United States Patent

Fish

[15] **3,657,976**

[45] **Apr. 25, 1972**

[54] APPLYING SHEET MATERIAL TO A BOX

[72] Inventor: **Ian Anthony Fish**, 8, Handel Close, Canons Drive, Edgware, England

[22] Filed: **June 8, 1970**

[21] Appl. No.: **44,147**

[30] **Foreign Application Priority Data**

June 6, 1969 Great Britain 28,869/69

[52] **U.S. Cl.** ..... **93/54 R**, 156/290, 156/553

[51] **Int. Cl.** **B31b 15/00**

[58] **Field of Search** ..... 93/54 R, 54.2; 156/290, 553

[56] **References Cited**

UNITED STATES PATENTS

2,009,285	7/1935	Armbruster	93/54.2
2,604,828	7/1952	Langdon	93/54.2
2,075,605	3/1937	Fleischer et al	93/54.2
2,713,813	7/1955	Triolo	93/54.2
2,879,698	3/1959	Triolo	93/54 X

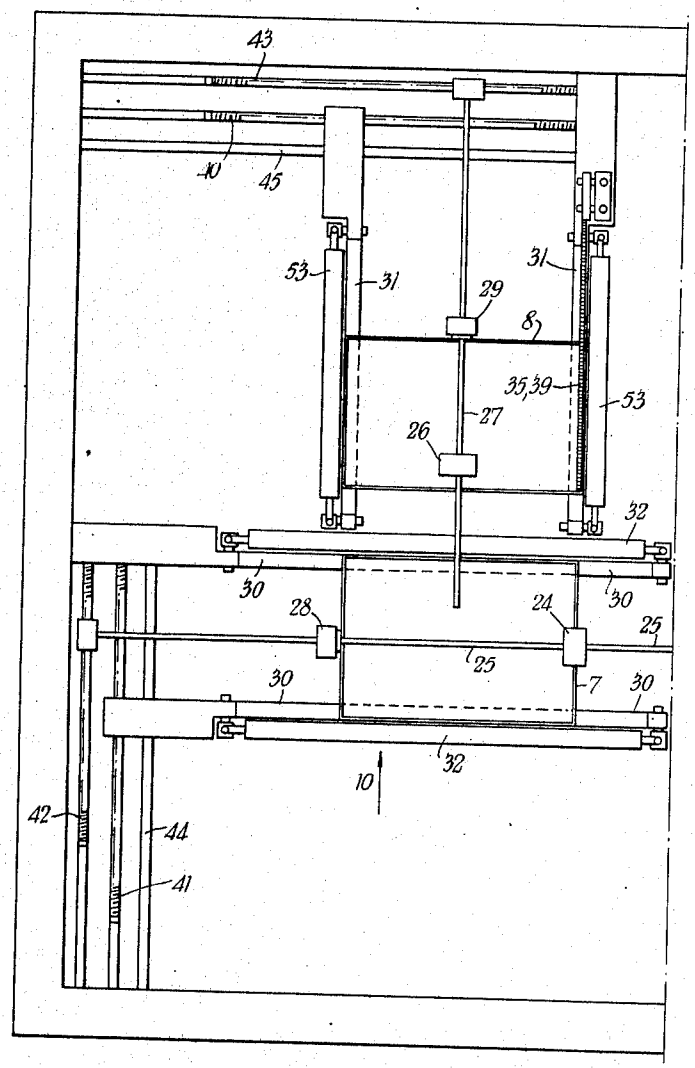
Primary Examiner—Bernard Stickney

Attorney—Waters, Roditi, Schwartz & Nissen

[57] **ABSTRACT**

A piece of sheet material with adhesive on one face is brought into contact with one side of a box, the adhesive facing the box, and spring-loaded presser members are moved simultaneously towards the box. Some of them enter the box and press the side of the box against the sheet material. Others have their advance halted by guard means which prevent them touching the tips of other sides of the box. If the piece of sheet material projects beyond the first-mentioned side of the box, the presser members are prevented by the guard means from touching the projecting parts of the sheet material and these are preferably stuck to the other sides of the box at two further locations.

