

Dec. 17, 1940.

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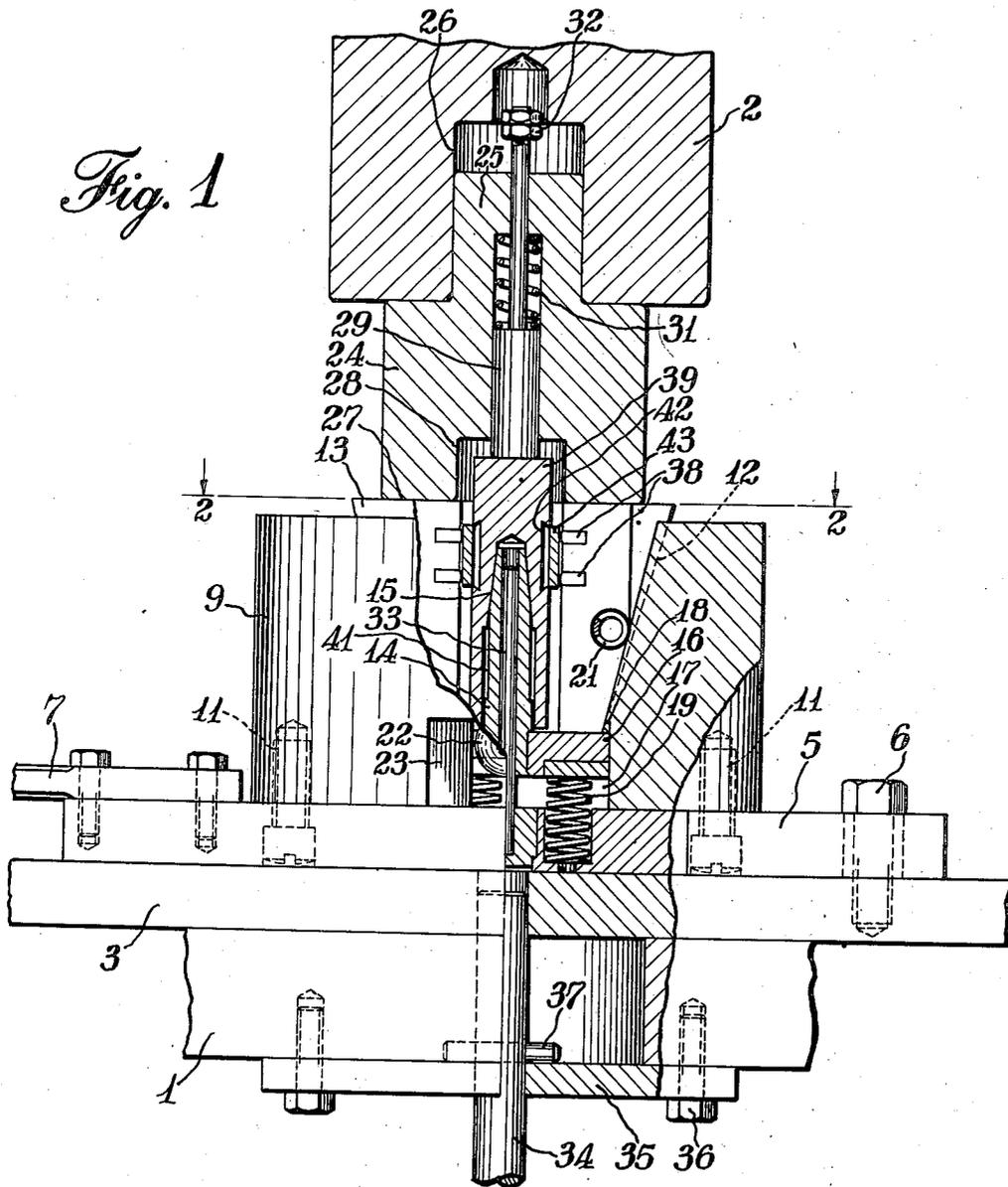
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BANDING PRESS

