

Feb. 21, 1933.

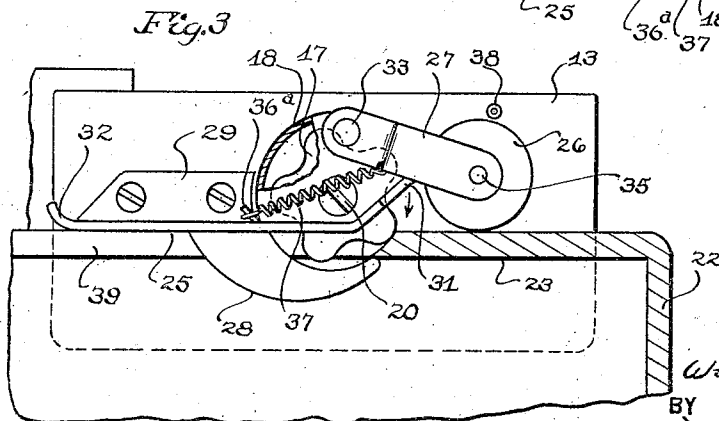
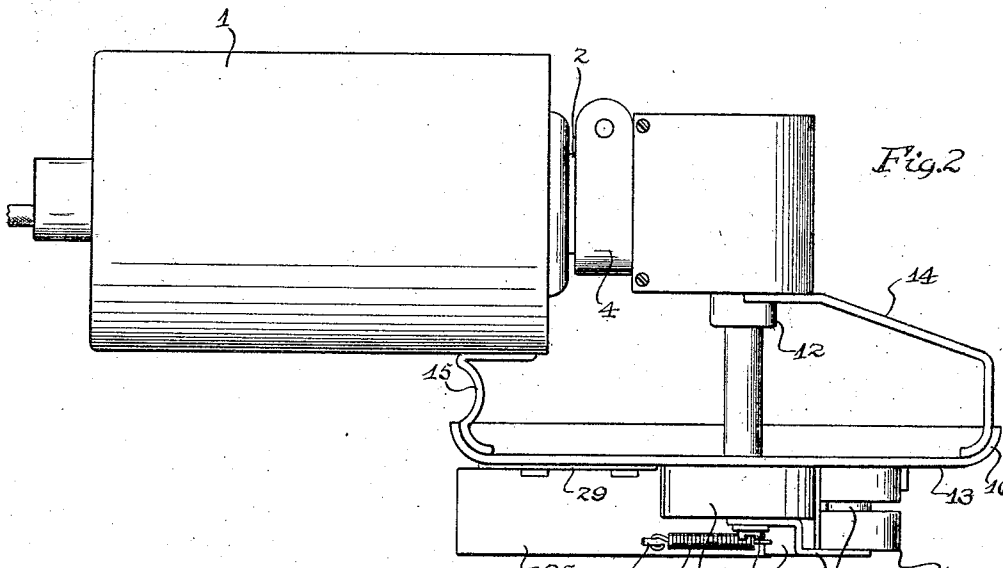
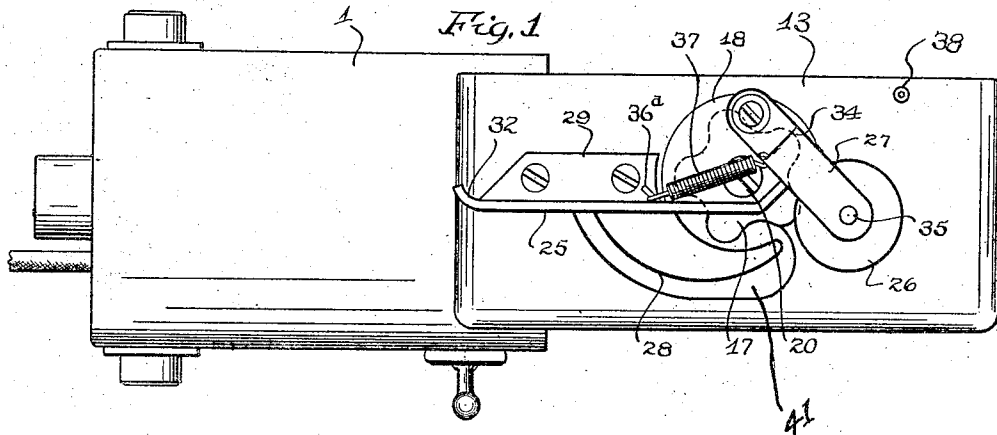
W. P. STEIN

1,898,910

PAPER BOX OPENING MACHINE

Filed Aug. 27, 1931

3 Sheets-Sheet 1



INVENTOR
William P. Stein
BY *[Signature]*
His ATTORNEY

Feb. 21, 1933.

