fig. 4.

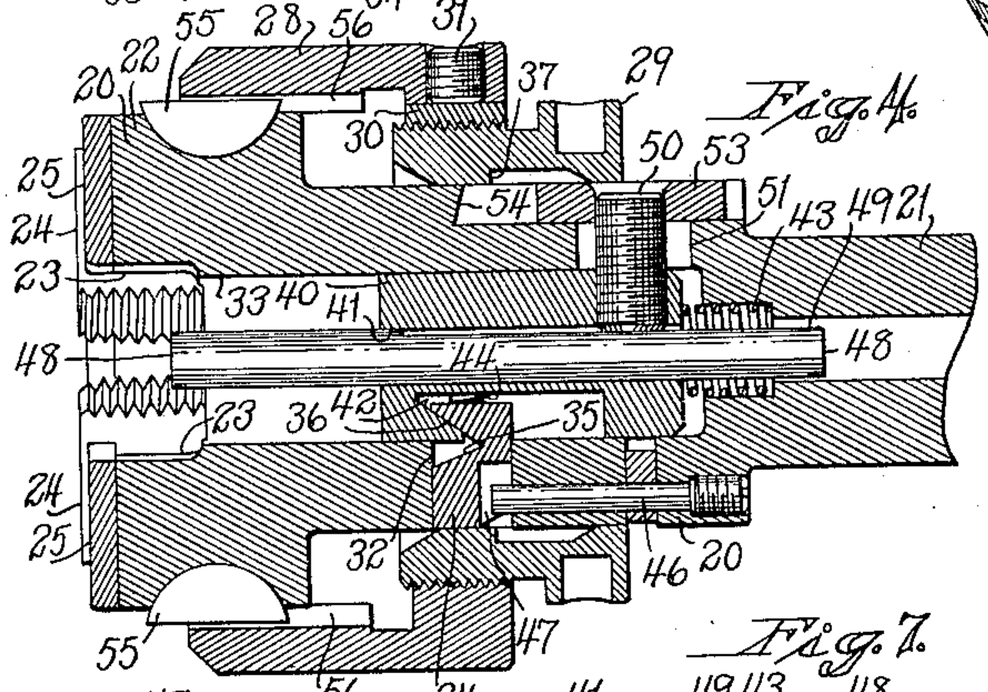


Fig. 7.

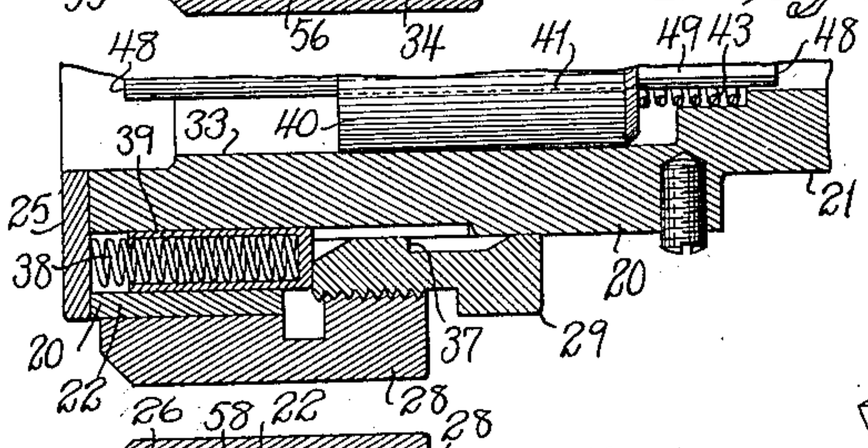


Fig. 5.

