

PATENT SPECIFICATION

846,340

DRAWINGS ATTACHED.

Inventor:—FRANK BRENT



Date of filing Complete Specification : Jan. 8, 1959.

Application Date : Jan. 28, 1958. No. 2800/58.

Complete Specification Published : Aug. 31, 1960.

Index at Acceptance :—Class 125(2), E3(B2D : D6).

International Classification :—B67b.

COMPLETE SPECIFICATION.

A Method of and Apparatus for Applying Metal Foil and like Thin Sheet Material to a Surface to be Covered thereby.

We, THE KIWI POLISH CO. PTY. LTD., of Burnley Street, Richmond, Victoria, Australia, a Company incorporated under the Laws of Victoria, Commonwealth of Australia, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of and apparatus for severing and applying thin sheet material such as metal foil to a flat surface to be covered thereby.

It is known to place aluminium foil discs of less than .04 mm. thickness on filled tins of shoe polish and the like and to cause the peripheral edge of the disc to be turned down around the outside upper edge of the body of the tin by the application of the lid so that the disc is held firmly by the lid when this is fitted on to the body of the tin, this operation being effected by applying a pre-cut disc by hand to the surface of the material in the filled tin. It is known to shear the disc of foil or other material by means of a punch and die. A disadvantage of this known method of producing the foil discs is that with foil of less than .040 mm. thickness after relatively little use the punch ceases to shear the material cleanly, and traces of aluminium or other matter from the foil are left on the inside of the shearing machine, causing the machine to become clogged and inoperable.

The object of the invention is to provide a method and apparatus which will sever the

foil (or other thin sheet material) without the disadvantages above referred to and will enable the whole operation to be effected mechanically and in one continuous process with consequent economy in time and labour.

With the foregoing object in view the method according to the invention consists in intermittently feeding a continuous strip or web of sheet material such as metal foil into a tearing or severing station, rigidly clamping in the tearing or severing station an area of the sheet material from which a piece is to be torn, feeding an article bounded by the surface to be covered by the sheet material into the tearing or severing station in which it is aligned with and disposed on one side of the clamped area of the strip or web of sheet material, moving a plunger against the other side of the clamped area of the strip of sheet material to tear or sever a piece from the strip, holding the severed piece on the plunger by suction and continuing the movement of the plunger until the piece held thereon is deposited on the surface to be covered, releasing the suction and admitting pressure fluid to act on the deposited piece to separate it from the plunger and withdrawing the plunger in readiness for the next succeeding operation.

The method may further consist in using a plunger having a cup-shaped end arranged to act on the sheet material to tear a disc therefrom, this cup-shaped end, and consequently the disc torn from the strip of sheet material, having a somewhat larger diameter than that of the surface to be covered, and

pressing the peripheral edge of the disc over and on to the outer peripheral edge either of the surface to which the disc is applied or of a container having an open end bounded by the said surface.

Apparatus made in accordance with the invention for covering flat surfaces with thin sheet material such as metal foil comprises means for intermittently feeding a continuous strip of metal foil or like thin sheet material into a severing station comprising a plunger co-operating with, and disposed on one side of, a die formed by two apertured die plates between which the continuous strip is fed, means for moving the two die plates together to clamp rigidly therebetween an area of the strip from which the piece to be applied to the surface to be covered is to be torn, means for successively and intermittently feeding the articles bounded by the surfaces to be covered into and out of the severing station, means for moving the plunger on to the clamped area of the strip to tear a piece therefrom and for continuing this movement of the plunger until the torn piece is applied to the surface to be covered, means for exerting suction on the torn piece to hold it on to the plunger until the piece has been applied to the surface and thereupon relieving the suction, means for exerting pressure on the torn piece after the suction has been removed to separate the piece from the plunger, and means for withdrawing the plunger in readiness for the next operation.

The end of the plunger which acts on the strip of thin sheet material may be of cup shape so as to provide an annular cutting or tearing edge to act on the strip to tear a disc therefrom.

The external diameter of the end of the plunger which acts on the strip of sheet material, and consequently the diameter of the disc torn from the strip, may be somewhat larger than that of the surface to be covered, and the apertures in the die plates may be of like diameter and arranged coaxially, the diameter of these apertures being somewhat larger than that of the external diameter of the plunger to facilitate the passage of the plunger through the aperture.

The internal diameter of the recess in the cup-shaped end of the plunger may be somewhat larger than that of the surface to be covered by the disc torn out of the strip of sheet material by the plunger, whereby during the continued movement of the plunger the peripheral edge strip of the disc is pressed by the internal wall of the cup over and on to the outer peripheral edge of the article bounded by the said surface.