Filed Sept. 17, 1938

3 Sheets-Sheet 1

*Fig. 1*



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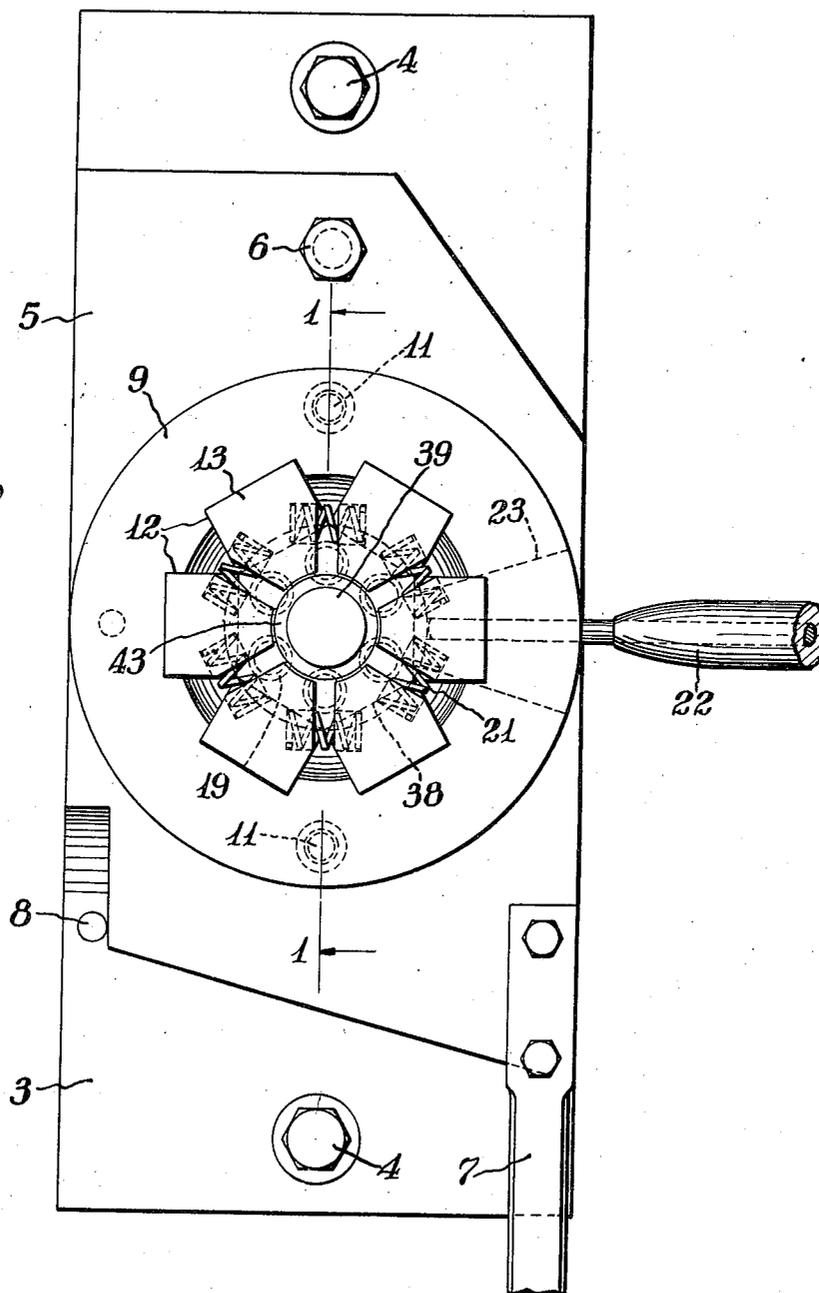
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BANDING PRESS

