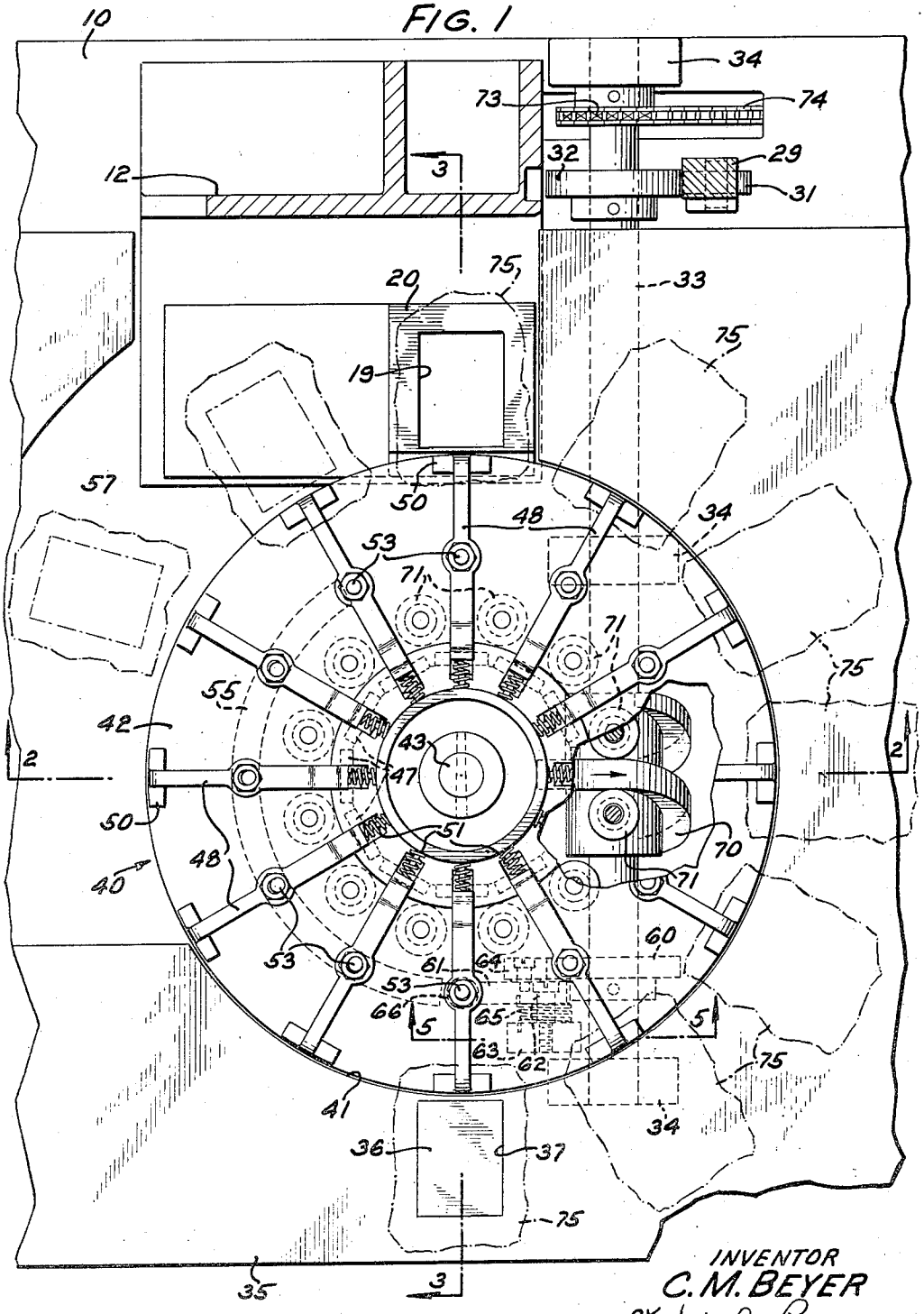
March 16, 1948. C. M. BEYER 2,437,994

BLANKING APPARATUS

Filed March 5, 1946 3 Sheets-Sheet 1

FIG. 1



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Filed March 5, 1946 3 Sheets-Sheet 2

