Sept. 21, 1948. J. STUART, 2D 2,449,625

DIE ASSEMBLY

Filed Dec. 29, 1945 2 Sheets-Sheet 1

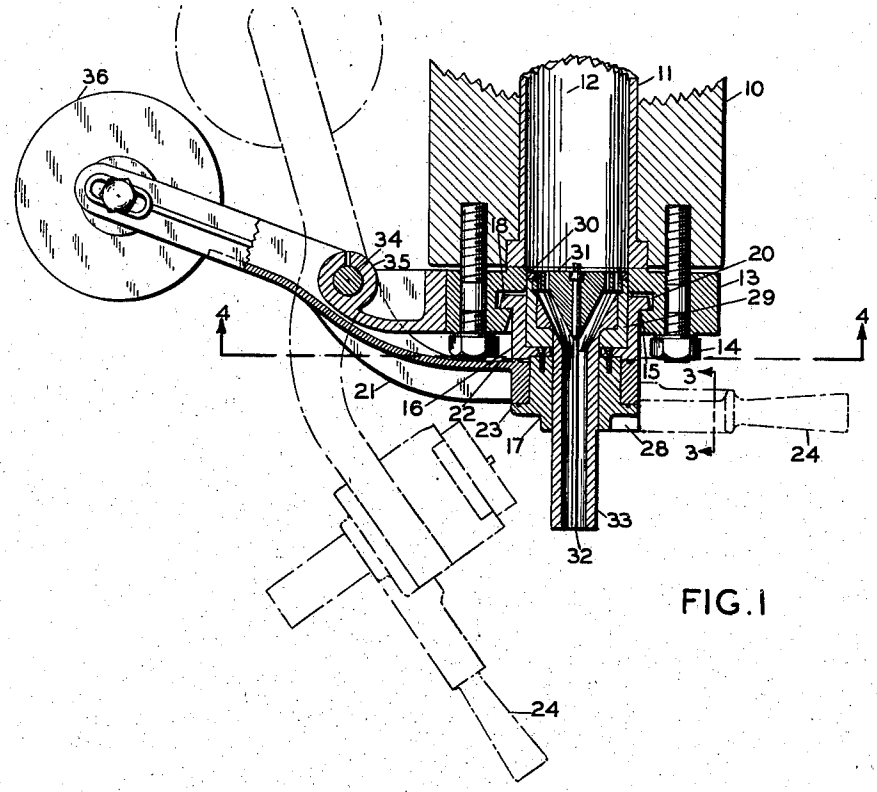


FIG. 1

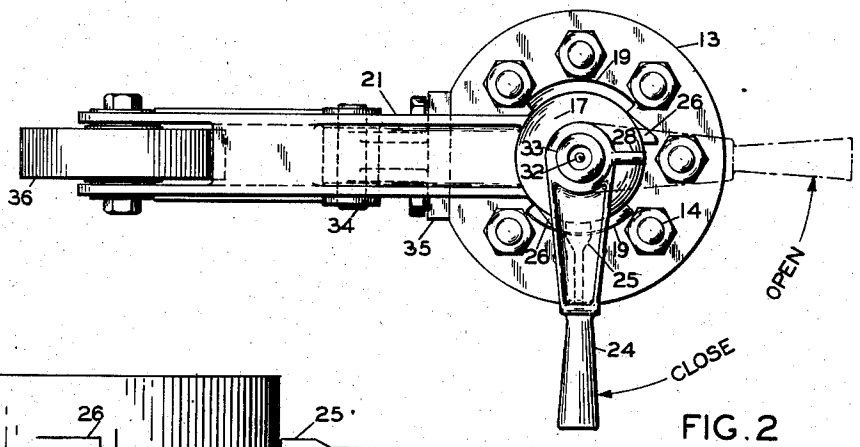


FIG. 2

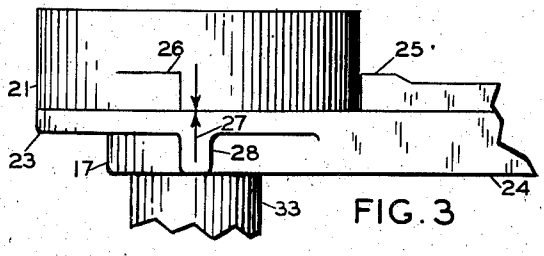


FIG. 3

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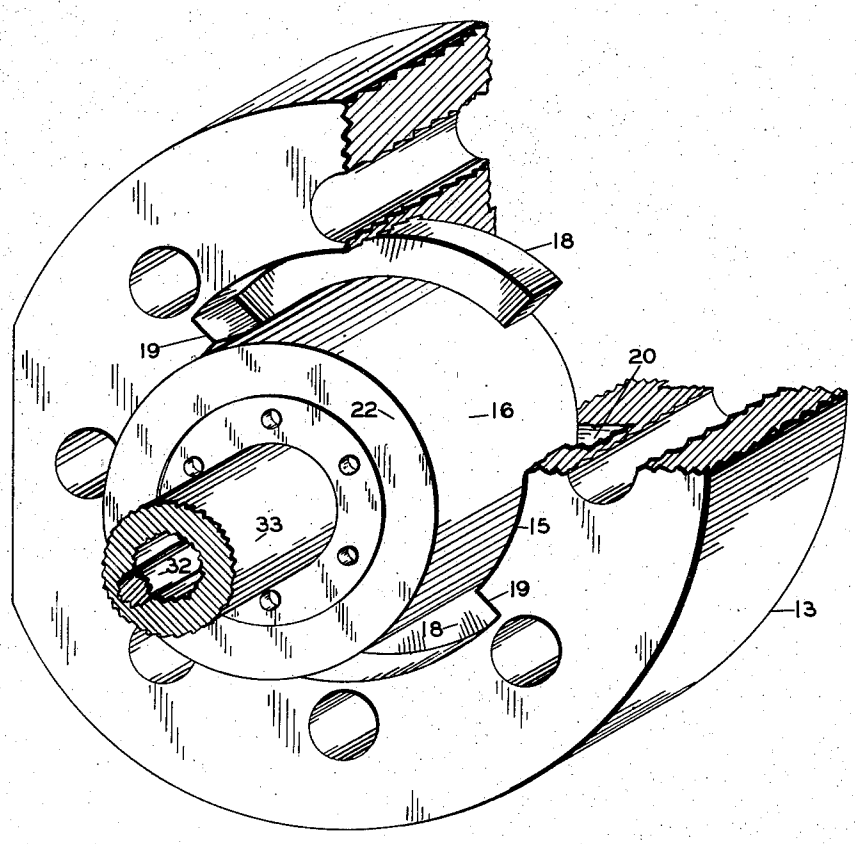


FIG. 4

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Patented Sept. 21, 1948 2,449,625

UNITED STATES PATENT OFFICE

2,449,625

DIE ASSEMBLY

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Application December 29, 1945, Serial No. 637,950

3 Claims. (Cl. 18—12)

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This invention relates to extrusion apparatus and particularly to die assemblies which are especially applicable in conjunction with the extrusion of hazardous material.

In the extrusion of hazardous material such as smokeless powder, machines having a removable die head are usually employed. The removable die head is customarily secured to the body of the machine by a plurality of bolts. The die is threadedly held in position in the removable die head, and because of the care required in handling the explosives-coated die, removal of the extrusion die is a laborious and hazardous operation.

Now in accordance with this invention smokeless powder extrusion machines have been provided with an extrusion die which will reduce the hazard involved in gaining access to the component parts of the die.

Another object is to provide a die assembly permitting removal of the extrusion die without completely removing the die holder from attachment with the support head.

Another object is to provide a die assembly which will permit efficient charging of the extrusion chamber of ram-type extrusion machines from the head end.

