Dec. 6, 1949 F. M. McBETH 2,490,697

FOLDING APPARATUS

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Fig. 1.

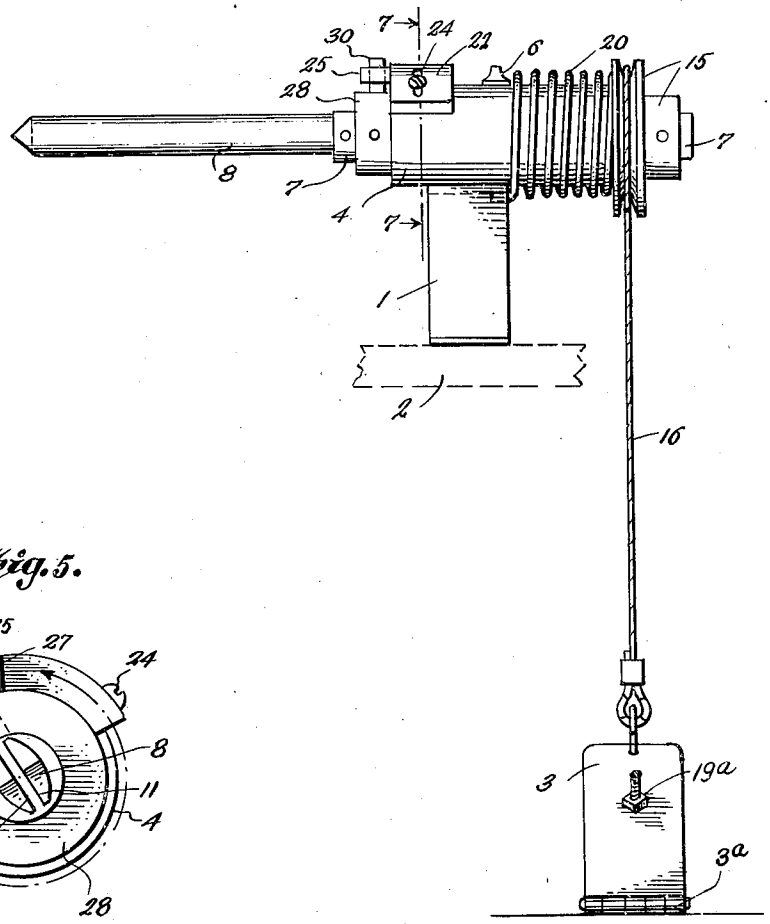


Fig. 5.

Fig. 2.

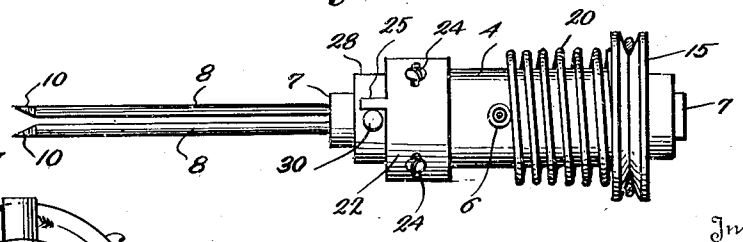
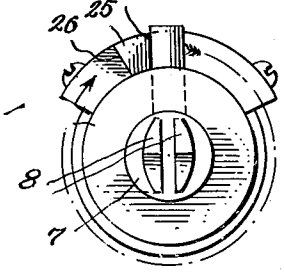


Fig. 6.



Inventor
FREEMAN M. McBETH

By E. F. Dalton

Attorney

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Fig. 3.

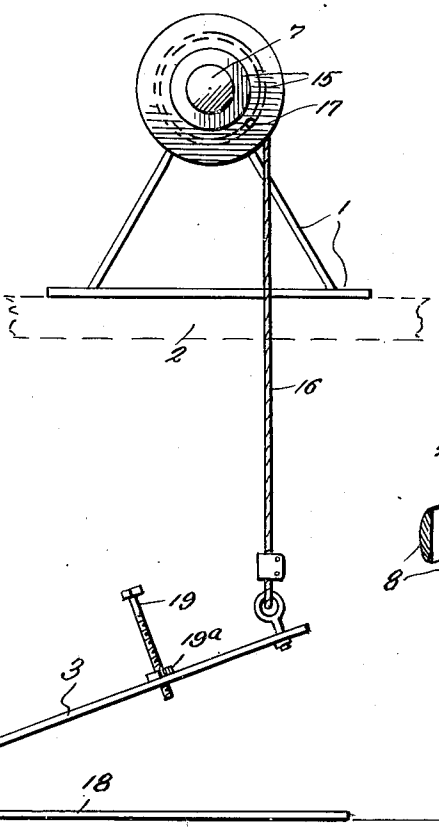


Fig. 7.

