Dec. 9, 1947. H. F. SCOVILLE ET AL 2,432,449

DIE SET

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Fig. 1.

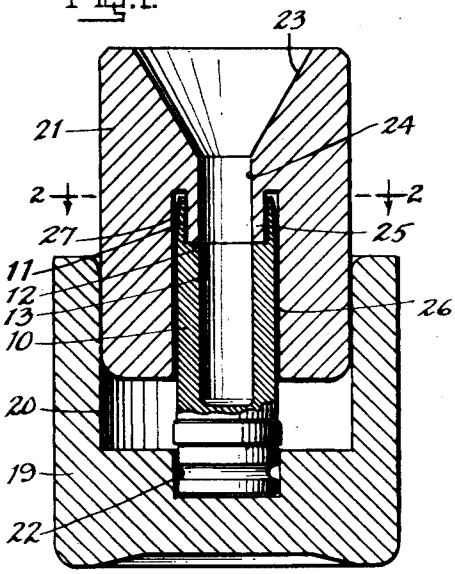


Fig. 3.

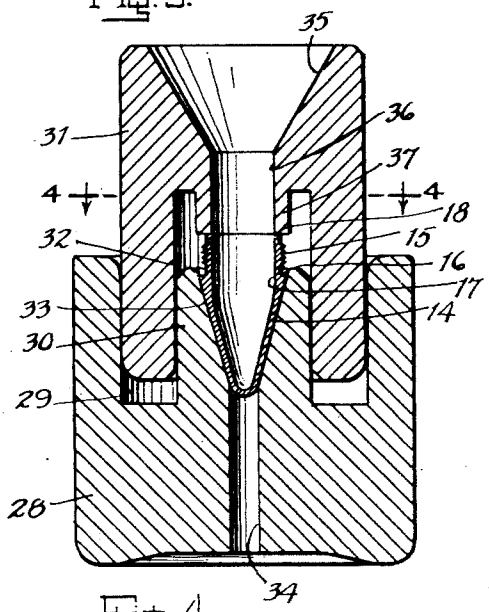


Fig. 2.

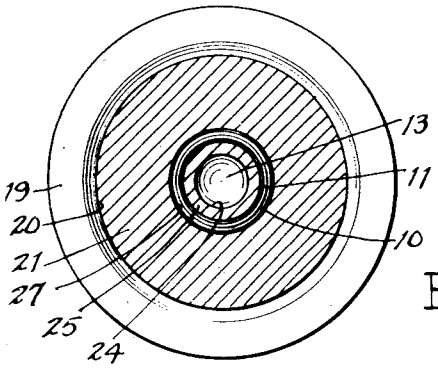


Fig. 4.

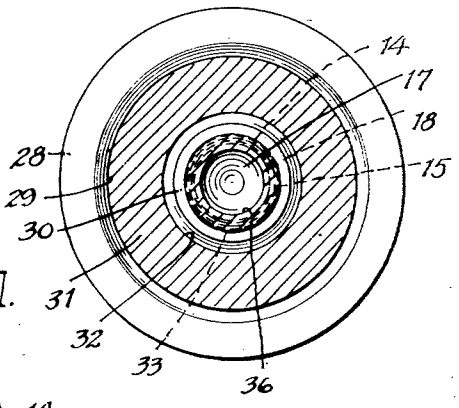


Fig. 7.

Fig. 5.

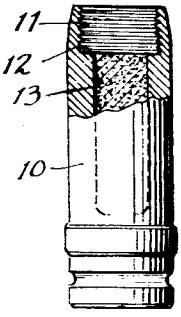
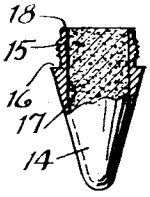
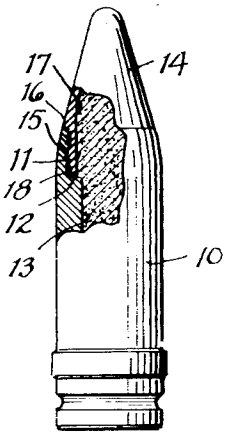


Fig. 6.





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DIE SET

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Fig. 8.