Generally described, the present invention comprises a locking die holder consisting of a hollow cylindrical retainer and a retainer clamping ring adapted to clamp the assembly to a hinged arm. The locking die holder is adapted to carry the die components comprising an adaptor ring, die bushing, bridge and core. The die holder retainer is provided with at least one external radially projecting segmental flange.

A support head in accordance with this invention, and adapted to be rigidly attached to the head of an extrusion machine, is provided with a central cylindrical bore, counterbored and otherwise adapted to receive the locking die holder. Recesses formed in the central bore permit ingress and egress of the segmental flange of the die holder retainer to the counterbored chamber. The counterbored chamber permits axial rotation of the segmental flanges in addition to restriction of movement in a direction parallel to the central axis of the die assembly. In one position the die holder may be freely swung into the support head, the segmental flanges passing through the recesses in the central bore and into position adjacent to the counterbored chamber. Then upon rotation of the die holder the flanges enter the counterbored chamber and the assembly is thereby locked in

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place in readiness for performing its function in extrusion processes.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, in which:

Fig. 1 is a fragmentary, cross-sectional, elevational view of a die assembly including the support head and the locking die holder of the invention shown in hinged attachment to an extrusion chamber;

Fig. 2 is an end view of the die assembly of Fig. 1;

Fig. 3 is an enlarged fragmentary view taken along line 3—3 of Fig. 1 showing a preferred visual limit indicator on the locking die holder means of the invention;

Fig. 4 is a fragmentary, enlarged, isometric view taken along the line 4—4 of Fig. 1 through the locking die holder and the extrusion die.

Figs. 1 and 2 show the locking die holder in the locked or closed position while Fig. 4 shows the locking die holder in the open position. In the drawings, like numbers refer to like parts wherever they appear.

An extrusion chamber head 10 carries an extrusion chamber liner 11 which defines an extrusion chamber 12. A support head 13 is bolted to the extrusion chamber 10 by stud bolts 14 in a manner to effect a sealed joint with the end of the extrusion chamber liner 11. The support head has a central cylindrical bore 15 which is counterbored, recessed and partially tapered to permit entry of a locking die holder. The locking die holder is composed of a retainer 16 and a retainer clamping ring 17. Segmental flanges 18 projecting radially from the end of the retainer 16 are spaced equidistant along the periphery of the retainer 16. Recesses 19 formed in the cylindrical bore 15 of the support head 13 are of a size to permit egress and ingress of the segmental flanges 18 to a counterbored chamber or annular groove 20. The counterbored chamber or annular groove 20 is of suitable dimensions to permit the axial rotation of the segmental flanges 18 within its confines.

The retainer clamping ring 17, when attached to the retainer 16, clamps the die holder about a hinged arm 21. A shoulder 22 of the retainer 16 abutting the upper surface of the hinged arm 21 and a flange 23 of the retainer clamping ring 17 abutting the lower surface of the hinged arm 21 serve to clamp the die holder unit in the hinged arm against movement parallel with the central bore although permitting rotational movement.

A lever 24 is also a part of the retainer clamping ring 17 and serves as a means by which an operator of the invention may manually apply a rotative force to the locking die holder, thereby locking or unlocking the unit in engagement with the support head 13. A projection 25 of the lever 24 contacts the end stop locks 26 to limit rotational travel of the locking die holder to limits necessary to bring about full engagement or disengagement of the segmental flanges 18 of the retainer 16 with the counterbored chamber 20.

An additional aid to the operator in determining, from his position remote from the press head, whether the die is in a locked or unlocked position is an indicating arrow 27 on the boss 28. The indicating arrow 27 will be brought in line with a corresponding arrow indicating the "open" or "closed" position of the die assembly as the die holder is rotated to the corresponding positions.

Within the die holder are die components comprising an adaptor ring 29 fitted with a resilient sealing member 30 to effect a sealing surface over the joint between the adaptor ring 29 and the cylinder liner 11 to prevent leakage of material being extruded and a bridge 31 and its attached core pin 32 centrally positioned in a die bushing 33 which is likewise centrally held in the bore of the adaptor ring 29.