The accompanying drawings illustrate one embodiment of apparatus suitable for carrying the invention into effect.

In the drawings:—

Figure 1 illustrates a diagrammatic layout of the apparatus;

Figure 2 illustrates the plunger in vertical section;

Figure 3 is an underneath plan view of Figure 2;

Figure 4 illustrates the plunger about to sever a foil disc preparatory to applying the severed disc on to a filled tin;

Figure 5 illustrates continued movement of the plunger after severing the foil disc; and

Figure 6 illustrates the application of the severed foil disc on to the surface of the material in a filled tin and around the peripheral edge of the latter.

The apparatus shown in the drawings is particularly intended for the severance and application of aluminium foil disc having a thickness of less than .040 mm. to the surface of filled tins of shoe polish. The apparatus comprises a tearing or severing station consisting of a plunger 10 co-operating with upper and lower apertured die plates 11, 12, a roller pair 13, for intermittently withdrawing a web or ribbon 14 of metal, e.g. aluminium foil, from a reel 15, and forwarding it between the die plates 11, 12, a roller pair 16 for intermittently forwarding the shred 14¹ of the web to a wind-up reel 17, and means (not shown in the drawings) for intermittently feeding the articles bounded by the surfaces to be covered by the foil discs torn by the plunger from the web 14 into a position in which they are disposed axially below the die plates 11, 12. In the present embodiment the foil discs are to be applied to the exposed surface of shoe polish or like dressing contained in tins 8.

The top of the plunger 10 is connected to the lower end of a rod 10¹ and its lower end is of cup shape, a circular recess 9 (see Figures 2 and 3) being formed in its lower surface. A plug 19 of porous foam plastic material is fixed in so as to fill the recess 9, the outer surface of the plug being flush with the lower end of the wall of the plunger surrounding the recess this lower end being machined flat. An annular series of suction passages 18 is bored in an axial direction through the wall of the plunger surrounding the recess 9 these passages communicating at their inner ends with an annular suction passage 20 formed in the solid part of the plunger above the closed end of the recess, this annular passage 20 communicating with a duct 21 extending through the solid part of the plunger and arranged for connection to a vacuum pump. Another duct 22 bored through the solid part of the plunger 10 communicates at its inner end with the recess 9 and is arranged for connection at its outer end to a source of compressed air, the supply from which will be controlled by a suitably located valve.



2-

Each of the two die plates 11, 12 is formed with a central aperture 11¹ or 12¹, these two apertures being coaxial and having the same diameter which diameter is equal to the desired diameter of the disc to be torn out of the web 14 and somewhat greater than the diameter of the surface to be covered. The apertures 11¹, 12¹ are also axially aligned with the plunger 10 and the diameter of these apertures is somewhat greater than the diameter of the plunger, so that during the tearing operation a clearance of 0.005 in. is provided between the outer periphery of the wall of the plunger and the peripheral edges of the apertures 11¹, 12¹. The die plates are movable towards and away from each other and means (not shown in the drawings) are provided for moving the two die plates 11, 12 together immediately prior to the tearing operation so as to clamp the foil firmly between them during this operation, and for thereafter moving the plates apart to allow the forward feed of the web to be effected.

In the embodiment shown in the drawings the diameter of the recess 9 in the plunger is a little greater than the outside diameter of the open end of the tin 8, so that there is a clearance of approximately 0.003 in. between the inner wall surface of the recess 9 and the outer surface of the wall of the tin. When these tins are formed as shown in the drawings, with an external peripheral shoulder 23 adjacent to the open edge of the body part, on which shoulder the edge of the lid bears when it is applied to the tin, the wall of the body being of somewhat reduced diameter above this shoulder, the clearance referred to would extend only to the outer surface of the wall of the tin above the shoulder.

