Dec. 9, 1969 A. EINHORN 3,482,478

ADJUSTABLE PUNCH HOLDER

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FIG. 1.

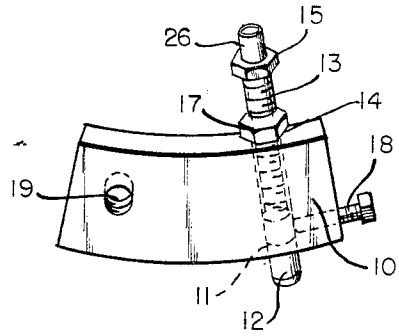



FIG. 2.

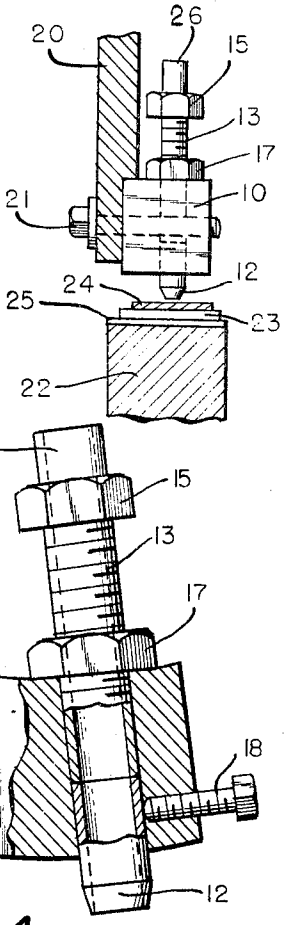



FIG. 3.

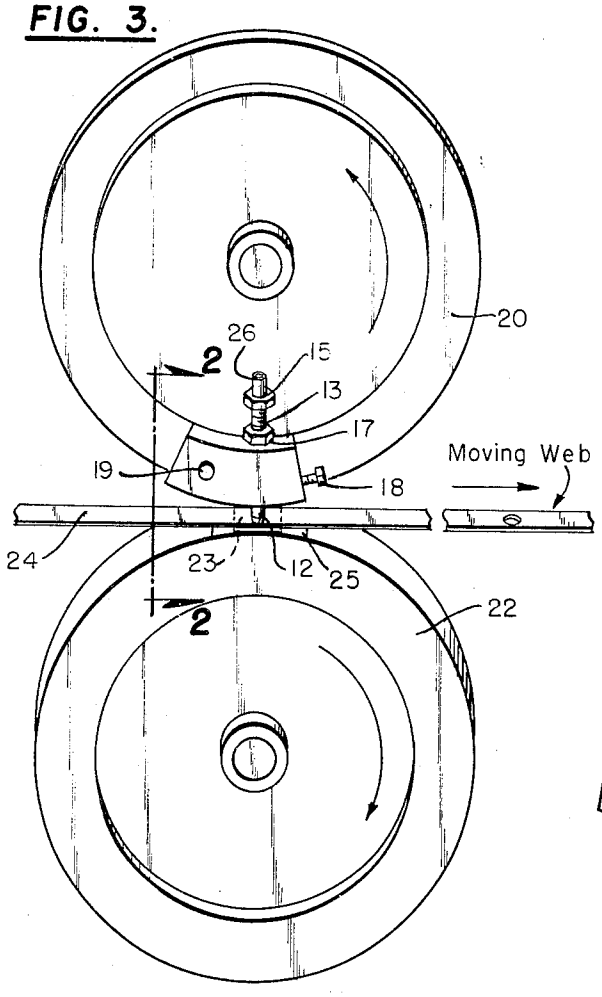



FIG. 4.