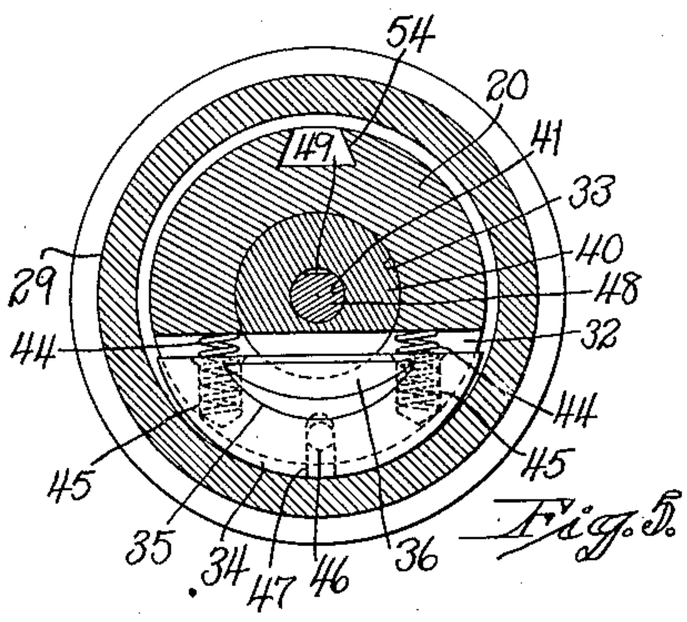


Fig. 10.

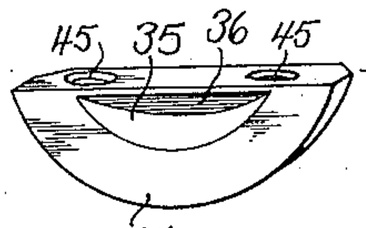
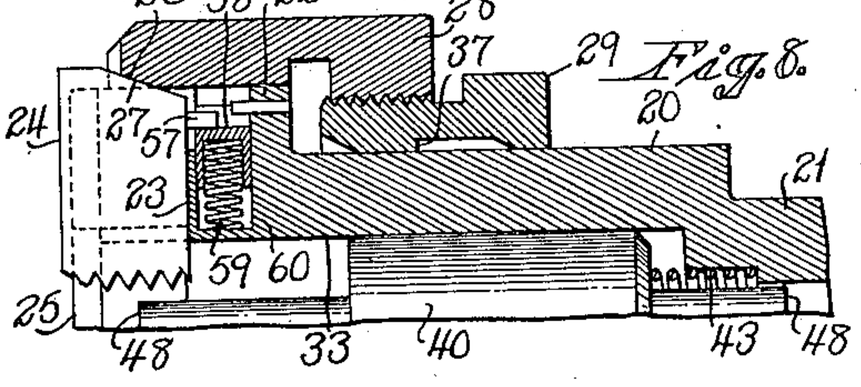


Fig. 8.



Inventor.
Albert F. Breitenstein
by Seymour Earle & Nichols,
attys.

Patented Nov. 26, 1935 2,022,273

UNITED STATES PATENT OFFICE

2,022,273

SELF-OPENING DIE-HEAD

Albert F. Breitenstein, New Haven, Conn., assignor to The Geometric Tool Company, New Haven, Conn., a corporation

Application April 27, 1934, Serial No. 722,701

4 Claims. (Cl. 10—95)

This invention relates to an improvement in self-opening die-heads and particularly to that class of self-opening die-heads commonly referred to as "inside-trip" die-heads, that is to say, die-heads constructed with capacity for being automatically tripped or released from the work by the engagement of the latter with a feature within the die-head structure.

The present invention, moreover, constitutes an improvement of the die-head structure of my prior United States Patent No. 1,872,059.

One of the objects of the present invention is to provide a superior inside-trip die-head characterized by fewness of parts, consequent low cost of manufacture and assembly, and freedom from derangement.

Another object is to provide a superior inside-trip die-head characterized by compactness, whereby a die-head of maximum thread-cutting size may be employed in screw-machines, etc., having limited space for the mounting of such tools.

A further object is to provide an efficient inside-trip die-head having a simple and rugged construction, whereby the tool may be tripped or released from the work either by the latter engaging with an abutment in the interior of the die-head, or by means operable from the exterior of the die-head.

Still another object is to provide a die-head of the class referred to in which the likelihood of jamming, due to chips, dirt, etc., is reduced to a minimum.

Other objects and advantages will appear to those skilled in the art from the following, considered in conjunction with the accompanying drawing and the appended claims.

In the accompanying drawing:

Fig. 1 is a view in side elevation of one form which a self-opening die-head embodying the present invention may assume;

Fig. 2 is a view thereof in front-end elevation;

Fig. 3 is a central longitudinal sectional view taken on the line 3—3 of Fig. 2, the parts being shown in the positions which they assume when the chasers are in their closed or cutting positions;

Fig. 4 is a view corresponding to Fig. 3 but showing the parts in the positions which they assume when the die-head is tripped for the disengagement of the chasers from the work;

Fig. 5 is a transverse sectional view taken on the line 5—5 of Fig. 3;

Fig. 6 is a similar view taken on the line 6—6 of Fig. 3;

Fig. 7 is a broken detail view in longitudinal section taken on the line 7—7 of Fig. 2;

Fig. 8 is a similar view taken on the line 8—8 of Fig. 2;

Fig. 9 is a perspective view of the tripping-sleeve, detached;

Fig. 10 is a perspective view of the latch-member, detached; and

Fig. 11 is a perspective view of the guard-slide, detached.