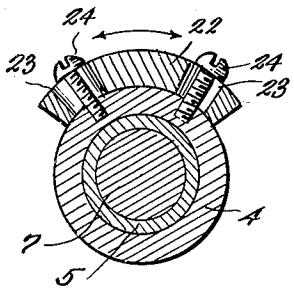


Fig. 9.

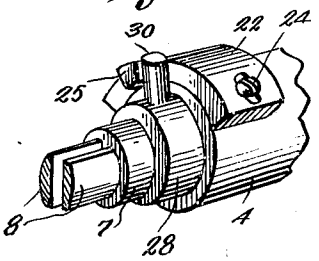


Fig. 4.

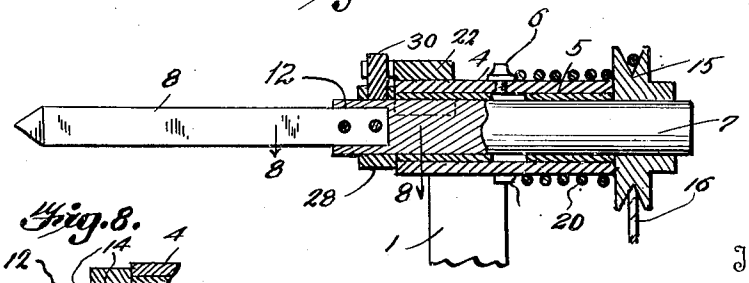
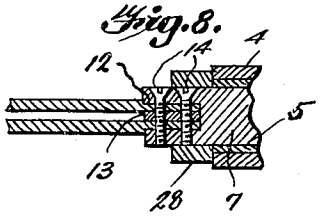


Fig. 8.



Inventor

FREEMAN M. McBETH

By

E. F. Dalton

Attorney

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FOLDING APPARATUS

Freeman M. McBeth, Harrisburg, Pa., assignor to Macbeth Engineering Corporation, a corporation of Pennsylvania

Application April 28, 1945, Serial No. 590,752

2 Claims. (Cl. 93—2)

1

The present invention relates to a device or mechanism by which bags, cartons and similar receptacles fashioned from paper or like material may be folded and is especially adapted for the folding and closing of the open ends of such receptacles when containing merchandise or other commodities.

The invention is primarily arranged to function in those instances where high production automatic folding machines are not required or would involve an unnecessary overhead expense and is especially designed for manual operation intermittently or continuously as the occasion might demand and under those circumstances where idleness of the machine would not be considered as a loss in the overhead investment.

Having the foregoing considerations in mind a simple mechanism has been evolved which includes a pair of fingers for receiving the open end portion of the bag or receptacle (while being held by the machine operator), and folding such end one or more times as a result of the rotation of the fingers occasioned by the movement of a treadle actuated by the foot of the operator. Under these circumstances both hands of the operator are left free to hold or adjust the receptacle during the folding operation which is a material aid in the speed of operations and uniformity of the folding of the successive packages, the latter at the present time being considered a desirable element of "dress" in aid of successful merchandizing.

When the folding operation is completed and the bag or receptacle withdrawn from the machine, automatic means are provided for restoring the several parts of the machine to their original position, ready for the next folding operation.

Following the folding operation, and especially where the folding is accomplished in a uniform manner, the receptacle may be delivered or passed on to a point where the folded portion may be stapled, closed by the application of a sealing strip or sealed by heat and pressure, if the material of the receptacle is responsive to such treatment. Other methods of closing or sealing the fold may also be used, none of which form, however, a part of the present invention.

In addition to a simple arrangement of the several parts going to make up the invention, their correlation is such that a minimum of manual effort is required for operation, so little indeed that women or children might operate the machine for long periods of time without fatigue.