The hinged arm 21 is pivotally supported on a hinge pin 34 retained by a projecting journal 35 of the support head 13. The hinged arm 21 extends beyond the hinge pin 34, and a pair of brackets are integrally formed to retain a counterweight 36 adjustably positionable with regard to its distance from the hinge pin 34. The use of a counterweight 36 located to exactly counterbalance the weight of the die assembly on the opposite side of the hinge pin 34 facilitates the manual operation of the assembly.

The segmental flanges should be integral with the locking die holder for greater strength. Their width must be such as to resist breakage or shearing off under the high pressures exerted against them during the extrusion of smokeless powder and may be made the weakest holding means on the head so that in the event of an explosion, these flanges will shear off, releasing the die assembly to relieve the explosive pressures and thereby saving other parts of the press from destruction. Further, the flanges should be horizontal, that is, parallel to the base of the locking die holder means.

The locking die holder is provided with a lever to permit its easy rotation by the operator. A single lever may be used both to rotate the locking die holder and to remove the locking die holder from the support head as illustrated in the drawings.

The locking die holder of this invention has made extrusion dies in smokeless powder machines of the removable die head type accessible without the hazard or effort heretofore inherent in their operation. It has thereby shortened the time needed to remove or clean dies, expediting manufacture of smokeless powder. The extrusion procedure has been greatly facilitated by the use of this invention on smokeless powder extrusion machines of the stuffer or ram type by permitting the insertion of the charge into the extrusion chamber from the head end instead of the ram end as has been the practice heretofore.

What I claim and desire to protect by Letters Patent is:

1. In an extrusion die assembly, a support head adapted to be rigidly attached to the head of an extrusion cylinder, said support head having a central opening axially therethrough, an annular groove extending outwardly from said central opening, and recesses extending from one end of said central opening to said annular groove; a hollow retainer for holding the components of an extrusion die, said retainer having flanges thereon of a size to pass through said recesses to said annular groove and to fit within said groove, to attach said retainer to said support head upon rotation of the said retainer with respect to said support head; and components of an extrusion die carried by said retainer.

2. In an extrusion die assembly, a support head adapted to be rigidly attached to the head of an extrusion cylinder, said support head having a central opening axially therethrough, an annular groove extending outwardly from said central opening, and recesses extending from one end of said central opening to said annular groove; a hollow retainer for holding the components of an extrusion die, said retainer having flanges thereon of a size to pass through said recesses to said annular groove and to fit within said groove to attach said retainer to said support head upon rotation of the said retainer with respect to said support head; components of an extrusion die carried by said hollow retainer; an arm pivoted to said support head for movement about an axis the direction of which is perpendicular to the direction of the axis of the central opening of said support head, and means for rotatably holding said hollow retainer in attachment with said arm so that said retainer, while held by said arm, may be rotated with respect to said support head.

3. In an extrusion die assembly, a support head adapted to be rigidly attached to the head of an extrusion cylinder, said support head having a central opening axially therethrough, an annular groove extending outwardly from said central opening, and recesses extending from one end of said central opening to said annular groove; a hollow retainer for holding the components of an extrusion die, said retainer having flanges thereon of a size to pass through said recesses to said annular groove and to fit within said groove to attach said retainer to said support head upon rotation of the said retainer with respect to said support head; a hollow adaptor carried within the hollow of said retainer, a die bridge within said adaptor, a die bushing connected with the hollow of said adaptor, a core pin attached to said bridge and extending into said die bushing; an arm pivoted to said support head for movement about an axis the direction of which is perpendicular to the direction of the axis of the central opening of said support head, and means for rotatably holding said hollow retainer in attachment with said arm so that said retainer, while held by said arm, may be rotated with respect to said support head.

JOSEPH STUART, II.

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