

(No Model.)

2 Sheets—Sheet 1.

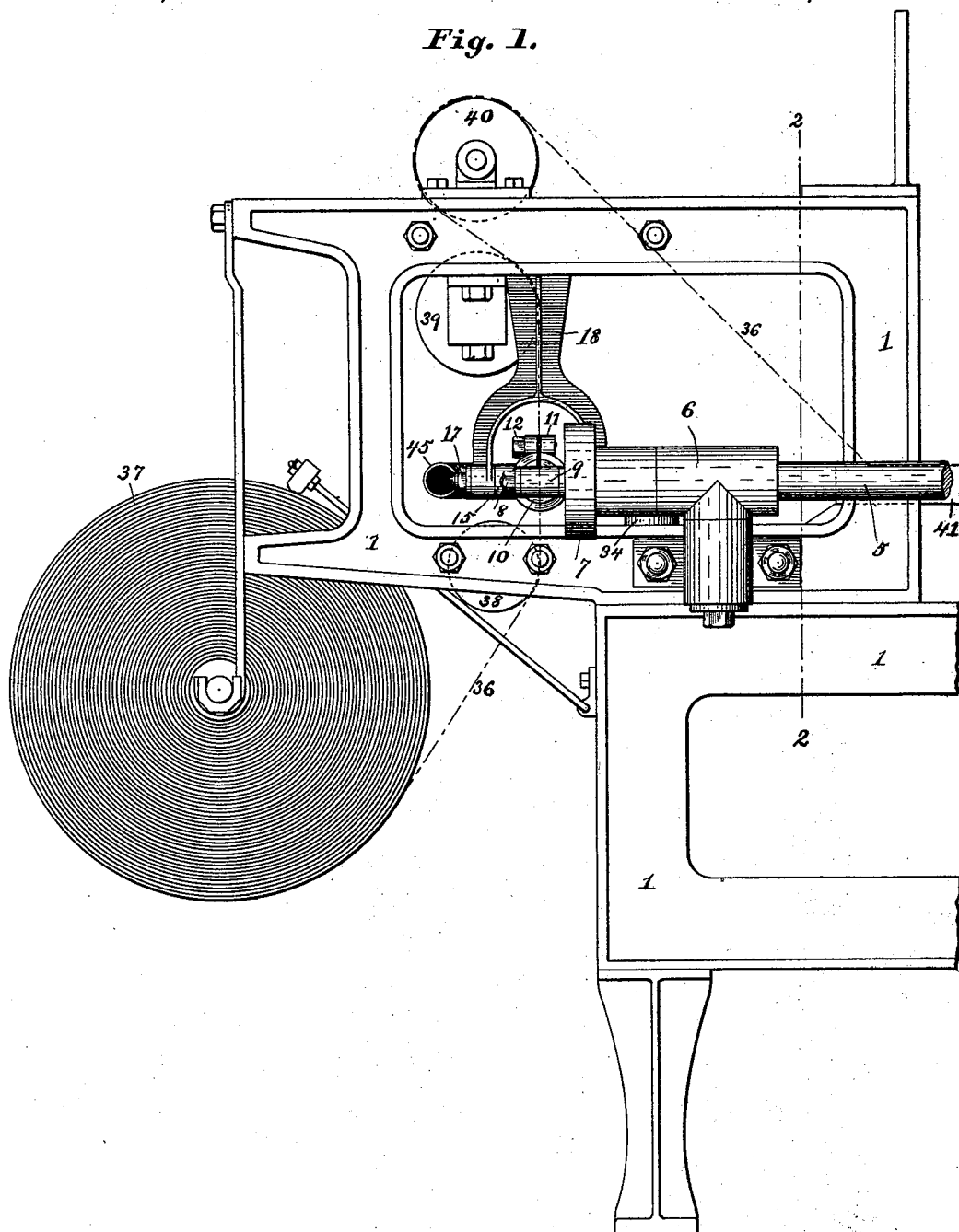
J. BOYER.

DEVICE FOR PUNCHING WEBS OF PAPER.

No. 477,402.

Patented June 21, 1892.

Fig. 1.



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Fig. 2.