17 Claims, 5 Drawing Figures



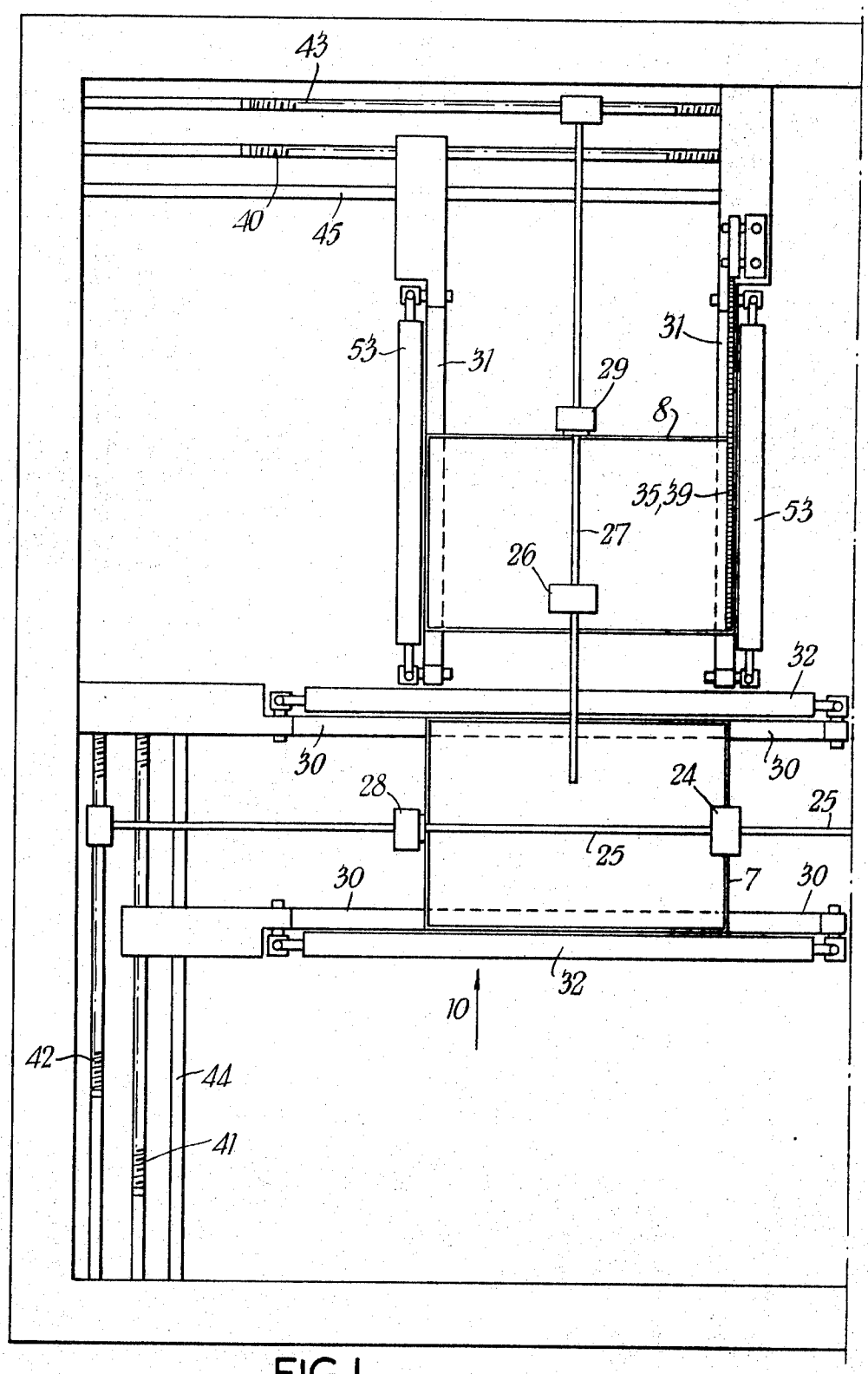

43
40
45
53
31
31
29
8
35,39
53
27
26
32
30
30
28
24
25
25
30
7
30
32
10
42
44
41