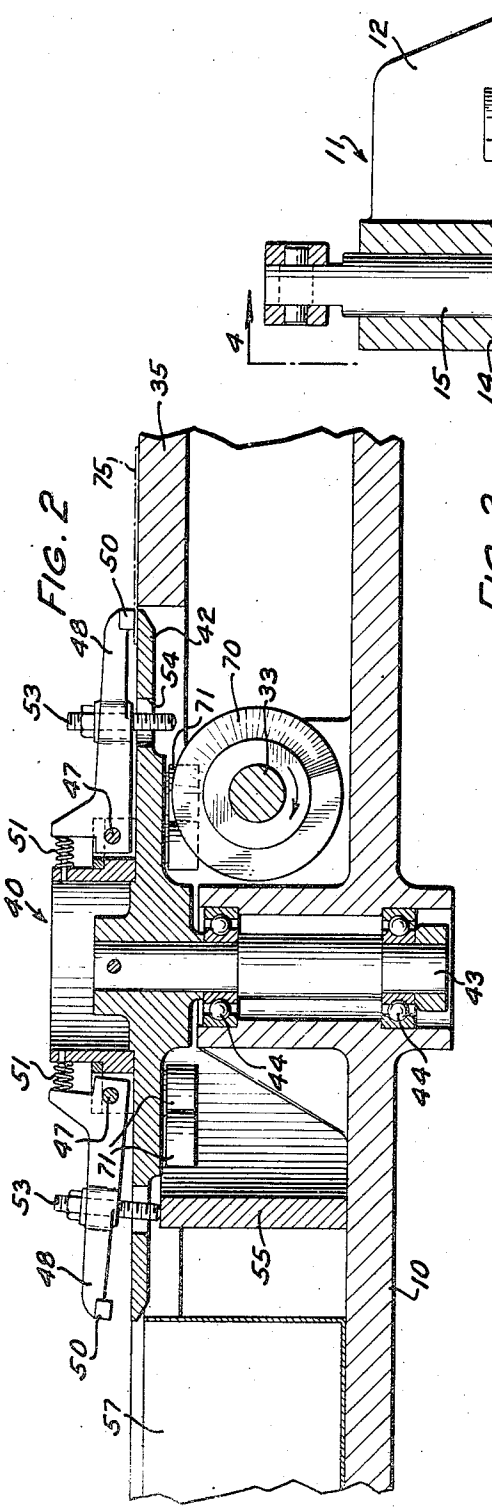

FIG. 2

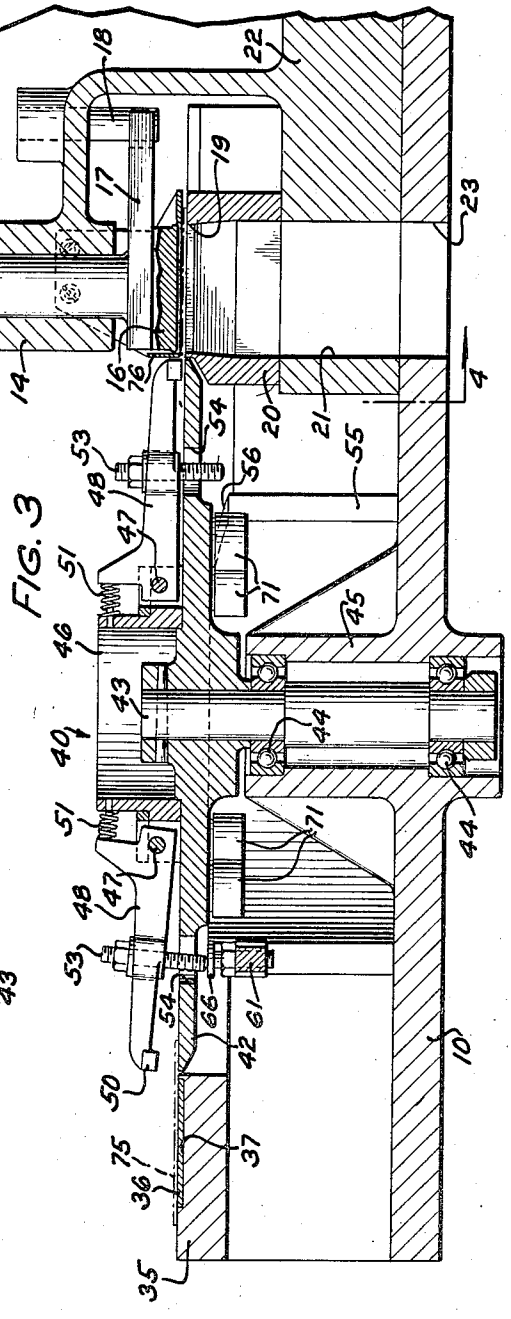

FIG. 3

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March 16, 1948. C. M. BEYER 2,437,994