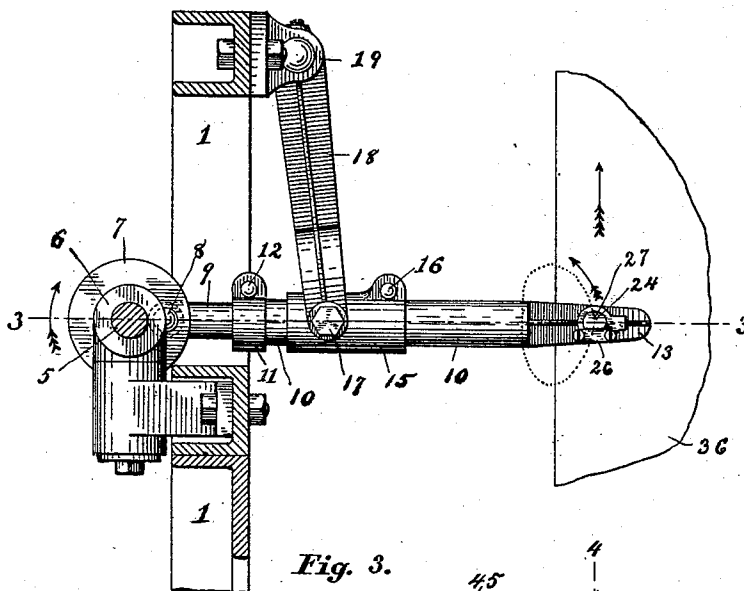


Fig. 3.

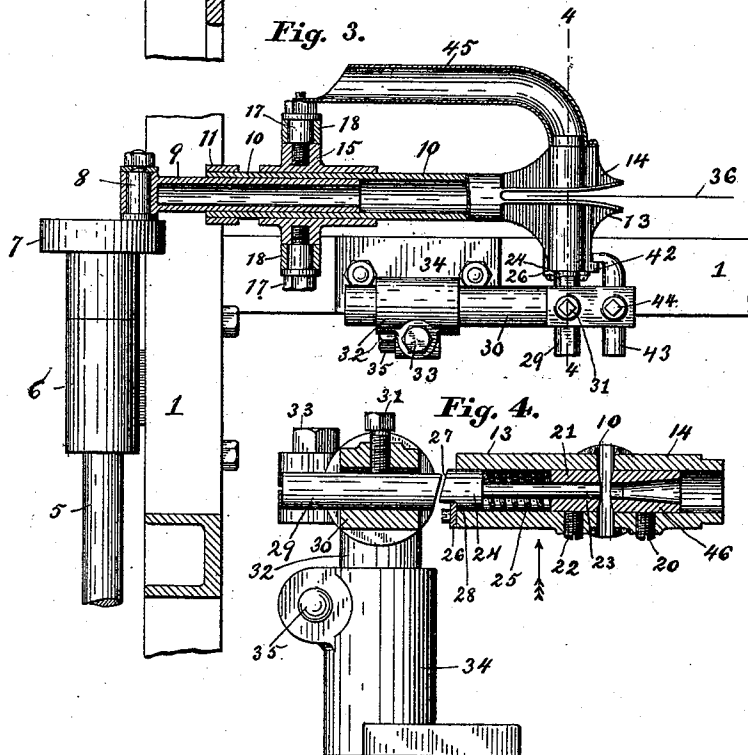
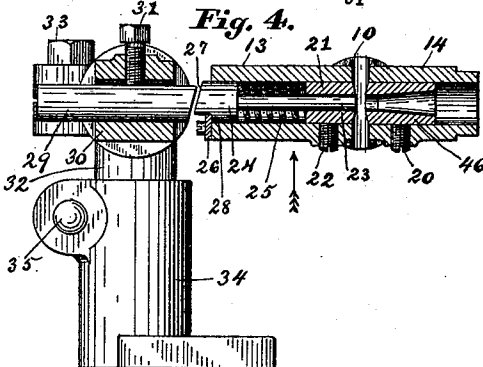


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOSEPH BOYER, OF ST. LOUIS, MISSOURI, ASSIGNOR TO SAMUEL CUPPLES
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DEVICE FOR PUNCHING WEBS OF PAPER.

SPECIFICATION forming part of Letters Patent No. 477,402, dated June 21, 1892.

Application filed November 19, 1891. Serial No. 412,393. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH BOYER, a citizen of the United States, residing at St. Louis, Missouri, have invented certain new and useful Improvements in Devices for Punching Webs of Paper, &c., of which the following is a specification.

My invention relates to devices for punching webs of paper and similar material, and while it may be applied for various uses in different kinds of machines it is especially applicable to punching a traveling web of paper; and the object of my invention is to provide a simple, cheap, and effective device, whereby a traveling web of material may be punched or perforated without danger of rupturing or in any way interfering with the movement of the paper.

To these ends my invention consists in a punching device having certain features of construction and modes of operation and adapted to be applied in substantially the manner hereinafter more particularly pointed out.

Referring to the accompanying drawings, Figure 1 is a side view of a portion of a bag-forming machine having my device applied thereto. Fig. 2 is a transverse section on the line 2 2, Fig. 1, showing the material part of the device. Fig. 3 is a section on the line 3 3, Fig. 2; and Fig. 4 is an enlarged section on the line 4 4, Fig. 3.