FIG. 1

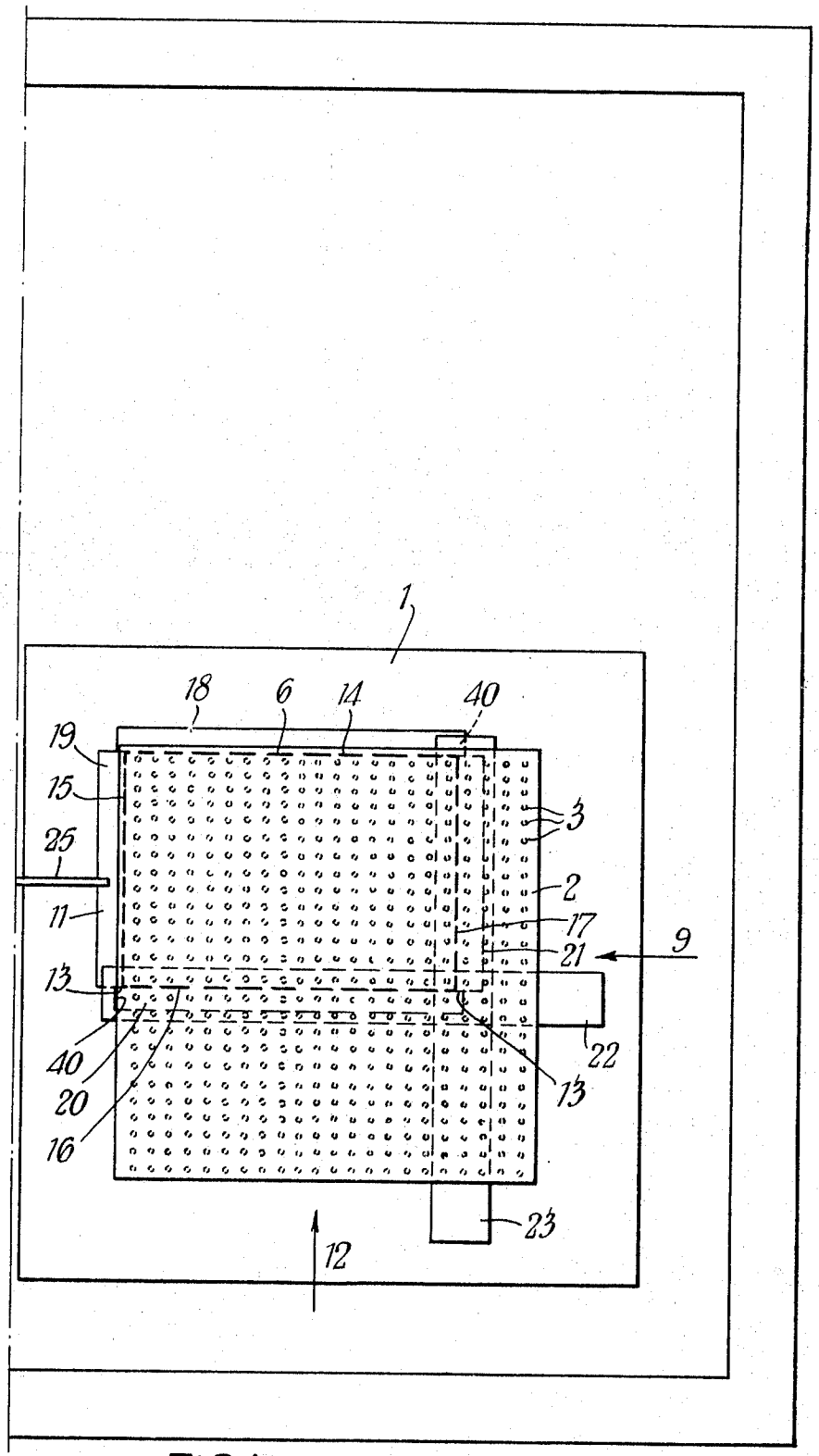
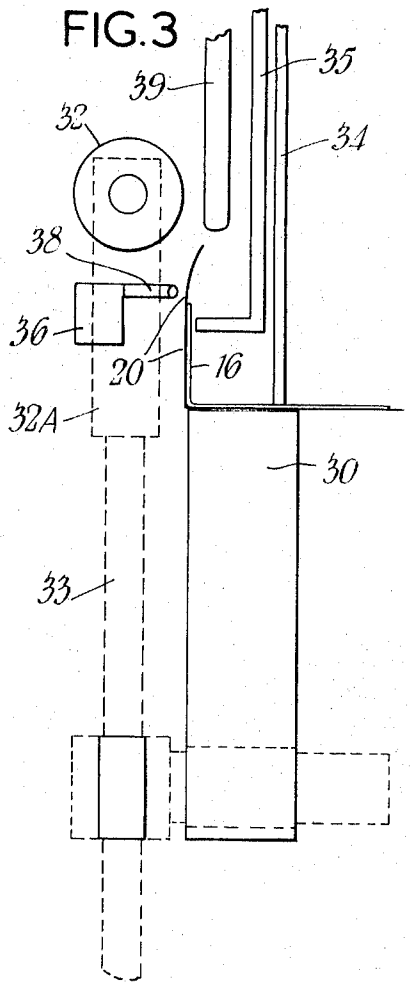