BLANKING APPARATUS

Filed March 5, 1946 3 Sheets-Sheet 3

FIG. 4

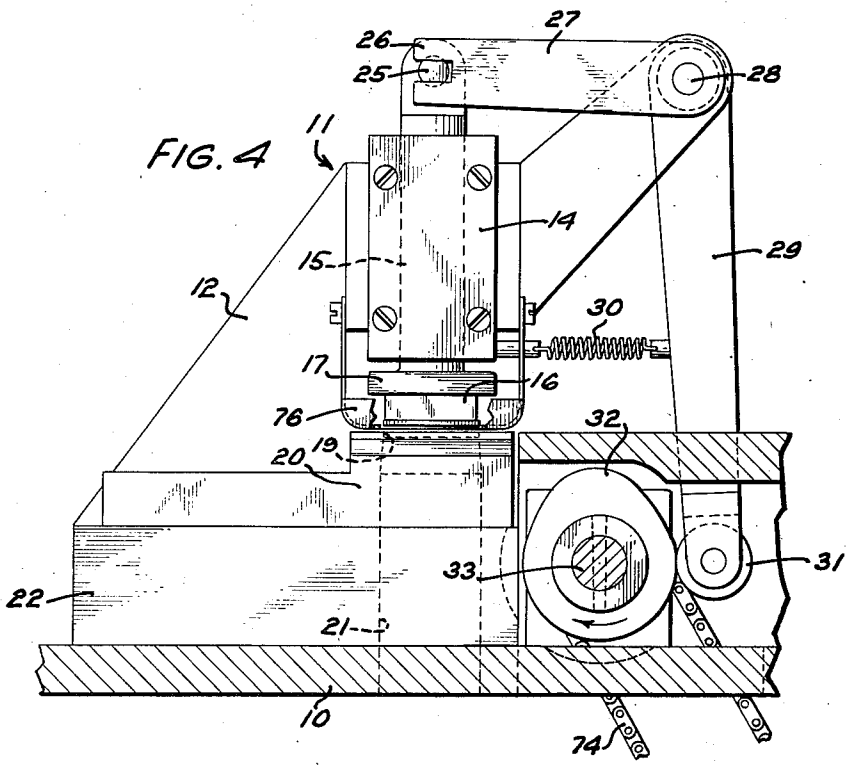
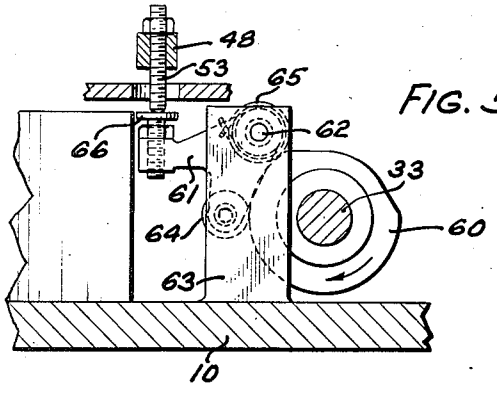


FIG. 5



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UNITED STATES PATENT OFFICE

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BLANKING APPARATUS

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Application March 5, 1946, Serial No. 652,182

1 Claim. (Cl. 164—20)

1

This invention relates to apparatus for blanking articles, particularly irregular transparent articles or materials, such as mica.

Thin portions of mica are employed in the communication arts for forming condensers of different sizes, these portions being blanked from the sheets of mica which are naturally irregular in contour. Due to the fact that mica is a natural material, the splittings or sheets are often wavy, making it difficult and ofttimes impossible to use vacuum means to feed the mica to a blanking press. A more positive holding mechanism to accurately position the material between the punch and die of a blanking mechanism to obtain a finished portion of a given contour has proven more desirable.

An object of the invention is to provide a blanking apparatus which is simple in structure, compact in form and efficient in operation for feeding irregular materials between elements of a press for the blanking of a portion of a given contour therefrom.