The operation is as follows:—

The foil web or ribbon 14 is fed intermittently from the supply reel between the two die plates 11, 12 which, after each intermittent feeding movement of the foil are moved tightly together as shown in Figure 4 to clamp firmly between them a length of the foil from which the next disc is to be torn out. Simultaneously with each forward movement of the foil a tin 8 filled with shoe polish is fed by known mechanical means before the lid is fitted thereon into a position below the two die plates in which it is axially aligned with the apertures in the two plates. The plunger with suction "on" and compressed air "off" is now operated and passes through the apertures 11¹, 12¹ in the die plates 11, 12 into contact with the foil clamped between the plates and thereby severs a disc 25 (see Figure 5) from the foil. At the moment when this operation occurs the disc 25 is caused to adhere closely to the outer end of the plunger by reason of the suction exerted through the suction passages 18 in the wall of the plunger surrounding the recess. A high degree of suction is neces-

sary to ensure that the disc will tear evenly all round and be severed cleanly and simultaneously around the whole of its periphery without leaving any remnants of the foil in the die plates. The plunger 10 continues to move downwards after severance of the foil disc, which continues to be held firmly in contact with the surface of the plunger during this further movement thereof by the suction acting through the suction passages 18 until the disc 25 comes into contact with the surface of the filled tin of polish below the die plates and is pressed against this surface by the resilient plug 19 of foam plastic in the recess 9 in the plunger. For the reasons above explained the diameter of the foil disc severed by the plunger is a little greater than the diameter of the recess 9 in the plunger and of the surface to be covered thereby so that its peripheral edge projects over the open edge of the tin. The wall of the plunger surrounding the recess moves (see Figure 6) over the open top of the tin and presses the projecting peripheral edge 14¹ (see Figure 6) of the foil disc on to the outer surface of this wall.

On the completion of the operation the suction is shut off and the compressed air valve is operated to admit compressed air through the recess 9 which compressed air passes through the porous plug and is directed on to the foil disc to separate it from the surface of the plunger and ensure that it remains in position on the surface of the polish during the subsequent withdrawal of the plunger.

Suitable means for intermittently operating the various parts of the apparatus in the required timed relationship can be readily designed by those skilled in the art and for this reason it is believed not to be necessary to describe these operating means.

WHAT WE CLAIM IS:—

1. The method of covering flat surfaces with thin sheet material such as metal foil consisting in intermittently feeding a continuous strip or web of the sheet material into a tearing or severing station, rigidly clamping in the tearing or severing station an area of the sheet material from which a piece is to be torn, feeding an article bounded by the surface to be covered by the sheet material into the tearing or severing station in which it is aligned with and disposed on one side of the clamped area of the strip or web of sheet material, moving a plunger against the other side of the clamped area of the strip of sheet material to tear or sever a piece from the strip, holding the severed piece on the plunger by suction and continuing the movement of the plunger until the piece held thereon is deposited on the surface to be covered, releasing the suction and admitting pressure fluid to act on the

Each of the two die plates 11, 12 is formed with a central aperture 11¹ or 12¹, these two apertures being coaxial and having the same diameter which diameter is equal to the desired diameter of the disc to be torn out of the web 14 and somewhat greater than the diameter of the surface to be covered. The apertures 11¹, 12¹ are also axially aligned with the plunger 10 and the diameter of these apertures is somewhat greater than the diameter of the plunger, so that during the tearing operation a clearance of 0.005 in. is provided between the outer periphery of the wall of the plunger and the peripheral edges of the apertures 11¹, 12¹. The die plates are movable towards and away from each other and means (not shown in the drawings) are provided for moving the two die plates 11, 12 together immediately prior to the tearing operation so as to clamp the foil firmly between them during this operation, and for thereafter moving the plates apart to allow the forward feed of the web to be effected.

In the embodiment shown in the drawings the diameter of the recess 9 in the plunger is a little greater than the outside diameter of the open end of the tin 8, so that there is a clearance of approximately 0.003 in. between the inner wall surface of the recess 9 and the outer surface of the wall of the tin. When these tins are formed as shown in the drawings, with an external peripheral shoulder 23 adjacent to the open edge of the body part, on which shoulder the edge of the lid bears when it is applied to the tin, the wall of the body being of somewhat reduced diameter above this shoulder, the clearance referred to would extend only to the outer surface of the wall of the tin above the shoulder.

The operation is as follows:—

The foil web or ribbon 14 is fed intermittently from the supply reel between the two die plates 11, 12 which, after each intermittent feeding movement of the foil are moved tightly together as shown in Figure 4 to clamp firmly between them a length of the foil from which the next disc is to be torn out. Simultaneously with each forward movement of the foil a tin 8 filled with shoe polish is fed by known mechanical means before the lid is fitted thereon into a position below the two die plates in which it is axially aligned with the apertures in the two plates. The plunger with suction "on" and compressed air "off" is now operated and passes through the apertures 11¹, 12¹ in the die plates 11, 12 into contact with the foil clamped between the plates and thereby severs a disc 25 (see Figure 5) from the foil. At the moment when this operation occurs the disc 25 is caused to adhere closely to the outer end of the plunger by reason of the suction exerted through the suction passages 18 in the wall of the plunger surrounding the recess. A high degree of suction is neces-