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3. Sheets-Sheet 2

*Fig. 2*



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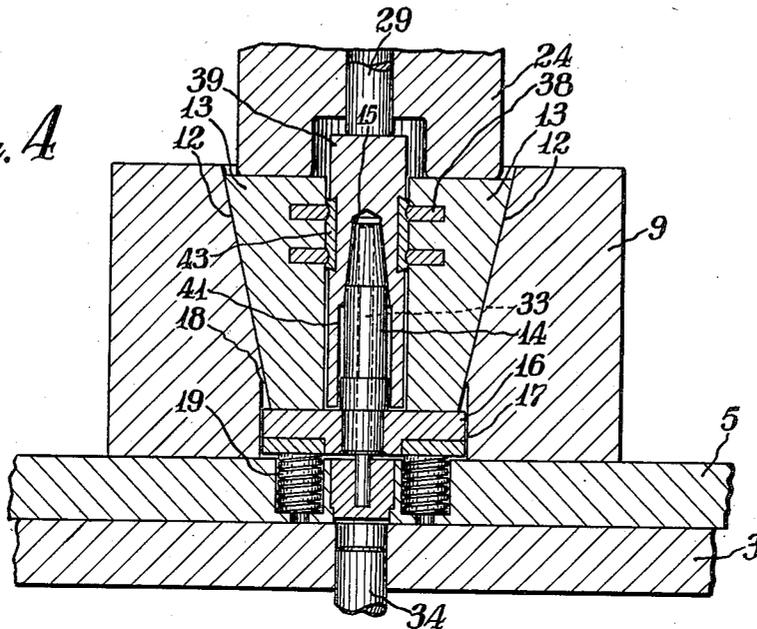
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BANDING PRESS

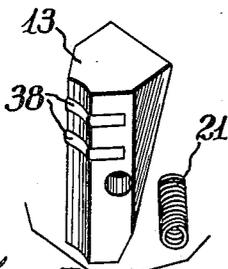
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3 Sheets-Sheet 3

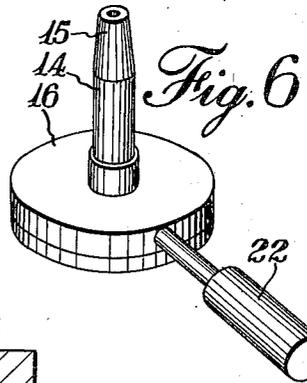
*Fig. 4*



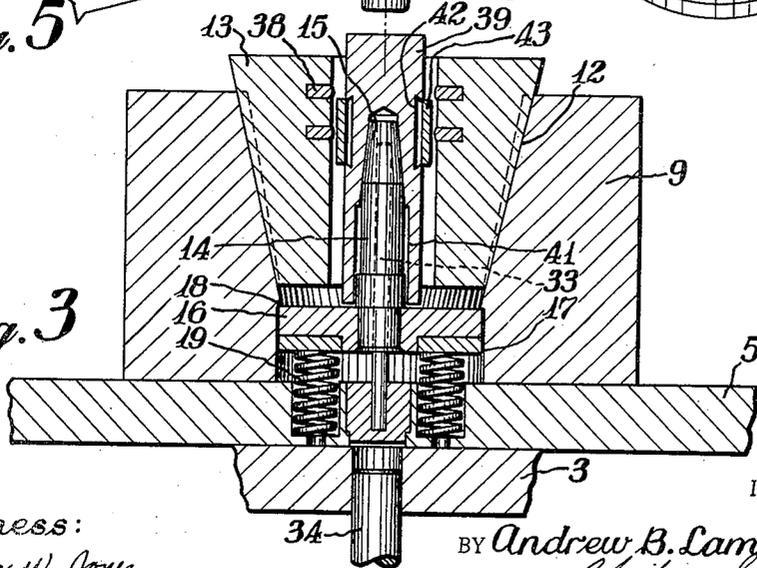
*Fig. 5*



*Fig. 6*



*Fig. 3*



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# UNITED STATES PATENT OFFICE

2,225,345

## BANDING PRESS

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Application September 17, 1938, Serial No. 230,501

8 Claims. (Cl. 73—15)

The present invention relates to a banding press and more particularly to a power press having a segmental circular die for applying circular bands to cylindrical objects.

5 In the manufacture of cylindrical containers for traversing tubular conveyers under the impulsion of compressed gas, it is customary to provide the container with one or more circular bands of relatively soft material to serve as bearing and packing rings. When the container is  
10 a steel projectile arranged to be discharged from a rifle barrel, such bands are commonly formed of copper and perform the additional function of engaging the rifling of the gun barrel to cause  
15 rotation of the projectile when discharged.