According to the invention, irregularly contoured work materials are accurately positioned, for transfer to a blanking position, at a safe position remote from the press. By so doing, all actions required by the operator are removed from the area of the press, guarding against injuries to the operator and accidents to the press, and also making it possible to use smaller pieces of material than could be manually fed with safety to the press.

One embodiment of the invention comprises an apparatus with a blanking die having an opening of a given contour and an actuable companion punch therefor, a locating target similar in contour to the die opening, being disposed at a position spaced from the die, and a spider, having fingers actuable to grip materials placed singly on the target, movable intermittently between operating cycles of the punch to successively feed the materials between the punch and die. The fingers are radially disposed upon a support and have individual springs normally urging their outer ends to hold their respective materials or sheets of mica in exactly the positions initially located over the target. A driving mechanism performs three operations in timed sequence, the first being the actuation of the finger adjacent the target for the location of a sheet of mica on the support therebeneath, including also the releasing of the finger to grip the material prior to the next movement of the spider. The second operation performed by the driving means includes a cam for intermittently advancing the

2

spider the distance between the radial centerlines of the fingers to successively position the materials between the punch anh die while they are in open position, the fingers firmly holding their respective materials during the blanking operations. The third operation performed by the driving means includes a mechanism for operating the punch for performing the blanking operation. A stationary cam moves the fingers away from the support at the first station beyond the punch and die to release the scrap material and allow it to pass into a receptacle. The scrap material may be urged from the spider by jets of air or other means if so desired.

Other objects of the invention will be apparent from the following detailed description, when considered in conjunction with the accompanying drawings, wherein

Fig. 1 is a top plan view of the apparatus with the punch mechanism removed;

Fig. 2 is a fragmentary vertical sectional view taken along the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary sectional view taken along the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary sectional view taken along the line 4—4 of Fig. 3; and

Fig. 5 is a fragmentary sectional view taken along the line 5—5 of Fig. 1.

Referring now to the drawings, the apparatus includes a base 10 having a blanking unit 11 mounted at a rearmost position thereon. The blanking unit includes a main bracket 12 with a bearing portion 14 to receive a reciprocable ram 15 of a blanking punch 16. A yoke 17 fixedly mounted upon the punch 16 straddles a guide pin 18 carried by the bracket 12. Through the cooperation of the yoke and the pin, the punch 16 is held against rotation and in true alignment with the aperture 19 of a blanking die 20. The die aperture 19 is in alignment with an aperture 21 of a base portion 22 of the bracket 12 and also with an aperture 23 of the base 10. If desired, a magazine may be attached to the base beneath the apertures to receive the blanked parts in stacked formation. The ram 15 of the punch carries a pin 25 providing connection between the ram and a yoke type end 26 of a lever 27 (Fig. 4). The lever 27 has its other end fixedly mounted upon a shaft 28, the shaft supporting a cam lever 29 and fixed thereto. The cam lever 29 is urged in a clockwise direction by spring 30 to normally hold the punch 16 in its upper position and to hold a cam roller 31, carried by the lower end of the lever 29, into engagement with a cam 32. The cam 32 is fixedly mounted upon a drive

shaft 33 which is journalled in suitable bearings 34 supported by the base 10.

A table 35 is supported by the base 10 at the forward portion thereof and has a target 36 of a given contour embedded in a recess 37 therein so that the upper surface of the target is in the plane of the upper surface of the table, the plane of these surfaces extending between the punch and die when the punch is in its upper position.