sary to ensure that the disc will tear evenly all round and be severed cleanly and simultaneously around the whole of its periphery without leaving any remnants of the foil in the die plates. The plunger 10 continues to move downwards after severance of the foil disc, which continues to be held firmly in contact with the surface of the plunger during this further movement thereof by the suction acting through the suction passages 18 until the disc 25 comes into contact with the surface of the filled tin of polish below the die plates and is pressed against this surface by the resilient plug 19 of foam plastic in the recess 9 in the plunger. For the reasons above explained the diameter of the foil disc severed by the plunger is a little greater than the diameter of the recess 9 in the plunger and of the surface to be covered thereby so that its peripheral edge projects over the open edge of the tin. The wall of the plunger surrounding the recess moves (see Figure 6) over the open top of the tin and presses the projecting peripheral edge 14¹ (see Figure 6) of the foil disc on to the outer surface of this wall.

On the completion of the operation the suction is shut off and the compressed air valve is operated to admit compressed air through the recess 9 which compressed air passes through the porous plug and is directed on to the foil disc to separate it from the surface of the plunger and ensure that it remains in position on the surface of the polish during the subsequent withdrawal of the plunger.

Suitable means for intermittently operating the various parts of the apparatus in the required timed relationship can be readily designed by those skilled in the art and for this reason it is believed not to be necessary to describe these operating means.

WHAT WE CLAIM IS:—

1. The method of covering flat surfaces with thin sheet material such as metal foil consisting in intermittently feeding a continuous strip or web of the sheet material into a tearing or severing station, rigidly clamping in the tearing or severing station an area of the sheet material from which a piece is to be torn, feeding an article bounded by the surface to be covered by the sheet material into the tearing or severing station in which it is aligned with and disposed on one side of the clamped area of the strip or web of sheet material, moving a plunger against the other side of the clamped area of the strip of sheet material to tear or sever a piece from the strip, holding the severed piece on the plunger by suction and continuing the movement of the plunger until the piece held thereon is deposited on the surface to be covered, releasing the suction and admitting pressure fluid to act on the





deposited piece to separate it from the plunger, and withdrawing the plunger in readiness for the next succeeding operation.

2. The method according to Claim 1 further consisting in using a plunger having a cup-shaped end arranged to act on the sheet material to tear a disc therefrom, this cup-shaped end and consequently the disc torn from the strip of sheet material having a somewhat larger diameter than that of the surface to be covered, and pressing the peripheral edge of the disc over and on to the outer peripheral edge of the article bounded by the said surface.

3. The method according to Claim 1 or 2 for applying a metal foil disc to the exposed surface of a shoe polish or other dressing contained in a tin.

4. Apparatus for covering flat surfaces with thin sheet material such as metal foil, comprising means for intermittently feeding a continuous strip of the thin sheet material into a severing station comprising a plunger co-operating with, and disposed on one side of, a die formed by two apertured die plates between which the continuous strip is fed, means for moving the two die plates together to clamp rigidly therebetween an area of the strip from which a piece to be applied to the surface to be covered is to be torn, means for successively and intermittently feeding the articles bounded by the surfaces to be covered into and out of the severing station, means for moving the plunger on to the clamped area of the strip to tear a piece therefrom and for continuing this movement of the plunger until the torn piece is applied to the surface to be covered, means for exerting suction on the torn piece to hold it on to the plunger until the piece has been applied to the surface and thereupon relieving the suction, means for exerting pressure on the torn piece after the suction has been removed to separate the piece from the plunger, and means for withdrawing the plunger in readiness for the next operation.

5. Apparatus according to Claim 4 wherein the end of the plunger which acts

on the strip of thin sheet material is of cup-shape so as to provide an annular cutting or tearing edge to act on the strip to tear a disc therefrom.

6. Apparatus according to Claim 4 or 5 wherein the external diameter of the end of the plunger which acts on the strip of sheet material, and consequently the diameter of the disc torn from the strip, is somewhat larger than that of the surface to be covered.

7. Apparatus according to Claim 4, 5 or 6 wherein the apertures in the die plates are of like diameter and arranged coaxially, the diameter of these apertures being somewhat larger than that of the external diameter of the plunger.