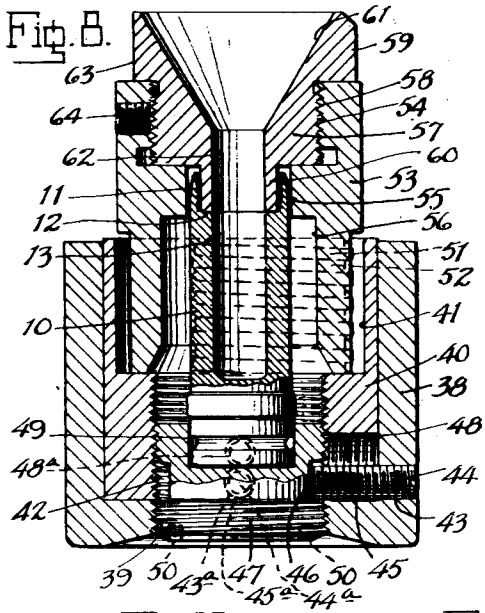


Fig. 9.

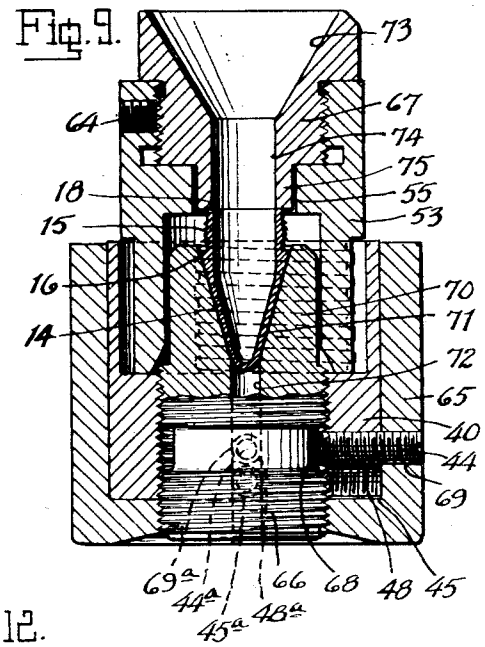


Fig. 10.

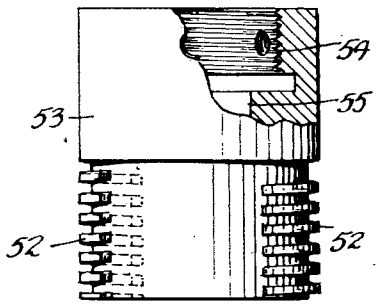


Fig. 12.

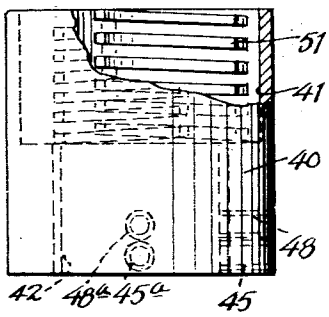


Fig. 14.

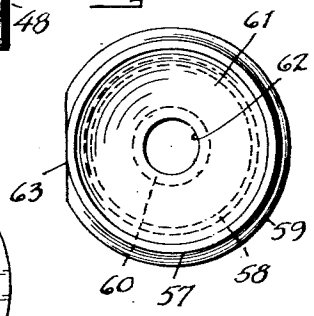


Fig. 11.

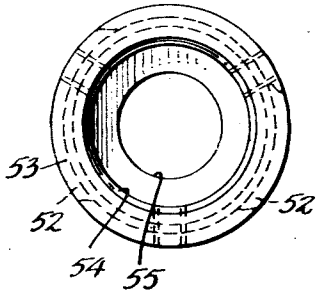
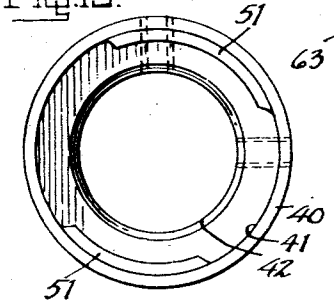


Fig. 13.



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UNITED STATES PATENT OFFICE

2,432,449

DIE SET

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Application March 28, 1945, Serial No. 585,312

3 Claims. (Cl. 86—20)

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The present invention relates to a die set, particularly for the purpose of holding an article having a pocket, while the pocket is charged with powder or the like. The invention is especially adapted for the charging with incendiary powder of incendiary projectiles, these projectiles consisting of a hollow body component having an internal thread at its upper end, and a hollow nose component having an external thread at its upper end and adapted to be screwed upon the upper end of the body component, both components being charged with incendiary powder.