A spider indicated generally at 40 is interposed between the target 36 and the punch and die, the table being recessed at 41 for the positioning of the target 36 closely adjacent the periphery of the spider. The spider 40 includes a support 42 in the form of a dial centrally mounted upon a vertical shaft 43, the shaft being journalled in suitable bearings 44 in an apertured portion 45 of the base 10. An annular member or hub 46 is centrally mounted upon the support 42 and has radially grooved portions for receiving and pivotally supporting the inner ends 47 of fingers 48. The fingers 48 are radially disposed at spaced positions above the support 42 and have widened material engaging ends 50 extending substantially to the periphery of the support. Individual springs 51 normally urge the fingers downwardly about their pivots into gripping positions with sufficient force to cause the fingers to hold material received at the target until after it passes the blanking position. Adjustable screws 53 are carried by the fingers intermediate their ends, the lower portions of the screws extending through apertures 54 in the support 42. An arcuate cam 55 mounted upon the base 10 beneath the support 42 has an upper surface 56 for the screws 53 to ride upon after the fingers leave the punch and die to move the fingers into open positions to free the scrap so that it may drop into a chute or receptacle 57. The cam 55 extends to a position short of the target 36 after which special means is provided to open the finger at the target, that is, to move the fingers away from the support for the feeding of material therebetween and for freeing the fingers to close on the material prior to the indexing of the spider. This mechanism, as shown in Figs. 1 and 5, includes a cam 60 mounted upon the drive shaft 33 and formed to actuate a cam lever 61. This lever is pivotally supported at 62 upon a bracket or integral vertical portion 63 of the base 10. On one arm, the lever carries a cam roller 64 which is normally urged into engagement with the cam 60 by helical spring 65. The other arm of the lever 61 carries an adjustable shelf 66 for movement into engagement with the lower end of the screw 53 of the adjacent finger 48 to move the finger into a raised position as shown at the left in Fig. 3. The contour of the cam is such that the finger opened by the lever 61 will be allowed to close on the material, placed over the target 36, prior to the indexing of the spider.

The indexing means for the spider includes a barrel type cam 70 fixedly mounted upon the drive shaft 33 and operating in conjunction with rollers 71 mounted in equally spaced circular formation on the under surface of the support 42 so that during each rotation of the shaft 33 the spider will be rotated the distance between the radial centers of the fingers and held in this position a given length of time sufficient for the operating cycle of the press. A sprocket 73 mounted upon the shaft 33 may be driven by a chain 74 from a suitable power means (not shown).

During the operation of the apparatus, a supply of the materials or mica sheets 75 may be placed at a suitable position on the table 35 so that the sheets may be singly selected and placed over the target 36 at the proper time so that a portion thereof may be positioned between the finger and the support 42. Once the material is located upon the target, it may be left there while the operator selects the next sheet of material. At a given time interval, during the continued operation of the drive shaft 33, the finger at the loading position will be closed firmly gripping the material in the desired location prior to the next advancement of the spider. The materials are thus successively positioned over the target which is a remote means of locating the material accurately between the punch and die. This accurate location of the material is maintained due to the firm gripping of the material at the loading position and maintaining the gripping connection while the material is fed to the punch and during the blanking operation. The fingers do not release their hold on the material until after the scrap, remaining from the blanking operation, has been moved beyond the punch and die to a position over the chute 57 at which time the scrap material is released. A guard 76, carried by the bracket 12 surrounds the punch 16 on three sides and is curved, as shown in Fig. 4, to assist in guiding the materials between the punch and die.

With this apparatus, a compact and complete mechanism is provided for receiving the irregular and ofttimes wavy sheets of mica for accurate location thereof at a remote position with respect to the press to locate the particular portion of the material which is to be blanked therefrom and to firmly hold the material in the selected location until after the completion of the blanking operation. The various mechanisms of the apparatus will always perform their functions in properly timed relation since they are all controlled by the common shaft 33.

Although specific improvements of the invention have been shown and described, it will be understood that they are but illustrative and that various modifications may be made therein without departing from the scope and spirit of this invention as defined by the appended claim.

What is claimed is:

A blanking apparatus comprising a blanking die having an opening of a given contour, an actuatable companion punch therefor, a table having a recess therein spaced from the punch and die, a locating target similar in contour to the die opening disposed in the recess, a spider, mounted for rotation between the target and the punch and die, including a support having an upper surface, a hub mounted centrally of the support, and equally spaced radially extending fingers pivotally carried by the hub and having widened ends normally urged toward the upper surface of the support to grip and firmly hold materials selectively located on the target, a drive shaft, means operated by the shaft to intermittently rotate the spider the distance between the radial centers of the fingers to feed the materials successively between the punch and die, means adjacent the target operated by the shaft to lift the adjacent finger from the support for the location of the next material on the target and to free the finger to grip the material prior to the next rotary movement of the spider, means operated by the shaft to move the punch through an operating cycle to blank a portion from the material positioned between the punch and die leaving the scrap of the material gripped by the adjacent finger and sup-

port, and means to move the fingers to free the scrap after they leave the punch and die.

CHARLES M. BEYER.

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