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Further objects and advantages of the invention will become apparent from the following detailed description where reference is made to the accompanying drawings wherein

Figure 1 is a side elevation of the improved mechanism, with the adjustable stud which limits the downward movement of the treadle shown fragmentarily.

Figure 2 is a plan view of the folding fingers and the barrel or bearing supporting the same.

Figure 3 is an end view of the mechanism shown in Figure 1.

Figure 4 is a side view, partly in section, showing the arrangement of parts adjacent to and within the barrel or bearing which supports the folding fingers.

Figure 5 is an enlarged end view of the fingers and the means whereby the path of their rotation may be varied. Here the fingers are in position to receive the portion of the bag or receptacle to be folded following which they are rotated in an anti-clockwise direction as indicated by the arrow to effect the folding.

Figure 6 is a view similar to Figure 5 but showing the position of the fingers at the conclusion of the folding operation. The fingers will thereafter be rotated in a clockwise direction as indicated by the arrow to their original or bag receiving position.

Figure 7 is a transverse section on the line 7—7 of Figure 1.

Figure 8 is a section on the line 8—8 of Figure 4.

Figure 9 is a perspective view of the inner end of the fingers, associated parts and the adjustable segment whereby the path of rotation of the fingers may be varied.

As shown in Figures 1 and 3 a suitable bracket or standard 1 supporting the receptacle folding mechanism may be fixed on a bench or table 2 and the foot treadle 3 for operating the folding mechanism may be pivotally fastened to the floor. Obviously, a frame or carriage may be provided to carry the standard and foot treadle as a unit so that the device as a whole may be moved from place to place as occasions may require.

The upper end of the bracket 1 supports a barrel or bearing block 4 longitudinally and horizontally bored to receive a bearing sleeve 5 of suitable material. This sleeve may be split or formed in several sections to reduce friction and in aid of lubrication of the bearing through an oil cap 6. A shaft 7 is mounted for rotation within the bearing sleeve and its ends extend

beyond the bearing block as shown in Figure 4.

The left end of the shaft 7 (Figure 4) is bifurcated or slotted to receive the inner ends of a pair of spaced folding fingers 8. The length of these fingers should be such as to effectively fold the widest bag or receptacle inserted in the machine. Best results are obtained by having the fingers slightly longer than the width of the article to be folded. The fingers are spaced from each other a distance sufficient to accommodate the thickest material to be folded, although if the machine is to cover a wide range of thicknesses of material several pairs of fingers of different spacings (and lengths) may be provided, since a better control and conformity of the fold is best accomplished when the spaced relation between the fingers and the material to be folded is not too great.

As shown in Figure 2, the outer end of one or both of the fingers may be ground or flared outwardly as at 10 to provide an enlargement of the spacing of the fingers at this point so as to guide or funnel the end of the bag to be folded into the slot between the fingers when it is moved horizontally from left to right by the operator (Figs. 1, 2, 4) to assume the folding position. The disposition of the material from which the fingers are formed should be such that they will be substantially rigid and not unduly flexed in the loading and folding operation otherwise high spots or localized zones of excessive thickness may impair uniform folding across the width of the bag or receptacle.

Observing the fingers endwise or in cross section the inner or slot forming faces 11 are substantially flat and equally spaced and the outer surfaces are curved or convex in form so as to minimize friction or undue gripping of the material being folded.

The inner ends of the fingers 8 are mounted in a slot or socket 12 formed in the shaft 7 with the fingers spaced to the desired extent by the spacer 13. Shims may be used to increase or decrease the spacing of the fingers as occasion requires. Screws 14 serve to hold the fingers 8 and spacer 13 securely in the end of the shaft 7.

The right end of the shaft (Fig. 4) beyond the bearing block 4 carries a sheave 15 keyed thereto. One end portion of a flexibe cable 16 is trained around the sheave and fastened thereto as at 17 in such a manner that a maximum downward pull upon the cable will produce substantially the desired rotation of the shaft 7 and fingers 8 carried thereby. The opposite end of the cable 16 is attached to the forward end of the treadle 3. The rear end of the treadle is pivoted as at 3a to a block 18 fastened to the floor or it may be pivoted directly to the floor. An adjustable stud 19 provided with a lock nut 19a serves to limit the downard movement of the treadle 3 and may thus serve to dampen the impact of the pin 30 against the face 27 of the abutment 25 hereinafter described. From the foregoing it is clear that a downward movement of the treadle will produce a rotation or revolution of the folding fingers 8.