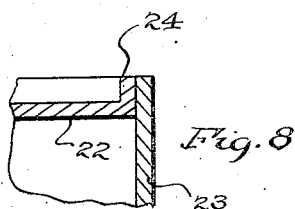
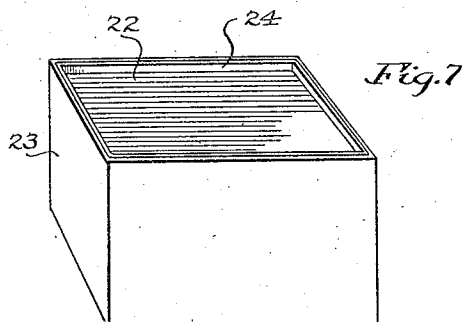
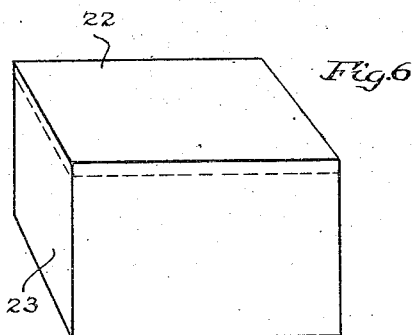
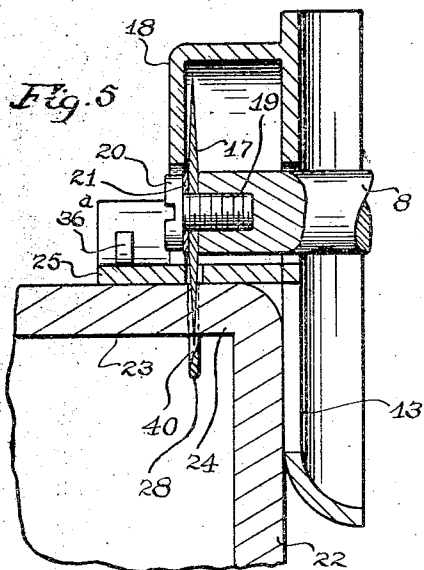
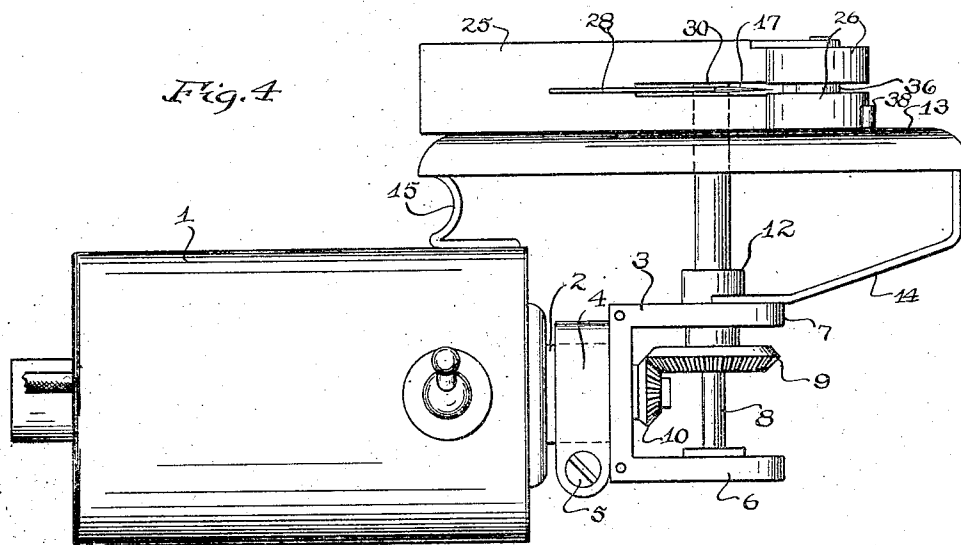
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3 Sheets-Sheet 2