FIG. IA

FIG.3



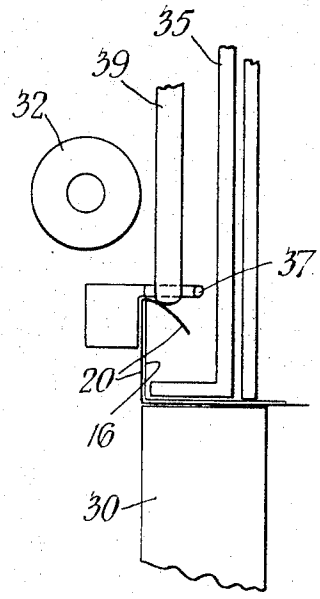


FIG.4

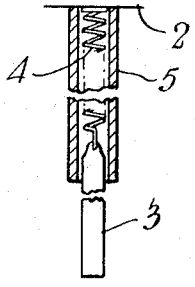


FIG.2

APPLYING SHEET MATERIAL TO A BOX

DESCRIPTION OF THE INVENTION

According to one aspect of the invention, there is provided a method of applying to a box a piece of sheet material which has an adhesive on one face comprising bringing the exterior face of one side of the box into contact with the adhesive face of the sheet material, advancing a plurality of spring-loaded presser members simultaneously with one another towards the box so that some of them enter the box and engage the interior face of said one side of the box and press said one side of the box against said sheet material and ensuring that none of the presser members engage the tips of the other sides of the box by interposing guard means in the paths of presser members which would otherwise engage said tips, which guard means halt the advance of those presser members. Alternatively there is provided a method of applying to a box a piece of sheet material which has an adhesive on one face comprising bringing the exterior face of one side of the box into contact with the adhesive face of the sheet material, advancing a plate towards the box to enter the box, the plate having a length and width substantially equal to the internal length and width of said one side, and engage the interior face of said one side of the box and press said one side of the box against said sheet material.

The box may be of carboard and the sheet material may be paper.

Preferably the piece of sheet material projects on one, some or all sides beyond said one side of the box when the two are brought into contact and said guard means are interposed also in the paths of presser members which would otherwise engage the projecting sheet material. If sheet material projects beyond said one side there are preferably subsequently performed the steps of moving the box with the sheet material from the location in which said one side of the box was pressed against the sheet material to a second location, there bringing two of said projecting parts of the sheet material into contact with the exterior faces of two further and opposite sides of the box, then moving the box with the sheet material from the second location to a third location and there bringing two more of said projecting parts of the sheet material into contact with the exterior faces of two further and opposite sides of the box. Then at each of the second and third locations there are preferably also performed the steps of bracing the two opposite sides of the box, which are brought into contact with the sheet material at that location, by separate bracing devices within and on opposite sides of the box and pressing the sheet material from outside the box against the exterior faces of the two opposite sides of the box. This makes it unnecessary to have a bracing block having a length and width and height substantially equal to the internal length and width and height of the box, as has been necessary in some prior arrangements, which involves the cost of producing different sizes of block when different sizes of box are to be covered.