While my invention is adapted to various purposes and for use in connection with various materials, I have shown it embodied in a device adapted more particularly for punching a hole in a web of paper—such, for instance, as is used in the manufacture of paper bags. It is found desirable that each completed bag should be provided with one or more perforations near its open end, by which the bag may be suspended or otherwise secured, and it is necessary that these openings or perforations should correspond and be in the same relative position on all the bags of any particular size. It has been found preferable to form this perforation in the web of paper prior to the formation of the bag, as it is among other reasons more easy to apply the perforating device to existing machines without liability of interfering with other operative parts of the machine, and the web can

be punched, and the dangers of stretching or straining the freshly-pasted portions of the tube or bag are thereby avoided. Moreover, the clippings or portions of paper removed from the web are not as liable to interfere with the pasting and folding operations as where the bag is punched during or immediately after the process of making. In order to accomplish this result, I provide a punch device which may be adapted to an ordinary paper-bag machine and in which the punch and die are mounted in the same moving piece, so as to keep them in perfect alignment, and motion is imparted to this device, so that at the time the perforations are made the punch and die are moving in the same direction and at the same speed as the paper which is being punched, and while so moving the punch is operated by suitable mechanism and the pieces punched out are discharged from the machine. Furthermore, as a paper-bag machine is usually made adjustable, so that bags of various sizes can be made thereon, and as it is desirable that the perforations should occupy the same relative position in regard to the bags, I provide means whereby the punch can be adjusted for different widths of paper and to make the perforations at different distances apart on the traveling web.

Referring now to the embodiment of my invention shown in the accompanying drawings, 1 represents a portion of the frame of a bag-machine upon which is mounted a bearing 6, supporting a shaft 5, which is arranged to be driven in unison with some operating part of the tube-forming or bottom folding or pasting mechanism, (not shown,) and on this shaft there is a crank-disk 7, carrying a crank-pin 8. Connected to this crank-pin is a connecting-rod 9, the other end of which is connected to a punch carrier or arm 10, in this instance it being shown as slipping therein and as being fastened in position by the split clamp 11, which is tightened by a screw 12, the end of the punch-carrying arm being split to enable it to grasp and fit the connecting-rod. The punch-carrying arm 10 at its free end is provided with a punch device having two fingers 13 and 14 arranged opposite each other and having a space between them for the pas-

sage of the web of paper 36, and one of these fingers 13 is provided with a punch and the other 14 is provided with a die. Connected to the punch-carrying arm is a split sleeve 15, which is secured thereto by a screw 16, and this sleeve is provided with trunnions on its opposite sides, in which bear the trunnion-bolts 17, by means of which the sleeve is pivotally connected to the swinging arm 18, which is in turn pivotally mounted in a bearing 19, fastened to the frame 1. The fingers 13 and 14 are each provided with a hole through them, and in one finger 14 there is a female die 46, which is held in position by the set-screw 20, while in the other finger 13 there is a punch-guide 21, similarly held by a set-screw 22, and the punch 23 passes through the guide. The punch is provided with an enlarged head 24 and is normally held in its outward position by a spring 25, but is prevented from being forced out of the finger by a plate 26, secured on the finger and bearing on a shoulder 28, formed in the enlarged head of the die. Also mounted on the frame of the machine is a bar 30, carrying a cam 29, against which the punch works, and this bar is adjustably secured by a set-screw 31. The bar 30 is also adjustable longitudinally in its support 32, being clamped therein by the screw 33, and this support 32 is in turn adjustable vertically in its bearing 34 by means of the clamping-screw 35, the support 34 being secured to the frame of the machine. The end of the cam 29 is beveled, as seen in Fig. 4, to correspond with the beveled surface 27 of the enlarged head 24 of the punch.

In order to prevent the action of the cam on the punch from throwing the parts out of alignment and causing a side motion, I find it desirable to provide a holding device, and I have illustrated it as embodied in a projection 42 on the finger 13, which passes behind the hooked portion of the arm 43, which is adjustably mounted in the bar 30 by means of the set-screw 44, and this is adapted to take up any side pressure on the finger 13, caused by the passing of the punch over the cam. The paper in this instance is shown in the form of a roll 37, supported from the machine, and the web 36 passes therefrom around the guides 38 39, passing between the fingers 13 and 14 of the punch, which are in this instance located between the said guide-rolls. Thence it passes over the guide-roll 40 and down to the table 41 to receive the desired manipulations to form it into a tube and then into the bag.