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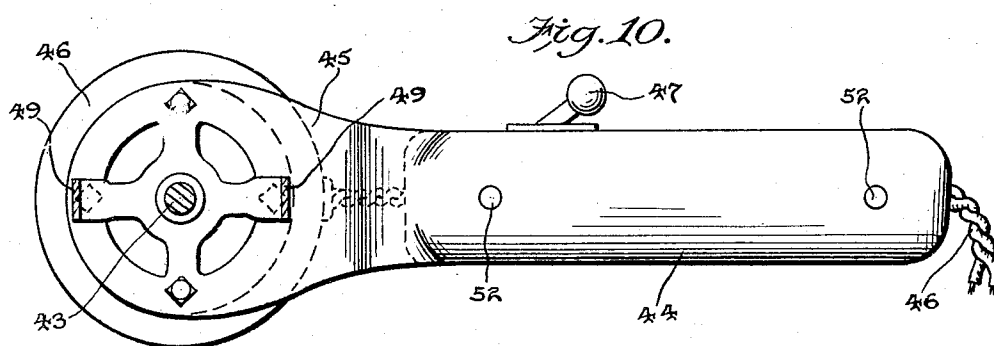
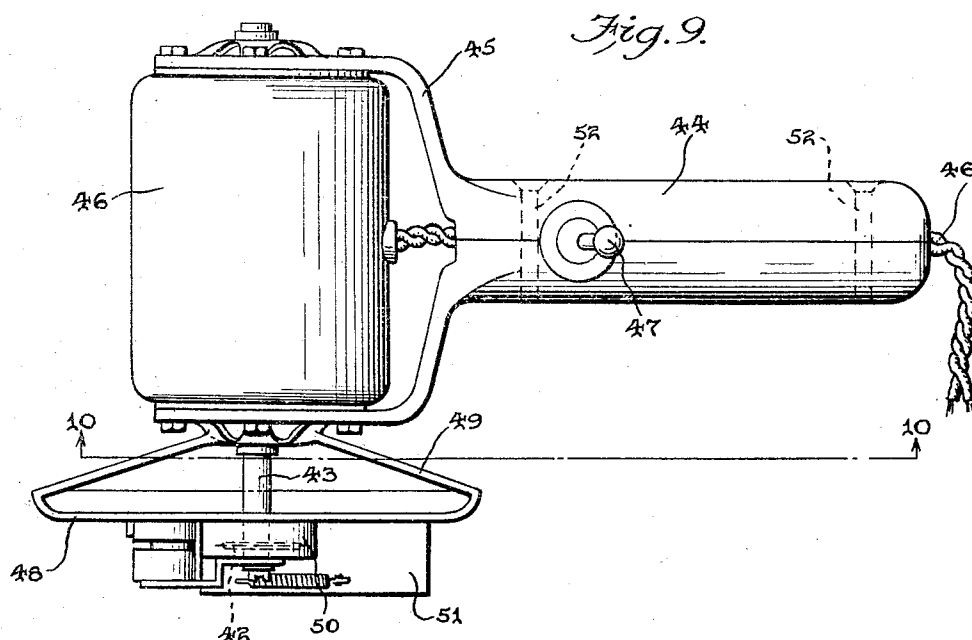
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PAPER BOX OPENING MACHINE

Filed Aug. 27, 1931

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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PAPER BOX OPENING MACHINE

Application filed August 27, 1931. Serial No. 559,780.

The invention relates to a paper box opening machine.

The object of the present invention is to provide a simple, practical and efficient paper box opener of strong, durable and comparatively inexpensive construction designed particularly for opening sealed boxes and cartons and adapted to enable one of the sides of a carton, preferably the top thereof, to be severed easily, rapidly and neatly, without the production of sawdust and with an unbroken marginal flange adapted to enable the severed portion to be inverted and replaced in the carton and secured to the sides or walls thereof after the original contents of the carton have been removed and the carton refilled with similar or other goods, thereby enabling the carton, uninjured, to be used a plurality of times.

A further object of the invention is to provide a paper box opener of this character with a cutter adapted to penetrate or cut completely through the walls of the carton and to provide an interior runner movable along the inner faces of the walls of the carton in advance of the acting portion of the cutter and adapted to form a guard for the same to prevent the blades of the cutter from coming in contact with and injuring any of the contents of the carton.

Another object of the invention is to provide a paper box and carton opener adapted to enable an initial cut to be easily made in a box or carton at a corner thereof to permit the guard runner to be easily inserted.