If the box is moved to the second and third locations as mentioned above there are preferably performed at each of them the steps of turning the two projecting portions of the sheet material, which are brought into contact with two sides of the box at that location, over the tips of these two sides of the box and then bringing them into contact with the interior faces of said sides of the box. In that case there are preferably also performed the steps of bracing the two opposite sides of the box, which are brought into contact with the sheet material at that location, by separate bracing members outside the box and pressing the sheet material from inside the box against the interior faces of the two opposite sides of the box.

According to another aspect of the invention, there is provided apparatus for applying to a box a piece of sheet material which has an adhesive on one face, comprising a flat support for the sheet material, a plurality of spring-loaded presser members mounted above the support, means for moving the presser members simultaneously downwardly towards the support and guard means for positioning above the support for

ensuring that some of the presser members do not move as far as the other towards the support.

The guard means preferably comprises either an L-shaped part or two disconnected bars perpendicular to one another, not necessarily with their axes lying in the same plane.

According to a further aspect of the invention there is provided apparatus for applying the four projecting portions of sheet material, from said one side of the box, which has adhesive on one face to two opposite sides of the box at each of two locations comprising at each location separate rods for supporting the sheet material and box, two separate bracing members which can be lowered within the box, and two rollers to apply the paper onto the exterior of the two sides of the box, and means for turning the two projecting portions of sheet material over the tips of the two sides of the box and then bringing them into contact with the interior faces of said two sides.

The apparatus preferably includes means for carrying out all the method steps described above.

An example in accordance with the invention is described below with reference to the accompanying drawings, in which:

FIG. 1 shows diagrammatically a plan view of an apparatus for covering the outside of a box with a sheet of paper,

FIG. 1A shows the first part of the covering operation,

FIG. 2 shows a side view of a spring-loaded presser member in the apparatus, and

FIGS. 3 and 4 show two successive stages in an operation performed by part of the apparatus.

FIG. 1 shows a flat horizontal support **1** above which is a horizontal plate **2** from which depend a large number of spring-loaded presser members **3**. Each presser member, as shown in FIG. **2**, is in the form of a vertical rod with an eye at its upper end into which is hooked the lower end of a helical wire compression spring **4**, the upper end of the spring being anchored to a tube **5** which is fixed to the plate **2** and within which the spring and the rod slide.

FIG **1** also shows three locations **6**, **7** and **8** at which there are three similar shallow and rectangular cardboard boxes, with no tops, represented by thick lines. Each box is moved in the direction of the arrow **9** to the location **6** and later to the location **7**. Each box is subsequently moved in the direction of the arrow **10** to the location **8** and later away from the illustrated apparatus. At each location part of an operation of covering the box with paper is performed and these parts are performed simultaneously on three boxes.

The first part of the covering operation involves feeding a sheet of paper **11** in the direction of the arrow **12** on to the support **1**. The paper is decorative on the lower face and covered with an adhesive on the upper face and it is rectangular with rectangular pieces removed from its corners and with slits **13** near its corners. Its length and width are greater than those of the boxes. Then a box is moved in the direction of the arrow **9** until it is centrally over the paper and then it is lowered so that the exterior face of its larger side or base comes into contact with the adhesive face of the paper. It is to be noted that the paper and the box are so positioned that the two vertical sides **14** and **15** of the box and the two flaps **18** and **19** of the paper which project beyond the box are not vertically below any of the presser members **3** but the other two sides **16** and **17** of the box and the other two flaps **20** and **21** are vertically below some of the presser members. Above the sides **16** and **17** and the flaps **20** and **21** but below the presser members there are positioned separate horizontal bars **22** and **23** the axes of which are perpendicular but do not lie in the same plane. Then the plate **2** is lowered so that all the presser members **3** begin to descend simultaneously. Some of them enter the box and engage the interior face of the base of the box and press the base of the box against the paper, while others simply engage and press upon the support **1**. The bars **22** and **23** lie in the paths of the others of the presser members and prevent them from engaging the tips or upper edges of the vertical sides **16** and **17** of the box and the flaps **20** and **21** of the paper. The springs connected to these latter presser mem-

bers are compressed more than the other springs. None of the presser members engages the tip of any of the sides **14** to **17** of the box nor any of the flaps **18** and **21** of the paper.