After the fingers have completed their folding operation it is desirable to return them and the foot treadle to their original position for the next folding operation. To this end a torsion spring 20 is laid around the bearing block 4 with one end attached thereto or to the bracket 1 and the opposite end attached to the shaft 7 or sheave 15 keyed to said shaft.

It is desirable to fix or predetermine the loading position of the fingers 8 and the slot therebetween and also to provide for identical folding operations by limiting the rotative movement of the fingers 8 and their supporting shaft 7. For this purpose a segment 22, mounted for adjustment on the bearing block 4 and about the axis thereof by virtue of the slots 23 and screws 24, is provided with an abutment 25 having opposite contact faces 26 and 27. A collar 28 fast to the shaft 7 carries a pin 30 which extends outwardly to engage the faces 26 and 27 of the abutment 25. Figure 5 illustrates a selected loading position of the fingers 8 with the slot therebetween inclined slightly from the vertical. The segment 22 is adjusted and locked so that the face 26 is engaged by the pin 30 which tends to move in a clockwise direction under the influence of the torsion spring 20. When the treadle 3 is depressed to the maximum extent the fingers 8, their shaft 7 and consequently the pin 30 rotate in an anticlockwise direction, as indicated by the arrow in Figure 5 until the pin contacts the face 27 of the abutment, see Figure 6. A comparison of Figures 5 and 6 shows that the fingers 8 approximate a complete revolution and by so doing produce two effective folds of the receptacle which is sufficient for closing or sealing purposes. When the abutment is adjusted in one direction or the other, a change in the path of rotation of the pin 30 and consequently the shaft 7 and fingers 8 takes place. The amplitude of movement remains the same and consequently the character of the fold is unaffected.

Upon the completion of the folding movements of the fingers, the bag or receptacle is withdrawn horizontally from the fingers and when it is clear of the fingers the operator removes his foot from the treadle whereupon the fingers are rotated automatically by the effort of the spring 20 to their original position ready for the next folding operation.

I claim:

1. In a device of the character described, the combination of a standard supporting a bearing block, a shaft mounted for rotation in the bearing block, a pair of substantially rigid and spaced fingers connected to said shaft, said fingers being provided with substantially flat and parallel surfaces defining a slot between the fingers with the outer end portion of at least one of the fingers flared away from the opposite finger to provide an enlargement at the entrance end of said slot, a pulley fast to the opposite end of said shaft, a treadle below the level of the bearing block, a flexible connection between the treadle and pulley for rotating the latter in one direction, a torsion spring surrounding a part of the bearing block having one end connected to said block and the other end connected to said pulley for rotating the shaft in the opposite direction, an abutment provided with opposite surfaces carried by the bearing block, and a pin connected to the shaft for engaging at times one of said abutment surfaces and at other times engaging the other of said surfaces whereby the rotation of said shaft in either direction is limited.

2. In a device of the character described, the combination of a standard supporting a bearing block, a shaft mounted for rotation in the bearing block, a pair of substantially rigid and spaced fingers connected to said shaft, said fingers being provided with substantially flat and parallel surfaces defining a slot between the fingers with the outer end portion of at least one of the fingers flared away from the opposite finger to provide

an enlargement of the entrance end of said slot, a pulley fast to the opposite end of said shaft, a treadle below the level of the bearing block, a flexible connection between the treadle and pulley for rotating the latter in one direction, a torsion spring surrounding a part of the bearing block having one end connected to said block and the other end connected to said pulley for rotating the shaft in the opposite direction, an abutment provided with opposite surfaces carried by the bearing block, a pin connected to the shaft for engaging at times one of said abutment surfaces and at other times engaging the other of said surfaces whereby the rotation of said shaft in either direction is limited, means for adjusting the abutment whereby to variably limit the rotational movement of said shaft, and adjustable means carried by the treadle for limiting its

downward movement and thereby dampening the contact of the pin with one of said abutment surfaces.

FREEMAN M. McBETH.

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