It is an object of the invention to provide a die set in which the components may be engaged in relation to a funnel member constituting a part of the die set in such manner that the threads of the components are protected, so that powder is prevented from getting into the threads during the charging operation, and further to provide a die set which promotes an accurate and level powder charge.

A further object is to provide a die set which will enable the operators to place the components therein, preparatory to charging, with accuracy, speed, and facility, it being pointed out that the die sets after being assembled with the components are automatically fed in a charging machine, which at one station charges them with a measured charge of powder, and at a successive station tamps the charge of powder to a predetermined level within the component. A charging machine of this character is disclosed in the United States patent to Forest W. Snodgrass for Projectile loading, No. 2,356,281, granted August 22, 1944.

A further object is to provide a die set which will compensate for slight variations in the height dimension of the component within the permitted tolerance limits.

With the above and other objects in view, embodiments of the invention are shown in the accompanying drawings, and these embodiments will be hereinafter more fully described with reference thereto, and the invention will be finally pointed out in the claims.

In the drawings:

Fig. 1 is a vertical sectional view of a die set, according to the invention, for charging the body component of an incendiary projectile, being shown in cooperative engagement with the component.

Fig. 2 is a horizontal sectional view, taken along the line 2—2 of Fig. 1.

Fig. 3 is a vertical sectional view of a die set for charging the nose component of the incendiary projectile, being shown in cooperative engagement with the component.

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Fig. 4 is a horizontal sectional view, taken along the line 4—4 of Fig. 3.

Fig. 5 is a side elevation, partially in vertical section, showing the charged body component.

Fig. 6 is a side elevation, partially in vertical section, showing the charged nose component.

Fig. 7 is a side elevation, partially in vertical section, showing the charged body and nose components, assembled.

Fig. 8 is a vertical sectional view of a die set, according to a modified form of the invention, for charging the body component of an incendiary projectile, being shown in cooperative engagement with the component.

Fig. 9 is a vertical sectional view of a die set, according to the modified form of the invention, for charging the nose component of the incendiary projectile, being shown in cooperative engagement with the component.

Fig. 10 is a side elevation, partially in vertical section, of the funnel holder forming part of the die set as shown in Figs. 8 and 9.

Fig. 11 is a top plan view of the funnel holder.

Fig. 12 is a side elevation, partially in vertical section of the insert member for interlockingly receiving the funnel holder.

Fig. 13 is a top plan view of the insert member.

Fig. 14 is a top plan view of the body charging funnel member.

Similar reference characters indicate corresponding parts throughout the several figures of the drawings.

Referring to the drawings, particularly to Figs. 1 to 4 thereof, the die set, according to the illustrated exemplary embodiment of the invention shown therein, comprises cooperating pairs of die and funnel members for respective cooperative engagement with two parts of a hollow article to be charged with powder or the like, each having screw threads for attaching one part to the other. In particular, the invention is especially adapted for the charging of incendiary projectiles, these consisting of a body component and a nose component, the body component 10 having at its upper end an internal screw thread 11 extending downwardly to an internal shoulder 12, and a powder receiving pocket 13 extending downwardly from the shoulder 12, and the nose component 14 having an external screw thread 15 for engagement with the internal thread of the body component, an abutment shoulder 16 for engaging the upper end of the body component in assembled position, and a powder receiv-

ing pocket 17 surrounded at its mouth by an annular end surface 18.

The body charging pair of the die set comprises a cup shaped die member 19 having a cylindrical cavity 20 and a cylindrical funnel member 21 engaged in the cavity with a slip fit. The base of the cavity 20 is provided centrally with a cylindrical pocket 22 to receive and position the base of the body component 10. The funnel member 21 is provided with a downwardly extending conical entrance passage 23 connecting at its lower end with a cylindrical passage 24 of corresponding diameter to the pocket 13 of the body component, this passage 24 extending through a cylindrical barrier wall 25 provided in the upper end of the upwardly extending body receiving passage 26 of the funnel member. The barrier wall is inwardly spaced from the cylindrical wall of the passage 26 to provide at the upper end of the passage an annular pocket 27 in which is engaged the internally threaded upper end of the body component, the lower end of the barrier wall seating firmly upon the shoulder 12 of the body, so that the threads 11 are sealed off from the charging passage of the funnel member and the pocket 13 of the body component.