8. Apparatus according to Claim 6 or 7 wherein the internal diameter of the recess in the cup-shaped end of the plunger is somewhat larger than that of the surface to be covered by the disc torn out of the strip of sheet material by the plunger, whereby during the continued movement of the plunger the peripheral edge strip of the disc is pressed by the internal wall of the cup over and on to the outer peripheral edge of the article bounded by the said surface.

9. Apparatus according to any one of Claims 5 to 8 wherein the plunger is provided with suction passages and with passages for admitting fluid under pressure.

10. Apparatus according to any one of Claims 5 to 8 wherein the recess in the cup-shaped end of the plunger is fitted with a pad or plug of resilient porous material.

11. Apparatus according to any one of Claims 4 to 10 for applying a metal foil disc to the exposed surface of a shoe polish or other dressing contained in a tin.

12. Apparatus for covering flat surfaces with thin sheet material substantially as described with reference to and as illustrated in the accompanying drawings.

McKENNA & CO.,
12 Whitehall, London, S.W.1,
Solicitors for the Applicants.

PROVISIONAL SPECIFICATION.

A Method of and Apparatus for Applying Metal Foil and like Thin Sheet Material to a Surface to be Covered thereby.

We, THE KIWI POLISH CO. PTY. LTD., of Burnley Street, Richmond, Victoria, Australia, a Company incorporated under the Laws of Victoria, Commonwealth of Australia, do hereby declare this invention to be described in the following statement:—

This invention relates to a method of and apparatus for tearing and applying metal foil

and like thin sheet material to a surface to be covered thereby.

It is known to place aluminium foil discs of .012 mm. thickness on filled tins of shoe polish and the like and to cause the peripheral edge of the disc to be turned down around the outside upper edge of the body of the tin by the application of the lid so that the disc is held firmly by the lid when this is fitted on to the body of the tin. So far

as the Applicants are aware this operation has previously been carried out by applying a pre-cut disc by hand to the surface of the material in the filled tin. In previous examples of this type of apparatus it has been the custom to shear the foil or other material by means of a punch and die. After heavy use the punch ceases to shear the material clearly, leaving traces of aluminium or other matter from the foil in the side of the shearing machine and so causing the machine to become clogged and inoperable.

The object of the invention is to provide a method and apparatus which will tear the foil without the disadvantages above referred to and will enable the whole operation to be effected mechanically and in one continuous process with consequent economy in time and labour.

With the foregoing object in view the method according to the invention consists in feeding a web of foil or like thin sheet material (hereinafter referred to as "foil") over the surface to be covered, rigidly clamping a section of the web in position above the said surface, tearing a disc from the clamped section of the web by means of a plunger and suction means incorporated therein pressing the severed disc on to the surface to be covered thereby and withdrawing the plunger after the disc has been applied to the surface.

The method further consists in severing the disc with a diameter somewhat greater than that of the open end of the body of the tin and pressing the peripheral edge of the disc over the outer edge of the body of the tin.

In carrying the method into effect suction may be exerted on the severed disc to cause it to adhere to the surface of the plunger until the disc has been applied to the surface to be covered and thereupon directing a stream of compressed air on to the disc during the subsequent return movement of the plunger to separate the disc from the plunger and hold it in position on the surface to which it has been applied.

Apparatus for carrying out the invention may comprise means for intermittently feeding the foil into a station comprising a die in which a section of the foil from which the disc is to be severed is rigidly clamped and a plunger co-operating with the die to sever the required disc from the clamped foil and to apply the severed disc to the surface to be covered thereby.

The die may comprise two plates having coaxially arranged apertures of like diameter and means for moving the plates together to clamp the foil tightly between them during the tearing operation and away from each other after the tearing operation to permit the passage of the web therebetween, the diameter of the apertures in the plates being

somewhat greater than that of the plunger to facilitate the passage of the plunger through the apertures.

The plunger may be provided with means for applying suction on the severed disc until the latter has been applied to the surface to be covered and with a passage for compressed air which is directed on to the disc after it has been applied to the surface to be covered to separate the disc from the plunger and press it firmly on the surface during the withdrawal movement of the plunger.

The operating surface of the plunger may be formed with a recess in which is secured a pad or plug of resilient porous material, this recess having a diameter somewhat greater than the diameter of the open end of the tin containing the substance to be covered by the disc so that the wall of the plunger surrounding this recess can engage over the edge of the tin and thereby press the peripheral edge of the disc around the edge of the outer wall of the body of the tin.

The apparatus may further comprise means for operating the plunger in timed relationship with the operation of the means for feeding the web of foil, the means for moving the plates to and away from each other, and the means for winding the remainder of the web on to a reel.