In order to prevent the punchings or clippings from interfering in any way with the tube forming or subsequent operations on the paper, I provide a conveyer or tube 45, which is attached to the finger 14, and in the present instance to one of the trunnions 17, and this delivers the punchings outside of the line of travel of the paper. Such being the construction of the device in the present embodiment, its operation will be readily un-

derstood, and is essentially as follows: The shaft 5, as before indicated, is driven from some operative portion of the machine, so that it makes one revolution to each bag formed, and the punch and die being connected thereto and supported from the swinging arm 18 are given a motion which is the combination of the circular motion derived from the crank and the swinging of the arm 18, so that the punch and die perform a movement substantially such as is indicated in the dotted line, Fig. 2, in the direction of the arrow. It will be seen that the punch and die as they pass the cam are traveling in the same direction and at the same speed as the web of paper and the punch is forced through the paper by the cam, forming the desired hole, without in any way interfering with the web or its movements. In other words, the die may be said to have what is commonly known to mechanics as a "four-motion"—that is, it travels with the paper at the same rate of speed, is withdrawn from the paper, it travels backward in a direction opposite to the travel of the paper, and is then carried forward over the paper to repeat its movements. While performing this four-motion one of the dies is given a motion in a plane at right angles to the plane of the four-motion movement of the die. The adjustment of the rod 9 in the punch-carrying arm 10 provides for an adjustment of the punches to suit the various widths of paper and for the location of the hole relative to the edge of the paper, while the adjustment of the sleeve 15 on the arm 10 will control and regulate the proper speed of the punch at the time of making the perforation. It will be understood, of course, that the arm 30, carrying the cam and side stop, must be adjusted to correspond with the adjustment of the rod and cam, as above indicated.

While I have thus described and illustrated the preferred embodiment and application of my invention, it will be understood by those skilled in the art that the details of construction and arrangement may be varied without departing from the spirit of the invention, and I therefore do not limit myself to the exact construction and arrangement shown.

What I claim is—

1. The combination of a moving carrier having fingers arranged to embrace the edge of a traveling web and provided with a male and female punching-die, and mechanism for moving the dies, when embracing the web, at the same rate of speed as the material, substantially as described.

2. The combination of a moving carrier mounted at one side of a traveling web, having fingers embracing the web, dies carried by the fingers, and an operating device for the dies arranged in the path of the carrier, substantially as described.

3. The combination, with the moving carrier having punching-dies, of an operating device for the dies arranged in the path of the moving carrier and a holding device for

the carrier when passing the operating device, substantially as described.

4. The combination, with a moving carrier mounted at one side of a traveling web and punching-dies mounted in the carrier, of mechanism for imparting to said carrier a four-motion to move the punching-dies into and out of the path of the traveling web, substantially as set forth.

5. The combination, with a punch device comprising a punch and die and a carrier therefor, of mechanism for imparting to said punch device a four-motion movement and means for operating the punch at right angles to the movement of said punch device, substantially as described.

6. The combination of a punch device arranged to embrace a traveling web, a carrier for the punch device, and means for imparting a four-motion movement to said punch device in a plane parallel to the movement of the paper, substantially as described.

7. The combination of a punch device arranged to embrace a traveling web, a carrier therefor, means for imparting a four-motion to said punch device in the plane of the traveling web, and means for operating the punch at right angles to the plane of travel of the punch device, substantially as described.

8. The combination, with a punch device comprising the punch and die, a carrier therefor, and a swinging arm in which the carrier is pivotally supported, of a shaft and connections between the shaft and carrier for operating the carrier, whereby the punch device is given a four-motion movement, substantially as described.

9. The combination of a punch device comprising the punch and die, a carrier therefor pivotally connected to a swinging arm, and

a crank-arm connected to said carrier, substantially as described.

10. The combination, with a punch device and carrier therefor, of a swinging support for the carrier, a crank-arm for operating the carrier, and a cam in the path of the carrier for operating the punch, substantially as described.

11. The combination of a punch device arranged to embrace a traveling web, a carrier for the punch device, a punch-operating device in the path of the carrier, and a tube for carrying off the punched portions, substantially as described.

12. The combination of a punch device arranged to embrace a traveling web, an adjustable carrier therefor, and means for adjusting the position and rate of travel of the punch device to correspond with the traveling paper, substantially as described.

13. A punching device consisting of a carrier having fingers provided with a male and female die, a cam for operating the male die, and a holder for supporting the carrier while the male die is being operated, substantially as described.

14. A punching device comprising the stationary fingers between which the material to be punched passes, a female die secured in one of the fingers, a spring-supported male die secured in the other, and an adjustable cam for operating said male die, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH BOYER.

Witnesses:

STEPHEN F. SULLIVAN,
AUGUST KRIEGER.