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ADJUSTABLE PUNCH HOLDER

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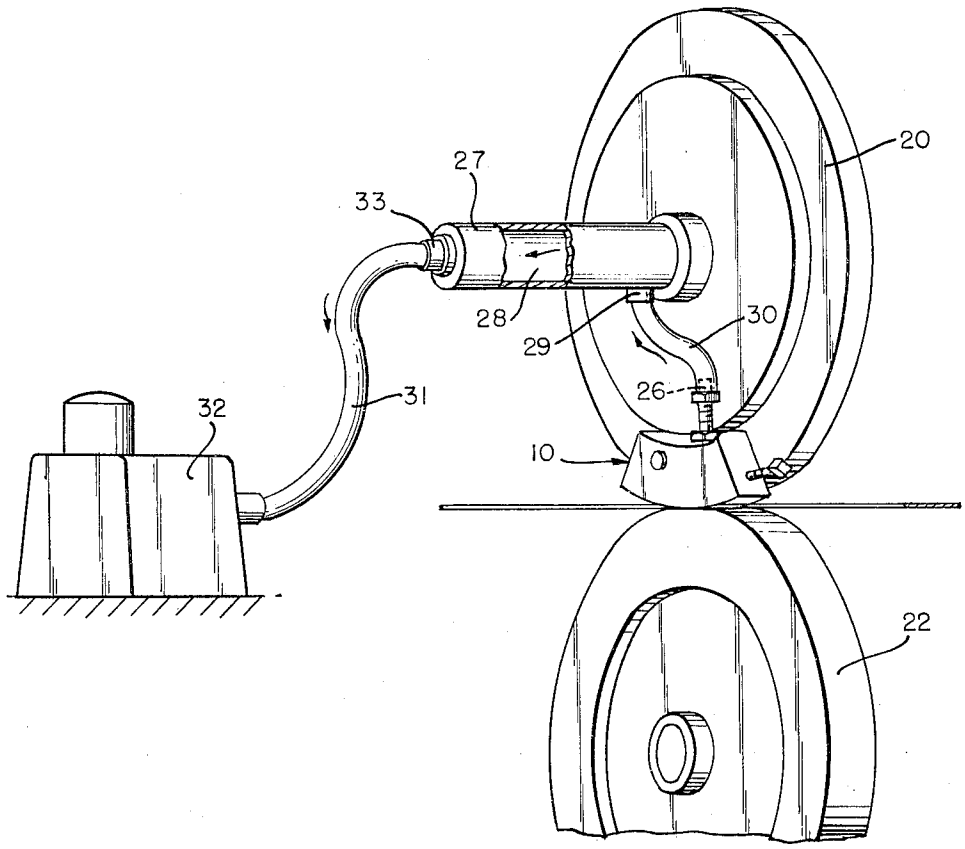



FIG. 5.

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3,482,478

# ADJUSTABLE PUNCH HOLDER

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U.S. Cl. 83—100 11 Claims

## ABSTRACT OF THE DISCLOSURE

An adjustable punch holder having a hollow cylindrical punch mounted on a ring segment mountable on a first disc assembly operable in cooperation with an anvil mounted on a second mating disc. A hollow adjusting screw is threaded through the hole in the ring segment through which the punch is mounted, to permit radical adjustment of the punch, as well as disposition of the cuttings through the hollow cylindrical punch and adjusting screw. A suction device may be arranged for rapid disposition of the cuttings.

## BACKGROUND OF THE INVENTION

### Field of invention

The present invention relates to an adjustable punch holder for punching holes in moving webs of paper, film, and other such surfaces. More particularly, the present invention relates to an adjustable punch holder, mountable on a disc assembly, and containing a hollow cylindrical punch with adjusting means for radially adjusting the punch.

### Description of the prior art

In the field of punch holders, it has been the general practice to employ solid punches which mate with hollow dies for punching holes in moving webs. Such devices have proved unsatisfactory since they require very accurate mating of the punch with the die. In addition, such devices have displayed a marked lack of adjustability. Furthermore, the prior art devices have displayed a lack of easy access to the working parts for adjustment and maintenance.

The accumulation of cuttings in the vicinity of the punch holder creates problems. The random scattering of such cuttings tends to get in the way of the punch during subsequent cuttings thereby rendering such cuttings non-uniform. In addition, the scattering of cuttings causes the work area to be untidy.

## SUMMARY OF THE INVENTION

The general purpose of this invention is to provide an adjustable punch holder which embraces all the advantages of similarly employed prior art devices and possesses none of the aforedescribed disadvantages. To attain this, the present invention provides a punch holder made of a ring segment mountable on a disc, and containing a radial hole therethrough. A hollow cylindrical punch is fitted through the outer end of the hole and a hollow adjusting screw is threaded through the end of the hole directed toward the center of the disc. The punch may be radially adjusted by simply turning the adjusting screw. The punch may be held in place by a set screw, and the adjusting screw may be secured by a jam nut.

An anvil comprising a hard surface is suitably mounted on the circumference of a mating disc. The anvil may be a thin small piece of hardened stainless steel which may be attached to the surface of the mating disc by adhesive tape or other means. The position of such an anvil on the circumference of the mating cylinder may be easily altered by removing the adhesive tape to which the anvil is attached and causing it to adhere to a different position on



the disc. This feature of the anvil avoids the necessity for accurate alignment of the punch with the anvil. The disc containing the punch assembly as well as the disc having the anvil are rotated in synchronism at a predetermined speed while a web is moved between them to achieve the desired punching of the moving web. The cuttings pass through the hollow cyindrical punch and then through the hollow adjusting screw having an inside diameter equal to at least that of the cylindrical punch, and are disposed of through the head of the adjusting screw.