Instead of the two bars **22** and **23**, a single L-shaped member could be employed. Alternatively the first part of the covering operation involves feeding a sheet of paper **11** in the direction of the arrow **12** on to the support **1**. The paper is decorative on the lower face and covered with adhesive on the upper face and it is rectangular with rectangular pieces removed from its corners and with slits **13** near its corners. Its length and width are greater than those of the boxes. Then a box is moved in the direction of the arrow **9** until it is centrally over the paper and then it is lowered so that the exterior face of its larger side or base comes into contact with the adhesive face of the paper. Then a plate **2A** (not shown) which has a length and width substantially equal to the internal length and width of the box is then lowered to enter the box and engage the interior face of the base of the box and press the base of the box against the paper.

When this first part of the covering operation has been completed, the plate **2** or **2A** is raised and the box at the location **6** is moved by a device **24**, which slides along a rail **25** under the action of a hydraulically operated piston and cylinder arrangement, to the location **7** and simultaneously the box at the location **7** is moved by a device **26**, which slides along a rail **27** under the action of another hydraulically operated piston and cylinder arrangement, to the location **8** and the box at that location is moved away. The boxes are halted in their desired positions at the locations **7** and **8** by spring-loaded stops **28** and **29**, respectively. Then the devices **24** and **26** are moved clear of the boxes and are ready to deal with further boxes.

At the location **7** the box rests on two parallel rails **30** and at the location **8** the box rests on two parallel rails **31**. Parallel to the rails **30** are two rollers **32** and parallel to the rails **31** are two rollers **53**, all the rollers being rotatable about horizontal axes.

One of the rollers **32** and one of the rails **30** are shown in FIGS. **3** and **4**, which also show the side **16** of the box and the flap **20** of the paper. The roller **32** shown in FIGS. **3** and **4** is mounted on a support **32A** at the top of a vertical and vertically displaceable rod **33** and when the rod is moved towards the adjacent rail **30** and raised to the position shown in FIG. **3** the flap **20** of the paper is rolled on to the exterior face of the side **16** of the box by the roller, which exerts pressure on the side **16**. Prior to this, however, there is lowered into the position shown in FIG. **4** a bracing device to brace the side **16** of the box. The bracing device has a part **39** which has downwardly extending straight fingers and a part **35** which has fingers which extend first downwardly and then sideways towards the side **16** of the box. After being lowered together until nearly touching the base of the box, the parts **35** and **39** are moved sideways together and comes into contact with the inner face of the side **16** of the box. In this way the box in correctly positioned. Then, still before the roller **32** is raised, two rods **34** are lowered into the corners of the box adjacent the side **16**. These rods press the box against the rails **30** to hold it still. The bracing device prevents the side **16** of the box being deformed by the pressure applied by the roller **32**.

FIGS. **3** and **4** also illustrate how the extremity of the flap **20** is turned over the tip of the side **16** of the box after raising of the part **35** and raising to a greater extend of the part **39**. This is done by moving towards the side **16** a block **36** mounted in the support **32A** and carrying a bar **37** which is bent into the form of three sides of a rectangle with a gap **38** between the longest side and the block **36**. The bar **37** pushes the extremity of the flap **20** from the position shown in FIG. **3**, almost to the position shown in FIG, **4**. Before the block **36** comes into contact with the paper on the side **16** of the box, parts **35** and **39** are lowered again, the part **39** passing through the gap **38** and bringing the extremity of the flap **20** into contact with the interior face of the side **16** of the box. Then the bracing device is moved to the left so that it presses the paper against the interior face of the side **16** of the box, the block **36** acting as a bracing member to prevent deformation of the box. The flap **18** is simultaneously applied in the same way to the side **14** of the box. Then means not shown apply the small tabs **40**, which now protrude beyond the ends of the sides **14** and **16** of the box, on to the exterior faces of the sides **15** and **17**. Finally the moving parts of the apparatus are moved as necessary to allow the box which has been treated at location **7** to be transferred to location **8** and a new one to take its place. At location **8** the flaps **19** and **21** of the paper are applied to the sides **15** and **17** of the box in the same way as described above, using the rollers **53** and other parts not shown, but here there are no tabs like the tabs **40** to be dealt with.