One embodiment of the invention will now be described by way of example, this embodiment being particularly designed for the severance and application of aluminium foil discs having a thickness of less than .040 mm. to the surface of filled tins of shoe polish.

In this embodiment of the invention the plunger effecting the severance of the disc has a rod fitted at one end thereof and a circular recess in its other outer end surface with a plug of porous foam plastic material fixed in so as to fill this recess, the outer surface of the porous plug being flush with the outer end of the wall of the plunger surrounding the recess this outer end being machined flat. An annular series of suction passages bored in an axial direction through the wall surrounding the recess communicate at their inner ends with an annular suction passage formed in the solid part of the plunger adjacent the closed end of the recess, this annular passage communicating with a duct extending through the solid part of the plunger and arranged for connection to a vacuum pump. Another duct bored through the solid part of the plunger and through the porous plug communicates with the outer end of the recess and is arranged for connection at its other end to a source of compressed air, the supply of which is controlled by a suitably located valve.

The plunger co-operates with a die comprising two apertured plates located below

the plunger and between which the foil to be operated upon by the plunger is fed.

Each of the two die plates is formed with a central aperture, the apertures in the two plates being coaxial and having the same diameter which is equal to the desired diameter of the disc and somewhat greater than the diameter of the surface to be covered. The apertures in the two plates are axially aligned with the plunger and the diameter of these apertures is somewhat greater than the diameter of the plunger, so that during the tearing operation a clearance of 0.005 ins. is provided between the periphery of the wall of the plunger and the edges of the apertures in the two die plates. Means are provided for moving the two die plates together immediately prior to the tearing operation so as to clamp the foil firmly between them during the punching operation, and for thereafter moving the plates apart to allow the forward feed of the web to be effected.

In the present embodiment the diameter of the recess in the plunger is a little greater than the outside diameter of the open end of the tin, so that there is a clearance of approximately 0.003 ins. between the inner wall surface of the recess and the outer surface of the wall of the tin.

Tins for containing shoe polish and like dressings are sometimes formed with an external peripheral shoulder adjacent to the open edge of the body part, on which shoulder the edge of the lid bears when it is applied to the tin, the wall of the body being of somewhat reduced diameter above this shoulder. In such cases the clearance would extend only to the outer surface of the wall of the tin above the shoulder.

The operation is as follows:—

The foil is fed intermittently from the supply reel between the two die plates which, after each intermittent feeding movement of the foil are moved tightly together to clamp firmly between them a length of the foil from which the next disc is to be torn out. Simultaneously with each forward movement of the foil a filled tin of shoe polish before the lid is fitted thereon is fed by known mechanical means into a position below the two die plates so that it is axially aligned with the apertures in the two plates. The plunger with suction "on" and compressed air "off" is now operated so that it passes through the apertures in the die plates into

contact with the foil clamped between the plates and thereby severs a disc from the foil. At the moment when this operation occurs the torn disc is caused to adhere closely to the outer end of the plunger by reason of the suction exerted through the suction passages in the wall of the plunger surrounding the recess. A high degree of suction is necessary as without such suction the disc will not tear evenly all round. The severance of the disc from the web is thus effected cleanly and simultaneously around the whole periphery of the disc and without leaving any waste traces of the foil in the die plates. The plunger continues to move downwards after severance of the foil disc, which continues to be held firmly in contact with the surface of the plunger during this further movement thereof by the suction acting through the suction passages until the disc comes into contact with the surface of the filled tin of polish below the die plates and is pressed against this surface by the resilient plug in the recess in the plunger. For the reasons above explained the diameter of the foil disc severed by the plunger is a little greater than the diameter of the recess in the plunger and of the surface to be covered thereby so that its peripheral edge projects over the open edge of the tin. The wall of the plunger surrounding the recess moves over the open top of the tin and presses the projecting peripheral edge of the foil disc on to the outer surface of this wall. On the completion of the operation the suction is shut off and the compressed air valve is operated to admit compressed air through the recess in the plunger which compressed air passes through the porous plug and is directed on to the foil disc to separate it from the surface of the plunger and ensure that it remains in position on the surface of the polish during the subsequent withdrawal of the plunger.

It will be understood that the operation above described which is carried out in one continuous operation is repeated intermittently, suitable means controlled by cams or the like being provided for synchronising the movements of the various parts of the apparatus.

MCKENNA & CO.,

12 Whitehall,

London, S.W.1.

Solicitors for the Applicants.