In order to secure the necessary tightness and rigidity of connection of the copper bands to projectiles, it is usual to form a seat in the periphery of the projectile to receive the band,  
20 such seat being roughened and flared inwardly; and the band is forced into the seat with sufficient pressure to cause the band to conform itself closely to the surfaces of the seat. As  
25 heretofore performed, this operation required the use of large and heavy presses which were comparatively slow acting, and several actuations of the press such as eight or more were necessary to secure an acceptable seating of the band. This  
30 repeated working of the copper band caused it to become undesirably hardened, thus inducing unnecessary wear on the rifling of the gun barrel.

It is an object of the present invention to provide a novel compressible die for applying circular bands to cylindrical articles, which is efficient  
35 and reliable in operation while being simple and economical in construction.

It is another object to provide such a device which is arranged to be used in a punch press of ordinary construction, and when so used is arranged to apply peripheral pressure to a deformable ring to seat it in a groove in the article to be banded.  
40

It is a further object to provide such a device which is arranged to convert the vertical pressure of the punch press ram into peripheral compression of the ring with any desired ratio of mechanical advantage whereby a comparatively  
45 small, quick-acting press may be utilized.

It is another object to provide such a device  
50 which is sufficiently powerful and uniform in its action to accomplish the desired compression of the band by a single stroke of the press, a repetition of the compressive stroke being utilized if desired merely to smooth off the surface of the  
55 band.

Further objects and advantages will be apparent from the following description taken in connection with the accompanying drawings in which:

Fig. 1 is a side elevation partly in vertical section of a preferred embodiment of the invention as used in conjunction with the ram and bolster plate of a conventional type of punch press;

Fig. 2 is a section taken substantially on the line 2—2 of Fig. 1, showing the parts in the positions assumed at the beginning of the compression of the band;

Fig. 3 is a vertical sectional view of the die and ram showing the parts in fully retracted position;

Fig. 4 is a view similar to Fig. 3 showing the parts in fully compressed position;

Fig. 5 is a detail in perspective of one sliding die segment and its spring; and

Fig. 6 is a detail in perspective of the central bearing member for the work with its supporting plate and indexing handle.

In Fig. 1 of the drawings there is illustrated a platform or bolster plate 1 of a punch press, and a ram 2 located above the platform and arranged to be reciprocated toward and from the platform by any conventional operating mechanism. Since the punch press may be of any conventional type, and the operating mechanism therefor forms no part of the present invention, further illustration of the punch press mechanism is deemed unnecessary.

According to the present invention a base plate 3 is centrally mounted on the bolster 1 as by means of cap screws 4 (Fig. 2), and a swinging carrier plate 5 is pivotally connected to the base plate 3 as by means of a stud 6. Manually operable means such as a handle 7 is provided for swinging the carrier plate 5 into and out of its centralized position beneath the ram 2, the operative position of the plate being defined by suitable means such as a stop pin 8.

A circular banding die comprising an annular frame member 9 is rigidly mounted on the carrier plate 5 as by means of studs 11 in position to be centrally located beneath the ram 2 when the carrier is in operative position as defined by its stop 8. The interior of the frame 9 is provided with a plurality of downwardly and inwardly inclined guideways 12, and a plurality of segmental die blocks 13 are slidably mounted in the guideways and arranged so that when they are pressed into the die frame by the ram 2 as illustrated in Fig. 4, the interior surfaces of the blocks form a hollow cylinder.

A central vertical bearing member 14 having a tapered work-supporting surface 15 is slidably mounted in the die frame 9 by means of a circular supporting plate 16 loosely fitting in a cylindrical opening 17 in the bottom of the die frame. Means are provided for normally maintaining the bearing member in its upper position with the supporting plate bearing against a shoulder 18 in the die frame, as illustrated in Fig. 3, in the form of a plurality of compression springs 19 seated in the carrier plate 5. The die blocks 13 are normally maintained in their retracted position as illustrated in Fig. 3 by means of expansive springs 21 (Figs. 1 and 2) seated in recesses in said blocks. Depression of the blocks by the ram causes the lower ends of the blocks to engage the top of the supporting plate 16 as shown in Fig. 1, after which the die blocks and central bearing member 14 move downwardly as a unit to the fully compressed position of Fig. 4.