Another object of the invention is to provide a paper box and carton opening machine provided with means adapted to form a guard or shield for the cutter and capable of preventing the same from coming in contact with the operator both when the device is in use and when not in operation.

Another object of the invention is to equip the box and carton opener with a yieldable guard and guide having rollers adapted to bear on the exterior surface of the box or carton to facilitate the operation of the device when in use and capable, when the device has completed a cutting operation and is removed from the box or carton, of moving

inwardly with respect to the cutter to assist in forming a complete guard for the same to prevent accidental contact of the operator with the cutter and to enable a cutter to continue its motion with perfect safety to the operator while transferring the device from one carton to another.

With these and other objects in view, the invention consists in the construction and novel combination and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and set forth in the claims hereto appended, it being understood that various changes in the form, proportion and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit of the invention or sacrificing any of the advantages thereof.

In the drawings,

Figure 1 is a side elevation of a paper box opener constructed in accordance with this invention.

Fig. 2 is a plan view of the same.

Fig. 3 is a longitudinal sectional view, partly in elevation, showing the paper box opener applied to a carton.

Fig. 4 is a reverse plan view of the paper box opener, the gear housing being removed to show the gearing.

Fig. 5 is an enlarged transverse sectional view taken substantially on the line 5—5 of Fig. 3, parts being omitted.

Fig. 6 is a perspective view of a paper box or carton with the line of cut for severing the top from the body indicated in dotted lines.

Fig. 7 is a similar view showing the severed top inverted and arranged within the walls of the carton to form a closure for the same.

Fig. 8 is an enlarged detail sectional view through one side of the carton, showing the arrangement of the top within the walls of the carton to form a closure for the same.

Fig. 9 is a plan view of a paper box opener illustrating another form of the invention.

Fig. 10 is a longitudinal sectional view on the line 10—10 of Fig. 9.

In the accompanying drawings, the paper box and carton opener comprises in its construction an electric motor 1 of the ordinary

construction adapted to be operated by the current from the ordinary supply of a lighting circuit. The sleeve or tubular extension 2 of the casing of the motor adjacent one end of the armature shaft has mounted on it a substantially U-shaped bearing bracket 3 secured to the said extension 2 of the casing by means of a split collar 4 having an adjusting screw 5 for clamping it on the tubular extension or bearing portion 2, but the bearing bracket may be connected in any other desired manner with the casing of the motor. The sides 6 and 7 of the U-shaped bracket are provided with transversely aligned bearings for the reception of a transversely disposed cutter shaft 8 arranged at right angles to the armature shaft and operatively connected to the same by means of bevel gears 9 and 10 located between the sides of the bearing bracket and mounted respectively on the cutter shaft and the adjacent end of the armature shaft. The gears may be of any desired ratio to secure the desired reduction in the speed of the cutter shaft, and they are housed within a substantially U-shaped casing or housing 11 suitably secured to the bearing bracket, as clearly illustrated in Fig. 2 of the drawings. The cutter shaft extends laterally from one side of the bearing bracket 3 and is journaled in a suitable bearing 12 carried by the bearing bracket and by a frame 13 consisting substantially of an oblong plate arranged at one side of the motor in spaced relation with the same and extending in advance of the motor and connected with the bearing bracket and the motor casing by arms 14 and 15 suitably secured to the inner face of the plate or body portion of the frame 13. The plate or body portion of the frame 13 is provided at its ends and at one of its longitudinal edges with a marginal flange and at one of its longitudinal edges with a marginal flange 16 which is rounded to present an outer convex surface. The front or outer arm 14 is approximately L-shaped, and has terminal attaching portions and the inner or rear arm 15 is approximately U-shaped to form a transversely disposed connecting portion and terminal attaching portions, as clearly illustrated in Fig. 2 of the drawings. The frame, however, may be varied in construction and may be connected with the motor casing and the bearing bracket in any other desired manner, as will be readily understood.