In operation, the body component is assembled with the die set and thereupon feeds automatically through the charging and tamping machine, a measured charge of incendiary powder being fed into the pocket 13 through the funnel member. This measured charge reaches a level within the passages 24 above the upper end of the pocket 13, being thereupon tamped by insertion of a suitable tamping tool into the passage 24 to compress the charge substantially to the level of the shoulder 12, as shown in Fig. 5. Following the charging and tamping operations the funnel member is disengaged and the projectile body removed. Slight variations in the height dimension of the body component will be compensated for by the slip fit of the funnel member with the die member.

The nose charging pair of the die set comprises a die member 28 provided with an annular cavity 29 surrounding a central pedestal portion 30, and adapted to receive the funnel member 31 with a slip fit, the funnel member being provided with a passage 32 extending upwardly from its lower end for engagement by the pedestal portion 30. The pedestal portion 30 is provided with a conical pocket 33 for receiving the nose component 14, a cylindrical passage 34 extending downwardly from the pocket 33 to the lower end of the die for the purpose of receiving a suitable nose removing rod. The funnel member 31 is provided with a downwardly extending conical entrance passage 35 connecting at its lower end with a cylindrical passage 36 of corresponding diameter to the diameter of the upper end of the pocket 17 of the nose component, this passage 36 extending through a cylindrical barrier wall 37 provided in the upper end of the passage 32. This barrier wall seats firmly upon the upper end surface 18 of the nose component, and thus effectually seals off the external screw threads 15 from the funnel passage 36 and the pocket 17 of the nose component, so that powder will be prevented from coming into contact with the threads.

In operation, a measured charge of powder is fed into the nose component and reaches a level within the passage 36 above the end surface 18 of the component, being thereupon tamped to compress it substantially to the level of the end

surface 18, as shown in Fig. 6. Thus, when the components are assembled, as shown in Fig. 7, the charges of powder within the body and nose components substantially meet to fill the projectile.

In Figs. 8 to 14, there is illustrated a modified form of the invention, wherein the cooperating die and funnel parts of the die set are adapted to be engaged in interlocking relation, as distinguished from the slip fit of the die set shown in Figs. 1 to 4. The body charging pair of the die set comprises a die holder 38 of cylindrical cup shape provided centrally within its base with a threaded passage 39, and within this die holder there is secured a cylindrical insert member 40 provided in its upper side with a cylindrical pocket 41 having within its base a threaded passage 42 forming an upward continuation of the threaded passage 39 of the die holder.

The die holder 38 is provided in its side wall adjacent its base with a threaded hole 43 for receiving a positioning set screw 44 and which engages a threaded hole 45 in the insert member 40, the inner end of the set screw engaging within an annular groove 46 of a threaded die member 47 engaged within the threaded passages 39 and 42. The insert member is provided above the threaded hole 45 with an additional threaded hole 48, for the purpose of cooperation with the die holder of the nose charging pair of the die set, illustrated in Fig. 9, and as will hereinafter more fully appear. In radially spaced relation to the threaded holes 43, 45 and 48 the die holder and insert are provided with additional holes 43^a, 45^a and 48^a for receiving an additional set screw 44^a also engaged in the annular groove 46 of the die member, for the purpose of additionally securing the insert member and the die member with respect to the die holder.

The die member 47 is provided centrally in its upper side with a cylindrical pocket 49 for receiving and positioning the base of the body component 10, and in its lower side is provided with a pair of sockets 50—50 for receiving a suitable wrench for the purpose of vertically adjusting the die member, the annular groove 46 having limited clearance with respect to the set screw 44, so that the die member may be vertically adjusted within predetermined limits to compensate for variations in the height dimension of the body component within the permitted tolerance limits.

The cylindrical pocket 41 of the insert member is provided with internal interrupted threads 51 for interlocking engagement by the external interrupted threads 52 of a funnel holder 53, this funnel holder being provided in its upper end with an internally threaded pocket 54 provided centrally in its base with a cylindrical passage 55 for receiving the upper end of the body component 10, the passage 55 extending to a body receiving passage 56 in the lower end of the funnel holder.