Means for indexing the bearing member 14 in order to rotate the work slightly between operative strokes is provided in the form of a handle 22 (Fig. 2) attached to the supporting plate 16 and having freedom for limited arcuate movement in an opening 23 in the side of the die frame 9.

Means are provided for transmitting pressure from the ram 2 to the die blocks 13 in the form of a pressure block 24 having a stem 25 mounted in a recess 26 in the ram, and having a flat annular face 27 adapted to engage the tops of the die blocks 13. A recess 28 is centrally located in the pressure block 24 to provide clearance for the top of the work. Means are preferably provided for yieldably pressing the work onto the work-supporting bearing member 14 in the form of a piston member 29 slidably mounted in the center of the pressure block 24 and arranged to normally extend below the pressure block as illustrated in Fig. 3 so as to engage the work before the pressure block engages the die blocks 13. A spring 31 is provided for yieldably holding the piston 29 in extended position as defined by abutment means 32.

Means for dislodging the work from its seat on the tapered portion 15 of the work holder 14 is provided in the form of a plunger rod 33 slidably mounted in the interior of the work holder 14 and adapted to be struck by a bar 34 slidably mounted in the base plate 3. The bar 34 is retained in the base plate by suitable means such as a plate 35 fixed as illustrated at 36 to the bolster 1, forming a guide for the bar 34 and arranged to engage a retaining pin 37 in said bar to define its idle position. It will be understood that the bar 34 may be operated by a treadle or any other suitable mechanism, not illustrated.

Means are preferably provided in the die blocks 13 for engaging the band and applying localized pressure thereto in order to assist in assuring that the band conforms itself tightly to the surfaces of its seat in the work. As here shown, this means comprises arcuate hard metal inserts 38 in the blocks arranged adjacent the ends of the band and projecting slightly inwardly from the surfaces of the blocks in order to press the metal of the band into the undercut surfaces of the groove in the work as illustrated in Fig. 4.

As here illustrated, the work consists of a cylindrical shell 39 having a central opening 41 tapered at its upper end to seat on the tapered portion 15 of the support 14. A groove 42 is

provided in the surface of the work for receiving a band 43 of deformable material such as copper, said groove being preferably undercut and knurled in order to provide a secure anchorage for the band.

In the operation of the device, a band 43 is manually applied to the work 39, being slid on the work into registry with the groove 42. The registry of the band with the groove may be maintained if desired by striking the band with a soft hammer sufficiently to deform it into a slightly oval shape, causing it to partly enter the groove. The die is swung out from under the ram 2 by means of the handle 7, and the work is dropped into the die onto its seat on the work support 14. The die is then swung back into operative position by the handle 7 and the ram is actuated in the usual manner, causing the pressure block 24 to be lowered. The plunger 29 first engages the top of the work 39, yieldingly pressing it onto its seat, after which the surface 27 of the pressure block 24 engages the die blocks 13 and moves them downwardly along the guideways 12 until the lower ends thereof engage the supporting plate 16 as illustrated in Fig. 1. At this time the inserts 38 in the die blocks 13 start to engage the band 43, and further travel of the ram 2 causes the die blocks 13, the work support 14, the work 39 and band 43 to be traversed downwardly as a unit while the die blocks move inwardly, compressing the band firmly into its seat 42 as shown in Fig. 4. The subsequent upward movement of the ram 2 permits the parts of the die to return to their retracted position by virtue of the springs 19 and 21, whereupon the releasing bar 34 is actuated to cause the plunger 33 to strike the interior of the work and loosen it from its seat. The bar 34 is then permitted to drop and the die swung out from the press to permit removal of the work.

Where it is desired to repeat the operation of the press in order to smooth up the exterior surface of the band, it is customary to index the work holder 14 by means of the handle 22 between the strokes of the ram in order to facilitate the removal of the slight ridges left in the band at the edges of the die blocks.

It will be understood that during the compression of the band in the die, the interior of the work is supported and prevented from being constricted by virtue of the close fit of the tapered portion 15 of the work support in the interior of the work. Since the pressure exerted in the banding operation is quite high, it is preferred to form the work support 14 of hardened steel in order to prevent the possibility of any deformation of the work by the pressures exerted by the die.