The self-opening die-head herein chosen as illustrative of the present invention includes, as shown, a body-member generally designated by the reference numeral 20 and having a rearwardly-extending hollow shank 21 and provided at its forward end with an enlarged head-portion 22, which latter is formed in its foward face with four (more or less) radial chaser-receiving slots 23, in each of which is mounted a radially-movable chaser 24.

The chasers 24 just above referred to are retained in place in the slots 23 in the head-portion 22 of the body-member 20 by means of segmental plates 25, and are each formed at their respective outer ends with a rearwardly-and-inwardly-sloping cam-surface 26. The cam-surface 26 of each chaser is engaged by a similarly-sloping cam-surface 27, one of which latter is formed adjacent each of the said chasers upon the inner forward corner of a cup-shaped chaser-operating sleeve 28. The said chaser-operating sleeve is mounted upon the body-member with capacity for axial sliding movement and bears at its forward end upon the periphery of the head-portion 22 of the said body-member, and its rear end is interiorly-threaded for engagement with a similar but exteriorly-threaded surface formed upon the periphery of the forward end of an adjusting-ring 29, which latter reciprocates at its rear-end upon the periphery of the body-member 20. Under normal conditions, the adjusting-ring 29 moves as a unit with the chaser-operating sleeve 28 and may, for practical purposes, be considered a part thereof.

For the purpose of firmly interlocking the chaser-operating sleeve 28 and the adjusting-ring 29, a clamping-shoe 30 is provided which is pressed into engagement with the threaded portion of the said adjusting-ring by means of a headless set-screw 31 mounted in the rear end of the said chaser-operating sleeve, as clearly illustrated in Figs. 3 and 4.

Just rearwardly of its head-portion and radially in line with the adjusting-ring 29, the body-member 20 is formed with a transverse notch or cut 32 of sufficient depth to intersect both its

outer periphery and its cylindrical axial bore **33**, and accommodates a latch-member **34** of segmental form. The said latch-member is provided in its forward face with a V-shaped cut **35** providing a forwardly-and-inwardly-sloping cam-surface **36**, and bears in and is guided by the front and rear walls of the notch **32** in the body-member **20**. The latch-member **34** is also of sufficient depth in a radial direction to project outwardly beyond the periphery of the body-member **20** and inwardly into the axial bore **33** therein.

The outer forward corner of the latch-member **34** is adapted to engage on occasion with an annular rearwardly-facing latching-shoulder or abutment **37** formed within the adjusting-ring **29** for the purpose of releasably holding the unit comprising the said adjusting-ring **29** and the chaser-operating sleeve **28**, in its forward chaser-closing position against the counterurge of a pair of retracting-springs **38—38**. The said retracting-springs are respectively located at diametrically opposite points in the die-head structure and their forward ends bear against the rear face of an adjacent one of the segmental plates **25**. The rear end of each of the said springs **38** fits within a cup-shaped plunger **39**, which latter thrusts against the forward edge of the adjusting-ring **29** and exerts a constant effort to move the same, together with the chaser-operating sleeve **28** in a direction rearwardly of the die-head structure.

To provide for disengaging the forward outer corner of the latch-member **34** from the annular latching-shoulder **37** in the adjusting-ring **29** to effect the retirement of the chasers **24** outwardly, as will hereinafter appear, I mount in the enlarged forward end of the axial bore **33** in the body-member **20**, a cylindrical tripping-sleeve **40** having a central axial passage **41** and cut away on one side to provide a cam-surface **42** of the same slope as and engaging with the cam-surface **36** of the latch-member **34**.

The tripping-sleeve **40** just above referred to is normally urged forwardly by a spring **43** to permit the latch-member **34** to move outwardly for engagement with the latching-shoulder **37**. The said latch-member is urged outwardly in turn by a pair of complementary springs **44—44** (Fig. 5) seated at their inner ends against the bottom wall of the notch **32** in the body-member **20** and their outer ends extended into pockets **45—45** in the inner face of the latch-member **34**. The outward movement of the latch-member **34** under the urge of the springs **44** just referred to is limited by a limiting-stud **46** mounted in the body-member **20** and having its forward end projecting into a limiting-notch **47** in the outer rear corner of the said latch-member **34**.