Mounted on the outer end of the cutter shaft is a rotary star wheel cutter 17 having cutting blades or portions beveled at both sides so as to cut the side walls of a box or carton without making any sawdust or dirt. The outer or upper portion of the star wheel cutter is protected by means of a substantially segmental guard 18 approximately L-shaped in cross section and located at the outer side of the star wheel cutter and extending across the cutting blades thereof in spaced relation with the

same, as clearly illustrated in Fig. 5 of the drawings. The shaft 8 is preferably provided at its outer end with a socket 19 into which a screw 20 is threaded for securing the star wheel cutter to the shaft, and a washer 21 is preferably interposed between the head of the screw and the side face of the cutter, but the cutter may be mounted on the shaft in any other desired manner. The oblong plate or body portion of the frame 13 presents a flat surface to the outer face of the carton top 22, while the same is being severed from the walls 23 of the body of the carton, as clearly illustrated in Fig. 5 of the drawings, and the star wheel cutter is spaced from the outer face of the frame 13 a sufficient distance to leave a flange 24 on the severed portion 22 of the desired width.

The device during the cutting operation is supported by means of a shoe 25 and a pair of rollers 26 carried by a spring arm 27 and movable to a position for use with their peripheries in alignment with the face of the shoe as illustrated in Fig. 3 of the drawings, and to a position in front of the cutter and adjacent a runner guide 28, as illustrated in Fig. 1 of the drawings, to form a guard for the front portion of the rotary cutter and prevent an operator or other person from coming in contact with the cutter. The supporting shoe, which is provided at its inner longitudinal edge with an attaching flange 29, is secured by screws or other suitable fastening means to the frame 13. The front portion of the shoe extends in advance of the flange and is provided with a longitudinal slot 30 for the passage of the rotary cutter, and the front terminal portion 31 of the shoe is bent at an angle and is arranged at an inclination with respect to the body portion of the shoe. When the shoe is arranged in a horizontal position upon the wall being severed, the inclined portion 31 extends upwardly and forwardly and the rear terminal portion 32 is curved upwardly as shown. This will enable the shoe to slide freely in a backward or forward direction on the wall operated on by the rotary cutter, and the cutting operation may be performed when the severed walls are in a vertical position by running the device around the box, or the box or carton may be laid on the side for cutting the wall at the top, the carton being partially rotated to present its walls at the top for cutting.

The spring arm 27, which is pivotally connected at one end with the frame 13 by means of a suitable pivot 33 mounted on the segmental cutter guard 18, is angularly bent at 34 to offset its free end laterally and outwardly to provide sufficient space for the rollers 26 which are mounted on a suitable spindle 35 and which are spaced apart by means of a suitable spacer 36 also mounted on the spindle 35. The spindle 35 is suit-

ably secured to the spring arm at the free end thereof and the arm is actuated by a coiled spring 37 secured at one end to the angularly bent portion 34 of the arm, and at its other end to a lug or projection 36 of the shoe 25. The spring is distended when the rollers are moved outwardly to the limit of their movement, as shown in Fig. 3 of the drawings, and when the device is removed from a box or carton after the cutting operation has been completed, the spring arm and the rollers are moved inwardly by the spring 37 to the position illustrated in Fig. 1. The rollers are automatically moved outwardly in placing the device in position on a box or carton, and they are limited in their outward movement by a suitable stop 38 which may be an anti-friction stop or any other suitable means for limiting the outward movement of the spring arm and the rollers. When the rollers 26 are moved inwardly by the spring the front portion of the rotary cutter is received in the space between the rollers.

The guard runner 28, which consists of a curved horn shaped plate, extends downwardly and forwardly beneath the rotary cutter and is suitably secured at its inner or rear end to the shoe, and it is tapered towards its front end, which bears against the inner face of the wall of the box or carton, as clearly illustrated in Fig. 3 of the drawings, to prevent the rotary cutter from coming in contact with any of the contents of a carton. The runner extends through the kerf 39 cut by the rotary cutter, and it is beveled at the outer side at 40 adjacent the cutter and the kerf for spreading the severed portions of the carton to prevent the same from binding against the rotary cutter and interfering with the operation of the same.

