Aug. 29, 1961 E. HOLMES, JR 2,997,969

INVERTOR FOR DIE SHOE

Filed Jan. 30, 1959 2 Sheets-Sheet 1

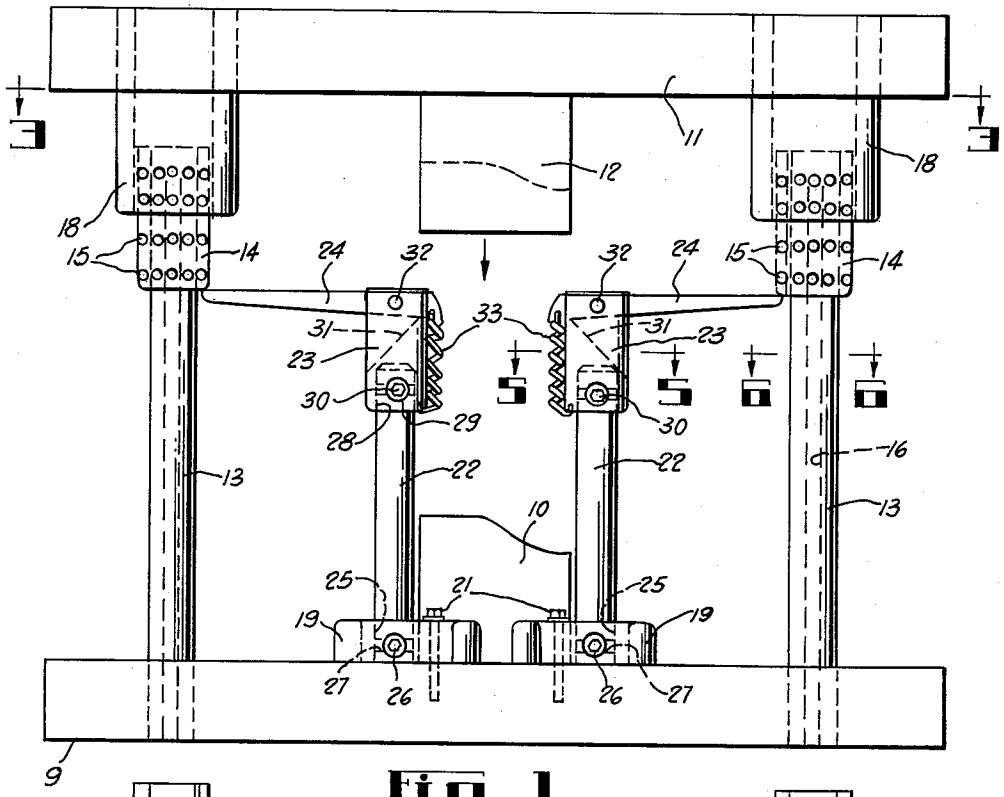


Fig. 1

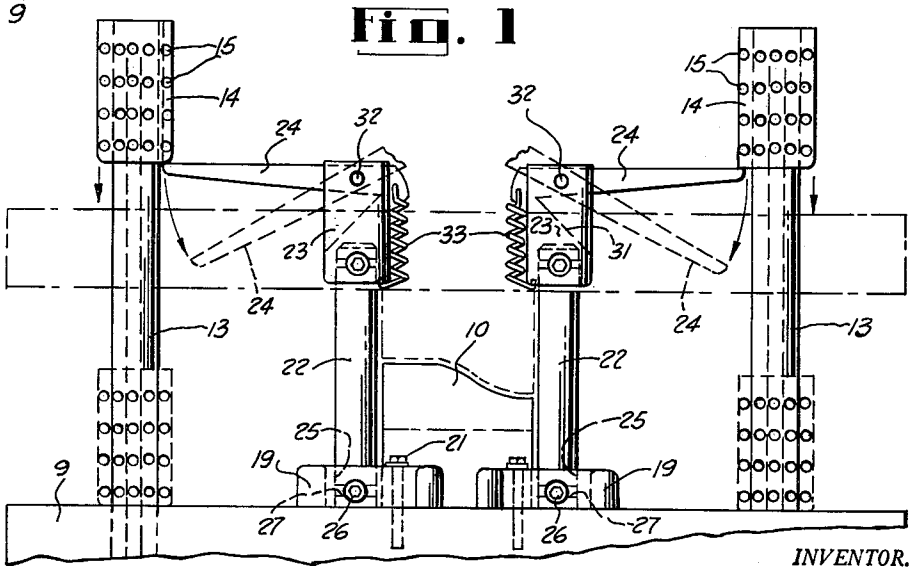


Fig. 2

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INVERTER FOR DIE SHOE

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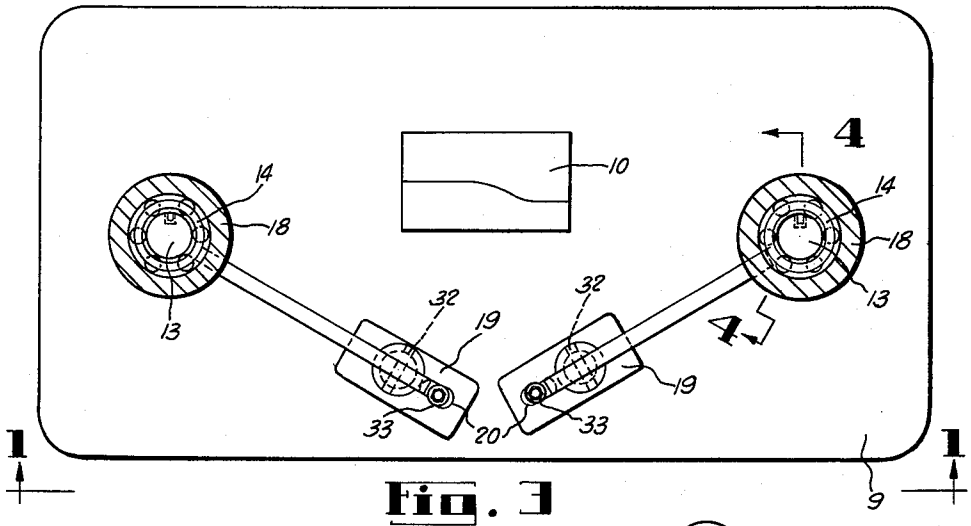


Fig. 3

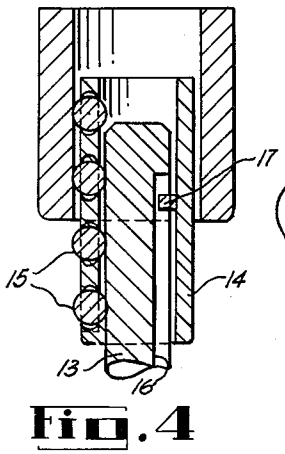


Fig. 4

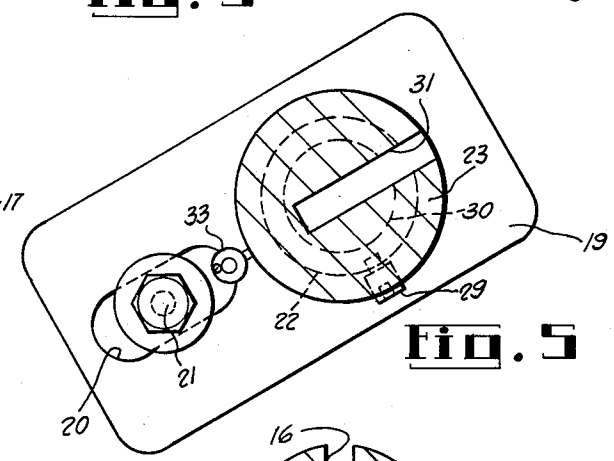


Fig. 5

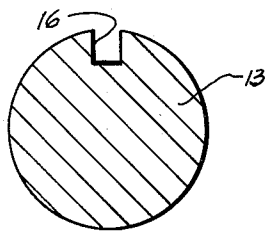


Fig. 6

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INVERTER FOR DIE SHOE

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4 Claims. (Cl. 113—49)

My invention relates to a new and useful improvement an inventer for a die shoe. The invention is particularly adapted for use in die construction work in which a die spot operation takes place. In function, it is customary to replace the upper die shoe with the lower die shoe and to mount the upper die shoe in the position of the lower die shoe. This enables the die man to operate on the upper portion of the die to considerable advantage as it renders the die easily accessible for operations thereon. In a machine used for this purpose, the lower die shoe has guide sockets or tubes which receive guide bushings which are slidably mounted on guide posts depending from the upper die shoe. When the upper die shoe is mounted in its normal position, the guide bushings, upon a separate upward movement of the die shoe, will slide downwardly toward the end of the posts on which mounted and be retained in such position until the die is again closed. As the socket, or tube, moves on to the guide bushing, it will move the guide bushing longitudinally upwardly on the guide post on which mounted.

