

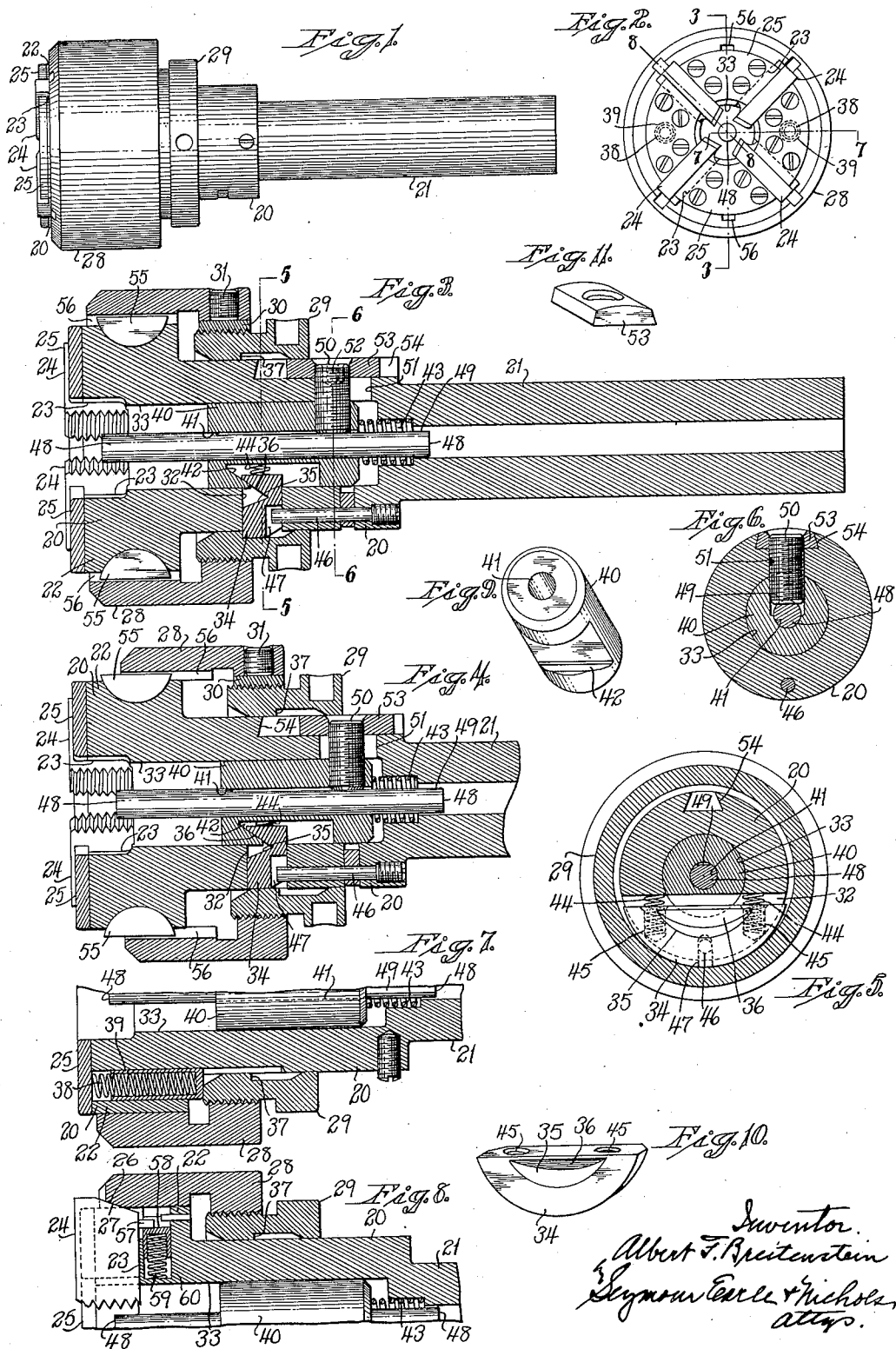
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SELF OPENING DIE HEAD

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SELF-OPENING DIE-HEAD

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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 forward 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., thereto.

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.

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