In starting to cut a carton, the device is placed in position against one corner of the carton, and is pressed inwardly or rearwardly until the cutter strikes the corner and severs and cuts a slot therein of sufficient size to permit the interiorly arranged runner guard to be introduced into the carton through the said slot. The device is pressed inwardly against the side wall of the carton until the rollers reach the limit of their outward movement. This initial cutting is done with a slight backward movement of the device and an initial cut is made of sufficient size to enable the guard or runner guide to be readily introduced into the carton. Owing to the blunt character of the front end of the guard or runner guide it would be impossible to place the guard or guide in position without this initial cut. When the rollers are at the limit of their outward movement, as illustrated in Fig. 3 of the drawings, they are spaced from the front inclined portion 31 of the shoe and this provides a substantially triangular space to receive the corner of

the box in making the initial cut. When the rollers 26 are at the limit of their outward movement and rigidly held against further outward movement they assist in supporting the cutter in operative position, as clearly shown in Fig. 3 of the drawings. The device is then moved forwardly, the cutter rotating in the direction of the arrow to assist the feeding of the device and the rollers and the shoe permitting the device to slide freely on the surface of the carton during the cutting of the carton. By spreading the kerf and providing means for enabling the device to slide freely on the walls of a carton, a flanged top may be cut from the carton, subsequently to provide a cover or closure for the carton. This will enable the sealed cover of the carton to be left unbroken and intact and the severed top 22 with its flange 24 may be inverted to the position shown in Figs. 7 and 8 of the drawings, and the flange 24 may be secured to the walls of the carton by any suitable means. The box opener may operate on a box a number of times and the cutter may be spaced from the frame any suitable distance for cutting the body of the box in a plane in parallelism with one of its walls to provide a flange of the desired width on the severed wall. While a pivoted spring actuated arm is provided for mounting the spaced rollers, any suitable means may be employed for yieldably mounting the rollers and for limiting the outward movement with respect to the cutter so that the rollers will operate as a guard for the cutter when not pressed outwardly therefrom during the operation of the device on a carton, and will also assist in slidably supporting the device on a carton during the cutting operation.

It is preferable to sever the top wall of a box or carton, as the address on the box or carton is usually placed upon the top thereof, and when the top is severed and inverted and placed within the body of the carton to form a closure for the same, the original address, which is located interiorly of the box or carton, may be left intact either for purposes of identification or to avoid the necessity of removing the address to provide a blank space for a new address. The bottom or any one of the side walls may, of course, be cut from the body of the carton to form a closure for the same, if desired. Also, in cutting the top wall or other wall, instead of entirely severing the same, only three of the side walls may be severed, leaving the top connected with the remaining side wall. This will form a hinge connection with the top and will prevent the same from being lost from the body of the carton. The hinge connection will permit the top to be raised and lowered, to open and close the box or carton. In practice the walls of the carton at the open top will stretch or expand sufficiently to enable the severed top to be inserted in position to form

a cover for the open top of the box or carton. Also if desired, a cut can be made in the side wall of the carton, preferably in a corner, to allow for expansion to receive the severed top.

A sight opening 41 is preferably provided in the plate or body portion of the frame 13 to enable the operator to see if the cutting operation is progressing satisfactorily.

10 Instead of employing gearing for connecting the transverse cutter shaft with the armature shaft, a rotary cutter 42 may be mounted directly on the armature shaft 43, as illustrated in Fig. 9 of the drawings. The device
15 is provided with a handle 44 having at its inner end a fork 45 closely fitting the motor and suitably secured to the casing 46 thereof. The lead in wires 46 extend through the handle, which is provided with a suitable switch
20 47, and the latter may be of the push button type or any other desired construction.

The handle 44 extends from the side of the motor at any convenient angle, preferably at a right angle. This handle is split longitudinally to form two sections which are connected by transverse screws 52, adapted to be removed to permit the sections to be separated. After removing the cutter 42 and the screws 52 and the three screws from the fork
30 45 at each end of the motor, the entire motor may be removed, in effect, separating the motor from the unitary device.

The frame 48 is provided with the arms 49 formed integral with the frame and cast integral with the fork 45 of handle 44. The guard 50 and the shoe 51 are integral with the frame. The other features of the invention are substantially the same as the construction heretofore described.

40 What is claimed is:

1. A box opener of the class described including a motor, a rotary cutter actuated by the motor and a fixed guard extending from a point in rear of the cutter around the effective portion thereof to a point in advance of the same, whereby the guard in the operation of cutting and opening a carton will project through the kerf made by the cutter and will extend along the wall of the carton being
45 cut to a point in advance of the kerf and contact at its terminal with an uncut portion of the said wall to space the contents of the carton completely from the cutter.