In operation, when the die shoes are inverted, that is, when the upper die shoe is used as a lower die shoe, the guide bushings will slide downwardly on the posts on which mounted and thus fail to function as guide bushings.

It is an object of the present invention to provide a structure whereby the guide bushing, when the upper die shoe is used as a lower die shoe, may be retained in position to project above the post on which mounted and be releasable as the die is closed.

Another object of the invention is the provision of a bushing retainer so constructed and arranged that it will automatically be moved into a die retaining position upon a supporting movement of a die shoe to retain a guide bushing in position for being embraced by a tube or socket.

Another object of the invention is the provision of a device of this class which will be simple in structure, economical of manufacture, durable, compact and highly efficient issue.

Other objects will appear hereinafter.

It is recognized that various modifications and changes may be made in the detail of the structure illustrated without departing from the invention and it is intended that the present disclosure shall be considered to be but the preferred embodiment.

Forming a part of this application are drawings in which:

FIG. 1 is a side elevation view of the invention,

FIG. 2 is a side elevational view of the invention, in a different stage of operation,

FIG. 3 is a horizontal sectional view of the invention, taken on line 3—3 of FIG. 1,

FIG. 4 is an enlarged fragmentary elevational sectional view of the invention, taken on ilne 4—4 of FIG. 3,

FIG. 5 is an enlarged horizontal sectional view of the invention taken on line 5—5 of FIG. 1, and

FIG. 6 is an enlarged horizontal sectional view of the invention, taken on line 6—6 of FIG. 1.

In the drawings I have illustrated a die shoe 9 on which is mounted a die section 10. The die shoe 9 is the upper die shoe but is illustrated as having been transposed so as to form a lower die shoe. The lower die shoe 11 is also indicated as being transposed so as to

form the upper die shoe. Mounted on the die shoe 11 is a die section 12.

Extending outwardly from one face of the die shoe 9 are the spaced apart guide posts 13 on each of which is slidably mounted a guide bushing 14 for the ball bearings 15 projecting outwardly from the inner surface and the outer surface of the bushing 14. A longitudinally extended groove 16 is formed in each of the posts 13 and projecting inwardly from the bushing 14 is a pin 17 which limits the slidable movement of the guide bushing 14 toward the end of the post 13.

Projecting from one face of the shoe 11 are the pair of spaced apart guide tubes 18 which have an inner diameter adapted to snugly engage the bearing balls 15 carried on the bushings 14. When the bushings 14 are lifted as shown in FIG. 1 and FIG. 2, they would slide downwardly to the lower ends of the post 13 unless there was some means to prevent such slidable movement. To this end, I adjustably mount on the face of the die shoe 9 a pair of plates 19 by means of the screws 21 which are each projected through a slot 20 formed in each plate 19 and threaded into the shoe 9. Mounted on each of the plates 19 is a post 22 which carries on its upper end a retainer 23 on which is pivotally mounted an engagement arm 24. The lower end of each of the posts 22 is rotatably mounted in a suitable hole as 25 and is adjustably secured therein by means of the socket type set screw 26. The inner end of each of the set screws 26 is adapted to engage the inner face of the annular groove 27, formed in each of the posts 22, for locking engagement therewith. The grooves 27 permit the swinging or rotation of the posts 22 relative to the plates 19. The upper end of each of the posts 22 is adapted to be rotatably mounted in a suitable hole as 28 which is formed in the lower end of each respective retainer 23. The posts 22 are adjustably secured in their respective holes 28 by means of socket type set screws 29 which engage the inner face of the annular groove 30 for locking engagement therewith. The grooves 30 are formed on the upper ends of the posts 22 and permit the swinging or rotation of the posts 22 relative to the retainers 23.

The inner end of each of the arms 24 is pivotally mounted in a vertical slot as 31 in each of the retainers 23, the slots 31 extending downwardly from the upper ends of the posts 22. A pivot pin as 32 is adapted to pivotally mount each of the arms 24 in its respective slot 31. The pins 32 are adapted to be mounted in suitable mating holes formed through the retainers 23 and the arms 24. The pins 32 are preferably press fitted in the retainers 23 and slip fitted through the arms 24. The arms 24 are normally held by the springs 33 in an upwardly swung position as shown in FIGS. 1 and 2. The springs 33 have their upper ends secured to the rear ends of their respective arms 24 and the lower ends secured to their respective retainers 23.