Mounted in the axial passage **41** of the tripping-sleeve **40** with capacity for longitudinal adjustment therein, is a rod-like tripping-plunger **48** having the rear portion of its periphery flattened as at **49** for engagement by the inner end of a headless set-screw **50** threaded into the said tripping-sleeve **40** and projecting outwardly through a longitudinal clearance-slot **51** in the adjacent portion of the body-member **20**. The outer end of the set-screw **50** is provided with a polygonal socket **52** and extends outwardly part way through a dovetail guard-slide **53** mounted for reciprocation in a dovetail groove **54** formed in the rear portion of the body-member **20** and extending longitudinally thereof. The guard-slide **53** just referred to serves, as the set-screw **50** moves back and forth in the slot **51** longitudinally of the body-member **20**, to cover the said slot and prevent the entrance of chips, dirt, etc., thereinto.

To prevent the turning movement but at the same time to permit relative axial movement of the chaser-operating sleeve **28** with respect to the body-member **20**, I provide complementary segmental keys **55**, each of which is seated in the head-portion **22** of the body-member **20** and projects outwardly into a longitudinal keyway **56** formed in the interior of the chaser-operating sleeve **28**, as clearly shown in Figs. 3 and 4.

Each of the chasers **24** hereinbefore referred to is preferably provided with individual means for urging the same radially outward with respect to the die-head structure, so as to release the toothed inner end of each chaser from the work when the die-head is tripped, in the manner as will hereinafter appear. For the purpose just described, each chaser **24** is provided with a rearwardly-projecting pin **57** engaged by the end wall of a cup-shaped plunger **58**, which latter is pressed outwardly by a helical chaser-retracting spring **59** located, together with the said plunger, in a radial pocket **60**, one of which latter is formed in the head-portion **22** of the body-member **20** just rearwardly of each of the chaser-receiving slots **23** therein, as clearly illustrated in Fig. 8.

Let it be supposed that the parts are in the positions in which they are indicated in Fig. 3, and that the die-head is being threaded over the work, or the work is being threaded into the die-head, so that the work ultimately abuts against the forward face of the tripping-plunger **48** to force the latter rearwardly into the die-head and correspondingly move the tripping-sleeve **40**, which is coupled to the tripping-plunger **48** by means of the set-screw **50** before described.

The rearward movement of the tripping-plunger **48** and tripping-sleeve **40** as just above described will compress the spring **43** and also cause the cam-surface **42** of the said tripping-sleeve to act with a cam-like action upon the cam-surface **36** of the latch-member **34**, with the effect of forcibly pulling the same inwardly against the tension of its springs **44** to disengage the forward outer corner of the latch-member from the latching-shoulder or abutment **37**. The disengagement of the latch-member from the latching-shoulder **37** as just described will permit the unit comprising the chaser-operating sleeve **28** and the adjusting-ring **29** to move rearwardly under the urge of the retracting-springs **38** and permit the chasers **24** each to be moved outwardly by its complementary chaser-retracting spring **59**. The parts will now have assumed the positions in which they are shown in Fig. 4, preparatory to being reset into the positions shown in Fig. 3 by a relative forward movement of the chaser-operating sleeve **28** with respect to the body-member **20** to cam the chasers **24** inwardly into their cutting positions. The movement, just referred to, of the sleeve **28** may be effected by a suitable abutment upon the machine in which the die-head is being used, if desired.

In the course of adjusting the tripping-plunger **48** longitudinally to regulate the length of thread cut upon the work, it is often desirable to be able to trip the die-head from the outside thereof. This tripping may be effected by inserting a suitable polygonal wrench in the socket **52** of the set-screw **50** and drawing rearwardly thereupon with the effect of correspondingly moving the tripping-sleeve and effecting the retraction of the latch-member **34**, etc., in the same manner as previously described.

By mounting the latch-member **34** in the body-member **20** itself in a position intermediate the tripping-sleeve **40** and the adjusting-ring **29** or equivalent part of the chaser-operating sleeve, a direct action is secured which minimizes lost motion and which will withstand long periods of harsh use.