2. A box opener of the class described including a motor, a rotary cutter actuated by the motor and a fixed guard extending from a point in rear of the cutter around the effective portion thereof to a point in advance of the same, whereby the guard in the operation of cutting and opening a carton will project through the kerf made by the cutter and will extend along the wall of the carton being cut to a point in advance of the kerf and contact at its terminal with an uncut portion
60 of the said wall to space the contents of the

carton completely from the cutter, said guard being bevelled at the front edge of its rear portion to travel readily along the kerf and spread the the walls thereof.

3. A box opener of the class described including a motor, a rotary cutter actuated by the motor, a shoe arranged to slide on a carton for supporting the box opener thereon and to limit the penetration of the rotary cutter, a fixed guard extending from the shoe at a point in rear of the cutter and around the effective portion thereof to a point in advance of the same, whereby the guard in the operation of cutting and opening a carton will project through the kerf made by the cutter and will extend along the wall being cut to a point in advance of the kerf and contact at its terminal with an uncut portion of the said wall to space the contents of the carton completely from the cutter, a roller arranged in advance of the cutter, and means for movably mounting the roller to permit inward and outward movement of the roller toward and from the guard and for rigidly limiting such movement, said roller when at the limit of its outward movement being in peripheral alignment with the plane of the shoe and adapted to run on the wall being cut to cooperate with the shoe and said roller when at the limit of its inward movement being located adjacent the guard to cooperate with the latter.

4. A box opener of the class described including a motor, a rotary cutter actuated by the motor, a shoe arranged to slide on a carton for supporting the box opener thereon and to limit the penetration of the rotary cutter, a fixed guard extending from the shoe at a point in rear of the cutter and around the effective portion thereof to a point in advance of the same, whereby the guard in the operation of cutting and opening a carton will project through the kerf made by the cutter and will extend along the wall being cut to a point in advance of the kerf and contact at its terminal with an uncut portion of the said wall to space the contents of the carton completely from the cutter, a pair of rollers arranged in advance of the cutter, a pivoted arm carrying said rollers and arranged to swing inwardly and outwardly to carry the rollers toward the said guard, means for rigidly limiting the inward and outward movement of the rollers, said rollers when at the limit of their outward movement being in peripheral alignment with the shoe and cooperating with the same and when at the limit of their inward movement cooperating with the guard, and a spring connected with the arm for urging the same and the rollers inwardly.

5. A box opener of the class described including a motor, a rotary cutter actuated by the motor, means for slidably fitting against a carton for limiting the penetration of the

cutter, a roller arranged in advance of the rotary cutter, means for mounting the same to permit the roller to move inwardly and outwardly and for rigidly limiting such inward and outward movement, said roller when at the limit of its outward movement being in peripheral alignment with the said slidable means and cooperating with the same in limiting the penetration of the cutter, and yieldable means for urging the roller inwardly to form a guard for the said cutter.

6. A box opener of the class described including a motor, a rotary cutter actuated by the motor, means for slidably fitting against a box or carton to limit the penetration of the rotary cutter, a pair of spaced rollers located in advance of the cutter, a pivoted arm carrying the rollers and arranged to swing inwardly and outwardly, means for rigidly limiting the inward and outward movement of the arm and the rollers, said rollers when at the limit of their outward movement being in peripheral alignment with the slidable means, and a spring connected with the arm for urging the same and the rollers inwardly to form a guard for the cutter.

7. A box opener of the class described including a rotary cutter, a shoe arranged to slide on a carton to support the cutter in operative position thereon for limiting the penetration of the cutter, said shoe being provided at its front with an inclined portion exposing the cutter for cutting a kerf in the corner of a carton, a fixed guard extending from the shoe at a point in rear of the cutter around the effective portion thereof to a point in advance of the cutter, whereby the guard in the operation of cutting and opening a carton will project through the kerf made by the cutter and extend along the wall being cut to a point in advance of the kerf and in contact at its terminal with an uncut portion of the said wall, a roller arranged in advance of the cutter, means for mounting the roller to permit the same to move inwardly and outwardly toward and from the said guard, said roller when at the limit of its outward movement being in peripheral alignment with the shoe and when at the limit of its inward movement being located adjacent the cutter and cooperating with the said guard, said roller when at the limit of its outward movement forming with the inclined portion of the shoe an approximately triangular space to receive the corner of a carton to permit the cutter to make an initial cut therein to enable the guard to be introduced into the carton.

In testimony whereof I have hereunto set my hand this 24 day of August, 1931.

WILLIAM P. STEIN.