The funnel member 57 is provided with an externally threaded intermediate portion 58 adapted to be screwed into the threaded passage 54, an upper flange portion 59 adapted to seat upon the upper end of the funnel holder, and a downwardly extending barrier wall portion 60 engaged within the passage 55 of the funnel holder. A conical entrance passage 61 extends downwardly from the upper end of the funnel member and connects with a cylindrical passage 62 extending through the barrier wall portion 60 and corresponding in diameter to the pocket 13 of the body component. The flange 57 of the funnel mem-

ber is preferably provided with a flat surface **63** for convenient engagement of a wrench therewith. Set screws **64** in the funnel holder secure the funnel member in its assembled relation.

The operation is substantially similar to the body charging pair of the die set shown in Fig. 1, except that instead of the slip fit of the funnel member, the funnel member together with the funnel holder are interlockingly engaged with the insert member **40** of the die holder by vertical engagement and rotation of the funnel member to cause the interrupted threads **51** and **52** to interlock.

The nose charging pair of the die set, shown in Fig. 9, employs the same funnel holder **53** and insert member **40**, as employed in the body charging pair of the die set as shown in Fig. 8, and has assembled therewith a die holder **65**, a die member **66**, and a funnel member **67**, especially adapted for cooperation with the nose component. The die member **66** is provided with an annular groove **68** substantially in line with the upper threaded holes **48** and **48a** of the insert member, and the die holder **65** is provided with threaded holes **69** and **69a** in line with the upper holes **48** and **48a**, the set screws **44** and **44a** being engaged through the holes **69**, **69a** and **48** and **48a** to secure the insert and being engaged in the groove **68** to secure the die member.

The die member is provided with an upwardly extending pedestal portion **70** which engages within the passage **56** of the funnel holder, and within this pedestal portion there is provided a conical pocket **71** for receiving the nose component, a vertical passage **72** extending downwardly from the lower end of this pocket for insertion of a suitable nose removing rod. The funnel member is provided with a downwardly extending conical entrance passage **73**, connecting with a passage **74**, corresponding in diameter to the diameter of the upper end of the pocket **17** of the nose component and extending through a cylindrical barrier wall **75** disposed within the passage **55** of the funnel holder, the lower end of this barrier wall seating firmly upon the end surface **18** of the nose component, to prevent powder from reaching the threads **15** in substantially the same manner as the nose charging pair of the die set shown in Fig. 3.

The form of the invention illustrated in the drawing and described herein is typical and illustrative only, and it is evident that the invention is capable of embodiments in other forms, all falling within the scope of the appended claims, which are to be broadly construed.

What is claimed is:

1. For charging an article having a charge receiving pocket, screw threads circumferentially offset outwardly from said pocket, and an annular seating surface between said pocket and

said threads; a die set comprising a cup shaped die member having article positioning means centrally within its base; and a funnel member axially engaged with said die member, said funnel member having a funnel passage adapted to be axially aligned with the pocket of said article, and a barrier wall surrounding said passage and having an annular end surface engageable with said annular seating surface of said article and adapted to constitute a barrier between said passage and the said screw threads of said article.

2. For charging an article having a charge receiving pocket, screw threads circumferentially offset outwardly from said pocket, and an annular seating surface between said pocket and said threads; a die set comprising a die holder, a die member engaged in said die holder for axial adjustment therein and having article positioning means; and a funnel member axially aligned with said die member, said funnel member having a funnel passage adapted to be axially aligned with the pocket of said article, and a barrier wall surrounding said passage and having an annular end surface engageable with said annular seating surface of said article and adapted to constitute a barrier between said passage and the said screw threads of said article.

3. For charging an article having a charge receiving pocket, screw threads circumferentially offset outwardly from said pocket, and an annular seating surface between said pocket and said threads; a die set comprising a die holder, a die member engaged in said die holder for axial adjustment therein and having article positioning means; a funnel member axially aligned with said die member, said funnel member having a funnel passage adapted to be axially aligned with the pocket of said article, and a barrier wall surrounding said passage and having an annular end surface engageable with said annular seating surface of said article and adapted to constitute a barrier between said passage and the said screw threads of said article: and cooperating interlocking means respectively carried by said die holder and said funnel member movable one with respect to the other into engaging and disengaging relation.

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