A suction device may be arranged whereby the cuttings are removed through the hollow punch and disposed of in a suitable receptacle. According to such an arrangement, a shaft having a vacuum chamber is mounted through the center of the disc carrying the punch holder. A tube made of some suitable material, such as rubber or plastic, connects a sleeve of the adjusting screw with the vacuum chamber of the shaft. The tube is connected to the vacuum chamber by a suitable fitting. A rotary coupling connects the vacuum chamber to a suction pump having a receptacle wherein the cuttings are collected.

Thus the invention is capable of disposing of the punched cuttings with ease and avoids the accumulation of a number of cuttings at the head of the punch which would render subsequent cuttings non-uniform. The vacuum arrangement is particularly useful in disposing of the cuttings as well as keeping the work area tidy. It is seen that the punch can be radially adjusted outwardly by simply turning the adjusting screw, thereby urging the punch outward. The punch is radially adjustable inwardly by simply turning the adjusting screw in the opposite direction with the pressure from the anvil urging the punch inwardly to the desired position. Furthermore, the circumferential position of the punch holder may be adjusted on the disc.

Accordingly, an object of the present invention is to provide adjustable punch holding means for punching holes in moving webs.

Another object of the present invention is to provide means for easily adjusting the radial and circumferential position of a punch mounted on a disc assembly.

A further object of the present invention is to provide hollow punching means which allows easy escape of the cuttings to prevent an accumulation of cuttings at the head of the punch from rendering subsequent punches non-uniform.

Yet another object of the present invention is to provide vacuum means operative in conjunction with hollow punching means to dispose of the cuttings in order to prevent an accumulation of cuttings at the head of the punch from rendering subsequent punches non-uniform and to prevent the work area from becoming untidy.

Still another object of the present invention is to provide hollow tube punching means operative in conjunction with an anvil which avoids the necessity of accuracy of mating inherent in prior art solid punching means with their associated conventional dies.

Yet another object of the present invention is to provide punching means arranged to permit easy access to the working parts for adjustment.

Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a diagram of an embodiment of the present invention.

FIGURE 2 is a section taken along line 2—2 of FIGURE 3.

FIGURE 3 is a diagram of the punch assembly and anvil mounted on the associated disc assembly.

FIGURE 4 is a front elevation of the preferred embodiment.

FIGURE 5 is a diagram of the present invention containing the vacuum arrangement.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGURES 1 and 4, there is shown a punch holder **10** having an opening **11** on the outward surface through which a punch **12** is fitted. Punch **12** is a hollow cylindrical punch. A threaded member **13** is fitted through hole **14** on the inward side of segment **10**. Threaded member **13** comprises essentially a hollow screw having a hollow head **15**. The inside diameter of the screw and head is equal to at least that of hollow punch **12**. Screw **13** may be secured by a jam nut **17** and punch **12** may be secured by a set screw **18**.

FIGURE 2 illustrates the embodiment of the adjustable punch holder shown in FIGURE 1 attached to disc **20**. A bolt **21** is threaded through disc **20** and hole **19** of segment **10**.

FIGURE 3 is an illustration of the adjustable punch holder operative in conjunction with a disc assembly. sometimes referred to as a spider, having a disc **20** with the punch holder attached to disc **20** as shown. The disc assembly contains a second disc **22** having an anvil **23** constructed of a suitable material such as stainless steel. Anvil **23** is attached to the surface of disc **22** by suitable means such as a piece of adhesive tape **25**. A web **24** of either paper or film or any such similar substance is moved between the two discs **20** and **22**. The punch holder may be attached at any location along the circumference of disc **20** so that punch **12** and anvil **23** face moving web **24** at the same time to enable punch **12** to punch a hole in the moving web against anvil **23**.

FIGURE 5 illustrates a vacuum arrangement operable to dispose of the cuttings. A shaft **27** having a vacuum chamber **28** is connected through the center of disc **20**. The shaft has a fitting **29** and a tube **30** made of a suitable material such as rubber or plastic which connects the vacuum chamber **28** at the fitting **29** with threaded member **13** at sleeve **26**. A rotary coupling **33** connects one end of a tube **31** with vacuum chamber **28**. The other end of tube **31** is connected to a suitable suction device **32** such as a vacuum motor having a receptacle.