FIG. **1** shows only one of the four bracing devices comprising the parts **35** and **39**. There is another one above the left-hand rail **31** and one above each rail **30**. The purpose of having these parts formed as fingers is to enable them to be used with boxes of differing sizes.

All the movements mentioned above may be performed automatically.

In an alternative method of using the apparatus the first part of the covering operation may be performed for example by hand, and the machinery modified so that it uses only the apparatus present to perform the covering operation at locations **7** and **8**, as described above, to stick the projecting sides of sheet material to the remaining sides of the box.

Referring to FIG. **1**, the right-hand rail **31** and the upper rail **30** are fixed and the left-hand rail **31** and the lower rail **30** are mounted on screw-threaded spindles **40** and **41**, which can be turned to control the distance between the two rails **31** and the distance between the two rails **30**, respectively, so that boxes of differing sizes can be dealt with. Also the rails **25** and **27** are mounted on screw-threaded spindles **42** and **43**, which can be turned to bring the rails **25** and **27** centrally between the rails **30** and **31**, respectively.

A bar **44** passes through the movable rail **30** and the rail **25** to guide their movements and similarly a bar **45** passes through the movable rail **31** and the rail **27**.

The stop **28** may be mechanically linked, although this is not shown, to the left-hand rail **31** so that when this is moved sideways the stop **28** moves with it. Also the member **22** may be mechanically linked to the lower rail **30** and the member **23** to the left-hand rail **31** so that when these rails are moved the members **22** and **23** are moved as appropriate.

To allow for the fact that not all the boxes dealt with will have the same depth, it is arranged that the height to which the support **32A** moves upwardly is adjustable, so that the bar **37** always just passes over the top of the side **16** of the box. Also to allow for different thicknesses of board used for making the boxes, the support **32A** may be movable a little to right or left, considering FIG. **3**, with respect to the rail **30**.

The word "box" used in this specification and claims is intended to be applicable also to a box-shaped lid for a box.

I claim:

1. A method of applying to a box a piece of sheet material which has an adhesive on one face comprising bringing the exterior face of one side of the box into contact with the adhesive face of the sheet material, advancing a plurality of spring-loaded presser members simultaneously with one another towards the box so that some of them enter the box and engage the interior face of said one side of the box and press said one side of the box against said sheet material and ensuring that none of the presser members engage the tips of the other sides of the box by interposing guard means in the paths of presser members which would otherwise engage said tips, which guard means halt the advance of those presser members.

2. A method according to claim **1** in which the piece of sheet material projects beyond said one side of the box when the two are brought into contact and said guard means are interposed also in the paths of presser members which would otherwise engage the projecting sheet material.

3. A method according to claim 2 in which the piece of sheet material projects on all four sides beyond said one side of the box when the two are brought into contact and comprising moving the box with the sheet material from the location in which said one side of the box was pressed against the sheet material to a second location, there bringing two of said projecting parts of the sheet material into contact with the interior faces of two further and opposite sides of the box, then moving the box with the sheet material from the second location to a third location and there bringing two more of said projecting parts of the sheet material into contact with the exterior faces of two further and opposite sides of the box.

4. A method according to claim 3 comprising, at each of the second and third locations, bracing the two opposite sides of the box, which are brought into contact with the sheet material at that location, by separate bracing devices within and on opposite sides of the box and pressing the sheet material from outside the box against the exterior faces of the two opposite sides of the box.

5. A method according to claim 3 comprising, at each of the second and third locations, turning the two projecting portions of the sheet material, which are brought into contact with two sides of the box at that location, over the tips of these two sides of the box and then bringing them into contact with the interior faces of said sides of the box.