Although but one form of the invention has been shown and described in detail, it will be understood that other embodiments are possible and various changes may be made in the dimensions and arrangement of the parts without departing from the spirit of the invention as defined in the claims appended hereto.

What is claimed is:

1. In a banding press, a die including a horizontal annular frame having downwardly and inwardly inclined guideways, a central vertical work-holding and reinforcing member having a tapered work-receiving seat, a plurality of segmental die blocks slidably mounted in the inclined guideways, a support for said bearing member having a circular flange adapted to be engaged by the lower ends of said blocks, a ram

adapted to engage the blocks and force them down in the frame, and spring means arranged to be compressed by downward motion of the support under pressure from said blocks.

5 2. In a banding press, a bolster plate, a circular stationary die frame mounted thereon having inclined guideways, segmental die blocks slidably mounted in said guideways, a central bearing member adapted to receive and hold the  
10 article to be banded, a yielding support therefor in the path of movement of said blocks, and a pressure block adapted to engage said die blocks and move them along the guideways, said die blocks being arranged to engage the support  
15 upon initial movement thereof, after which the support, the work and the die blocks are translated in unison by the pressure block, while the die blocks close in on and compress the work by reason of the inclination of the guideways.

20 3. In a banding press, a bolster plate, a stationary circular die frame mounted thereon having inclined guideways, segmental die blocks slidably mounted in said guideways, a central bearing member adapted to receive and hold the  
25 article to be banded, a yielding support therefor adapted to be engaged and moved by said blocks, a pressure block adapted to engage said die blocks and move them along the guideways, and a yielding plunger in the pressure block adapted  
30 to engage the work and press it down on the bearing member.

35 4. In a banding press, a bolster plate, a stationary circular die frame mounted thereon having inwardly inclined guideways, segmental die blocks slidably mounted in said guideways, a central bearing and reinforcing member having a tapered seat adapted to receive and hold the  
40 article to be banded, a yielding support therefor adapted to be engaged and moved by said blocks, a pressure block adapted to engage said die blocks and move them along the guideways, and movable means in the bearing member for engaging and removing the work therefrom.

45 5. In a compressive die for a banding press, an interiorly tapered stationary annular frame, a plurality of segmental blocks slidably mounted in the frame, a central work holder in the frame adapted to be engaged and moved by said blocks, yielding means urging the work holder to a nor-

mal position in the frame, and springs between the blocks normally maintaining them spaced from the work holder.

6. In a banding die for hollow shells, a stationary frame, a central bearing member within  
5 said frame formed to fit and support a shell to be banded, a plurality of blocks slidably mounted in inclined guideways in the frame and having means for engaging and compressing a band  
10 on the shell, a common yielding support for said bearing member adapted to be engaged and moved by said blocks, means for yieldingly pressing the shell on the bearing member, and a ram engaging the blocks to move them into  
15 engagement with the support and thereafter to move the block, shell and support in unison in the frame.

7. In a banding die for hollow shells, a stationary horizontal annular frame having down-  
20 wardly and inwardly inclined guideways, a central vertical bearing member within said frame formed to fit and support the interior of a shell to be banded, a plurality of die blocks slidably mounted in the inclined guideways and having  
25 means for engaging and compressing a band on the shell, a common support for said bearing member adapted to be engaged and moved by said blocks, means for yieldingly pressing the shell on the bearing member, a ram engaging  
30 the blocks to move them into engagement with the support and thereafter to move the block, shell and support in unison with the frame, and yielding means for raising said support and for separating said blocks.

8. In a press, a banding die including a sta-  
35 tionary horizontal annular frame having downwardly and inwardly inclined guideways, a central vertical work holder, a plurality of die blocks slidably mounted in the inclined guideways, a yielding support for the work holder and die  
40 blocks, a ram adapted to engage the die blocks and move the blocks, support and work holder longitudinally within the stationary frame to cause the blocks to operate on the work, said work holder being slidably journaled in the  
45 frame, and manually operable means for rotating the work holder in the frame between strokes of the ram.

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