In the operation of the invention, web **24** is moved between discs **20** and **22** and holes are punched when punch **12** is opposite anvil **23**. The cuttings from the punched holes pass through punch **12** and then through screw **13**. In the embodiment shown in FIGURE 5 having the vacuum arrangement, a vacuum is maintained in chamber **28** which removes the cuttings from screw **13** through tube **30**, through the chamber **28**. The suction device **32** draws the cuttings through tube **31** and deposits them in a receptacle (not shown) in the suction device.

It is seen from FIGURES 1 and 4 that punch **12** may be longitudinally adjusted by simply turning screw **13**. If punch **12** is not attached to screw **13**, it may be adjusted outwardly by turning screw **13** to push punch **12** outwardly. The punch may be adjusted inwardly by turning screw **13** in the opposite direction and utilizing the pressure from anvil **23** to urge punch **12** in the opposite direction. The punch holder segment **10** may be adjusted circumferentially around disc **20** to accommodate any desired punching requirements.

It is apparent from FIGURE 1 that the cuttings from the moving web **24** shown in FIGURE 3 move through the center of hollow punch **12** and through the center of hollow screw **13**. The fact that the anvil is attached to adhesive tape which may be arranged to adhere to disc **22** at any location on its circumference avoids the problem of accurate alignment of the punch and die which is inherent in prior art devices. The vacuum arrangement shown in FIGURE 5 enhances the ease of escape of the cuttings through the center of punch **12**, and screw **13** insures continuous disposal of the cuttings to thereby maintain uniform punching and keep the work area clean. Furthermore, the very nature of the assembly enables easy access to the working parts for adjustment.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. For example, although the adjustable punch holder has been shown in FIGURE 3 to be operative in conjunction with a disc or spider assembly, it is entirely feasible to mount the punch holder on any rotating assembly having two rotating members such as rigid bars. One member of the assembly would have punch holder **10** attached to it and the second member would have anvil **23** attached to it and the rotation would be synchronized so that punch **12** and anvil **23** would both be opposite the moving web at the same point of time. In addition, although both members of the disc assembly have been shown to be coplanar, the planes of rotation of the two rotating members may be at any angle with each other provided the punch and anvil are opposite the moving web at the same point of time. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

**1.** An adjustable punch holder assembly operable in conjunction with a rotating assembly, having two members, for punching holes in a moving web comprising:
- a hollow cylindrical punch;
- a punch holder having an opening through which said hollow cylindrical punch is fitted;
- hollow adjustment means fitted through said opening for longitudinal adjustment of said hollow cylindrical punch;
- attachment means for attaching said punch to the first member of said rotating assembly; and
- an anvil arranged on the second member of said rotating assembly;
- whereby the cuttings cut from said moving web escape through the center of said hollow cylindrical punch and thence through said hollow adjustment means.

**2.** The device as described in claim **1** wherein said punch holder comprises a ring segment and is attached to said first member of said rotating assembly so that said opening is radially directed through the center of rotation of said first member of said rotating assembly.

**3.** The device as described in claim **1** wherein said first member of said rotating assembly is a disc.

**4.** The device as described in claim **1** wherein said second member of said rotating assembly is a disc.

**5.** The device as described in claim **2** wherein said first member of said rotating assembly is a disc.

**6.** The device as described in claim **5** wherein said second member of said rotating assembly is a disc.

**7.** The device as described in claim **6** wherein said first and second disc members are coplanar and wherein said anvil is arranged along the circumference of said second disc.

**8.** The device as described in claim **7** wherein said hollow adjustment means comprises a threaded member.

**9.** An adjustable punch holder assembly operable in conjunction with a rotating assembly, having two members, for punching holes in a moving web comprising:
- a hollow cylindrical punch;
- a punch holder having an opening through which said hollow cylindrical punch is fitted;
- hollow adjustment means fitted through said opening for longitudinal adjustment of said hollow cylindrical punch;
- suction means connected to said hollow adjustment means for removing cuttings cut from said moving web through the center of said hollow cylindrical punch and thence through said hollow adjustment means;

attachment means for attaching said punch to the first member of said rotating assembly; and

an anvil arranged on the second member of said rotating assembly.

**10**. The device as described in claim **9** wherein said suction means comprises:

a vacuum chamber;

a tube connecting said vacuum chamber and said hollow adjustment means; and

a suction pump connected to said vacuum chamber for maintaining a vacuum in said chamber.

**11**. The device as described in claim **10** wherein said vacuum chamber is mounted on said first member of said rotating assembly.



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U.S. Cl. X.R.

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