The invention may be carried out in other specific ways than that herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiment is, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

1. A self-opening die-head comprising a body- or mounting-member having an axial bore therein and a latch-guiding passage intersecting both the said bore and the outer periphery of the body-member, the said body-member being provided with means for rigidly attaching it to the spindle of a threading-machine; chasers movably carried by the said body-member; a chaser-operating member movable on the exterior of the said body-member to effect the movement of the said chasers and having a latching-abutment in its interior; a tripping-member axially movable within the bore of the said body-member; and a latch-member movable inwardly and outwardly in and guided by the latch-guiding passage of the said body-member and held by the walls of said passage against displacement longitudinally of the body-member, the said latch-member being interposed in a radial direction directly between the said tripping-member in the interior of the body-member and the said chaser-operating member on the exterior of the body-member, the said latch-member having its outer portion engageable with the latching-abutment of the said chaser-operating member and having cam-like coaction with the said tripping-member in the interior of the body-member.

2. A self-opening die-head comprising a body- or mounting-member having an axial bore therein and a latch-guiding passage intersecting both the said bore and the outer periphery of the body-member, the said body-member being provided with means for rigidly attaching it to the spindle of a threading-machine; chasers movably carried by the said body-member; a chaser-operating member movable on the exterior of the said body-member to effect the movement of the said chasers and comprising two relatively-adjustable cylindrical parts, one of which latter is provided in its interior with a latching-abutment; a tripping-member axially movable within the bore of the said body-member; and a latch-member movable inwardly and outwardly in and guided by the latch-guiding passage of the said body-member and held by the walls of said passage against displacement longitudinally of the body-member, the said latch-member being interposed in a radial direction directly between the said tripping-member in the interior of the body-member and the said chaser-operating member on the exterior of the body-member, the said latch-member having its outer portion engageable with the latching-abutment of the said chaser-operating member and having cam-like coaction with the said tripping-member in the interior of the said body-member.

3. A self-opening die-head comprising a body- or mounting-member having an axial bore therein, a clearance-passage, and a latch-guiding passage, both intersecting the said bore and the outer periphery of the body-member, the said body-member being provided with means for rigidly attaching it to the spindle of a threading-machine; chasers movably carried by the said body-member; a chaser-operating member movable on the exterior of the said body-member to effect the movement of the said chasers and having a latching-abutment in its interior; a tripping-sleeve axially movable within the bore of the said body-member; a tripping-plunger mounted in and axially adjustable with respect to the said tripping-sleeve; a latch-member movable inwardly and outwardly in and guided by the latch-guiding passage of the said body-member and held by the walls of said passage against displacement longitudinally of the body-member, the said latch-member being interposed in a radial direction directly between the said tripping-member in the interior of the body-member and the said chaser-operating member on the exterior of the body-member, the said latch-member having its outer portion engageable with the latching-abutment of the said chaser-operating member and having cam-like coaction with the said tripping-sleeve in the interior of the body-member; and coupling-means threaded into the said tripping-sleeve and extending outwardly through the clearance-passage in the said body-member in position for manipulation from the exterior of the die-head and serving to adjustably connect the said tripping-plunger with the said tripping-sleeve.

4. A self-opening die-head comprising a body- or mounting-member having an axial bore therein, a clearance-passage, and a latch-guiding passage, both intersecting the said bore and the outer periphery of the body-member, the said body-member being provided with means for rigidly attaching it to the spindle of a threading-machine; chasers movably carried by the said body-member; a chaser-operating member movable on the exterior of the said body-member to effect the movement of the said chasers and having a latching-abutment in its interior; a tripping-sleeve axially movable within the bore of the said body-member; a tripping-plunger mounted in and axially adjustable with respect to the said tripping-sleeve; a latch-member movable in and guided by the latch-guiding passage of the said body-member and held by the walls of said passage against displacement longitudinally of the body-member, the said latch-member having its outer portion engageable with the latching-abutment of the said chaser-operating member and having cam-like coaction with the said tripping-sleeve in the interior of the body-member; a coupling-screw threaded into the said tripping-sleeve and extending outwardly through the clearance-passage in the said body-member in position for manipulation from the exterior of the die-head and serving to adjustably connect the said tripping-plunger with the said tripping-sleeve; and a guard-slide on the exterior of the said body-member and perforated for the reception of the outer end of the said coupling-screw, with which latter it moves longitudinally of the die-head.

ALBERT F. BREITENSTEIN.