As the die shoe 11 moves downwardly, the tubes 18 will move on to the bushings 14 and there is then established a frictional engagement between the tubes 18 and the bushings 14. As the downward movement of the shoe 11 continues, the arms 24 will prevent the bushings 14 from moving downwardly in response to the frictional engagement until these arms are engaged by the lower ends of the tubes 18 whereupon the arms 14 will rock into the dotted line position shown in FIG. 2. As the die shoe 11 is moved upwardly towards its elevated position, the frictional engagement between the tubes 18 and the bushings 14 will be such that the bushings 14 will also move upwardly with the tubes 18.

When the die shoe 11 is moved into an elevated position, the retainer arms 24 will ride on the peripheries

of the tubes **18** and the bushings **14** until they clear the bushings **14**. When the retainer arms **24** clear the bushings **14**, they will snap into a retaining position, engaging the lower end of the bushings **14** so as to retain them in their elevated positions.

As the die shoe is moved into a closed position, each of the bushings **14** will be retained in its elevated position until its respective tube **18** engages the adjacent arm **24** whereupon the arm **24** will swing into the dotted line position shown in FIG. 2. The tube **18** will not engage the retaining arm **24** until the guide bushing **14** is entirely enclosed by the tube **18**. With this retainer arm **24** mounted in this position, the person operating the die may open and close the die as often as desired without necessitating a manual retaining of the guide bushing in its elevated position.

By mounting the plate **19** by means of the screw **21** extended through the slot **20**, the device may be adapted for use on devices having different sized guide bushings **14**. The plate **19** also may be swung so that the arm **24** may extend at various angles to the guide bushing **14**.

What I claim is:

1. In combination with a die shoe, a guiding post projecting upwardly from one side of said shoe adapted to guide another die shoe; a bushing slidably mounted on said post; a supporting plate adjustably mounted on said first mentioned shoe; a standard mounted on and projecting upwardly from said supporting plate; a rockable engagement arm projecting outwardly from and pivotally connected to the upper end of said standard for engaging the end surface of said bushing and retaining the same in an elevated position on the post, and said arm being adapted to swing downwardly for releasing said bushing for sliding movement on said post.

2. In combination with a die shoe, a guiding post projecting upwardly from one side of said shoe adapted to guide another die shoe; a bushing slidably mounted on said post; a supporting plate adjustably mounted on said first mentioned shoe; a standard mounted on and projecting upwardly from said supporting plate; a rockably mounted engagement arm projecting outwardly from and pivotally connected to the upper end of said standard for engaging the end surface of said bushing and retaining the same in an elevated position on the post, said arm being adapted to swing downwardly for releasing said bushing for sliding movement on said post; and a spring for resisting downward swinging movement of said arm.

3. In combination with a die shoe, a guiding post projecting upwardly from one side of said shoe adapted to guide another die shoe; a bushing slidably mounted on said post; a supporting plate adjustably mounted on said first mentioned shoe; a standard mounted on and projecting upwardly from said supporting plate; a rockably mounted engagement arm projecting outwardly from and pivotally connected to the upper end of said standard for engaging the end surface of said bushing and retaining the same in an elevated position on the post, said arm being adapted to swing downwardly for releasing said bushing for sliding movement on said post; a spring for resisting downward swinging movement of said arm; and means for limiting longitudinal movement of said bushing on its post in one direction.

4. In combination with a die shoe, a guiding post projecting upwardly from one side of said shoe adapted to guide another die shoe, a bushing slidably mounted on said post; a supporting plate adjustably mounted on said first mentioned shoe; a standard mounted on and projecting upwardly from said supporting plate; a rockably mounted engagement arm projecting outwardly from and pivotally connected to the upper end of said standard for engaging the end surface of said bushing and retaining the same in an elevated position on the post, said arm being adapted to swing downwardly for releasing said bushing for sliding movement on said post; a spring for resisting downward swinging movement of said arm; means for limiting longitudinal movement of said bushing on its post in one direction; and means for adjusting said supporting plate on said shoe.

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