6. A method according to claim 5 comprising, at each of the second and third locations, bracing the two opposite sides of the box, which are brought into contact with the sheet material at that location, by separate bracing members outside the box and pressing the sheet material from inside the box against the interior faces of the two opposite sides of the box.

7. Apparatus for applying to a box a piece of sheet material which has an adhesive on one face, comprising a flat support for the sheet material, a plurality of spring-loaded presser members mounted above the support, means for moving the presser members simultaneously downwardly towards the support and guard means for positioning above the support for ensuring that some of the presser members do not move as far as the others towards the support.

8. Apparatus according to claim 7 in which said guard means comprises an L-shaped part.

9. Apparatus according to claim 7 in which said guard means comprises two bars perpendicular to one another.

10. Apparatus according to claim 7 and further comprising second and third supports, means for moving a box with sheet material adhering to it from said first-mentioned support to the second support and later from the second support to the third support, means operable while the box is on the second support to apply the sheet material to the exterior faces of two opposite sides of the box and means operable while the box is on the third support to apply the sheep material to the exterior faces of two more opposite sides of the box.

11. A method of applying to the exterior faces of two opposite sides of a box portions of a piece of sheet material with adhesive on one face, which piece has already been applied to the exterior face of the base of the box, comprising inserting into the box, adjacent respective ones of said two sides, two separate bracing devices and pressing the sheet material from outside the box against the exterior faces of the two opposite sides of the box, which are braced by the respective bracing devices.

12. A method of applying to boxes pieces of sheet material which have adhesive on one face comprising, at a first location, bringing the exterior face of one side of a first box into contact with the adhesive face of a first piece of the sheet material and advancing pressing means which enter the box and engage the interior face of said one side of the box and press said one side of the box against the sheet material, moving the box with the sheet material from said first location to a second location and moving a second box to said first location, bringing projecting parts of the first piece of sheet material into contact with the exterior faces of two further and opposite sides of the first box at said second location while at the same time treating at said first location the second box and a second piece of the sheet material in the same way as the first box and piece of sheet material were treated there, moving the first box to a third location, the second box to said second location and a third box to said first location, bringing projecting parts of the first piece of sheet material into contact with the exterior faces of two more opposite sides of the first box at said third location while at the same time treating at the second and first locations the second and third boxes and pieces of sheet material in the same ways as the first box and piece of sheet material were treated at these locations, and continuing in like manner with further boxes and pieces of sheet material.

13. A method according to claim 12 in which at said first location each box is pressed against its piece of sheet material by advancing a plurality of spring-loaded presser members simultaneously with one another towards the box so that some of them enter the box and engage the interior face of said one side of the box and press said one side of the box against said sheet material and ensuring that none of the presser members engage the tips of the other sides of the box by interposing guard means in the paths of presser members which would otherwise engage said tips, which guard means halt the advance of those presser members.

14. A method according to claim 12 in which at said first location each box is pressed against its piece of sheet material by advancing a plate with a profile having substantially the same shape and size, as seen when looking in the direction of advancement, as the inside of the box, into the interior of the box to engage said one side of the box.

15. A method according to claim 12 in which at each of said second and third locations each box is supported by two parallel rails of which at least one is adjustable transversely to adjust the distance between the rails, the rails being disposed under the sides of the box to which the sheet material is applied at the location concerned.

16. A method according to claim 11 in which said two sides of the box are supported by two rails below and parallel to them, of which at least one rail is adjustable transversely to adjust the distance between the rails.

17. A method according to claim 16 and further comprising displacing the box, after applying the sheet material to said faces of said two opposite sides of the box, to a different location where two further opposite sides of the box are supported by two further rails below and parallel to them, of which at least one rail is adjustable transversely to adjust the distance between the rails, and there applying to the exterior faces of said two further opposite sides of the box further portions of the piece of sheet material by inserting into the box, adjacent respective ones of said two further sides, two further separate bracing devices and pressing the sheet material from outside the box against the exterior faces of said two further opposite sides of the box, which are braced by respective ones of said two further separate bracing devices.

* * * * *