Jan. 24, 1967 J. C. TAYLOR 3,299,803

ENGRAVING APPARATUS FOR MAKING MODEL BUILDING MATERIALS

Filed May 3, 1965 2 Sheets-Sheet 1

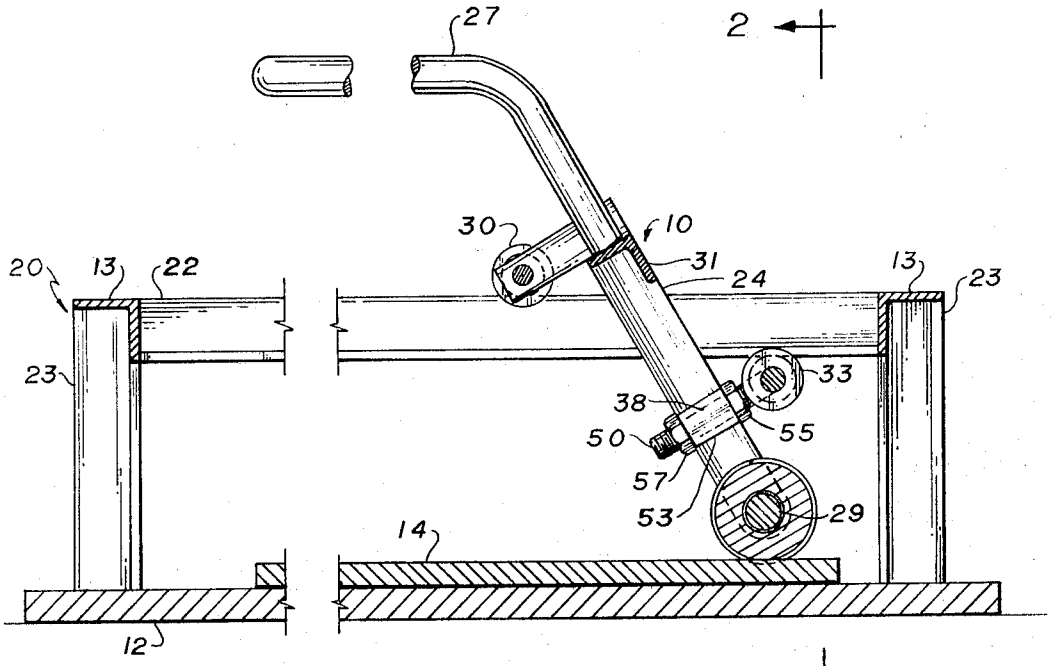

FIG. 1

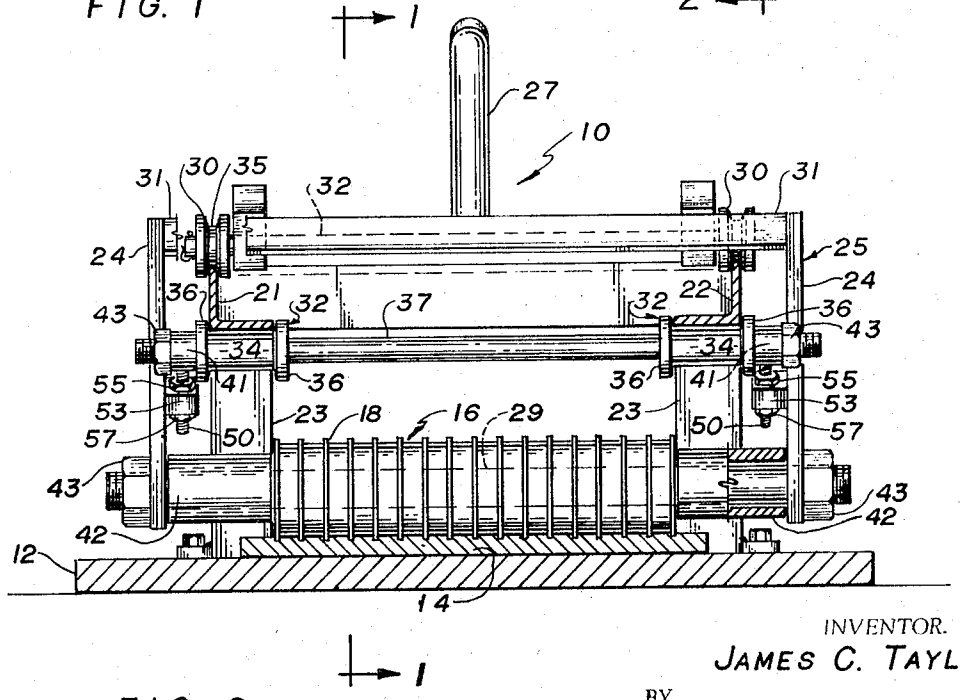

FIG. 2

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ENGRAVING APPARATUS FOR MAKING MODEL BUILDING MATERIALS

Filed May 3, 1965 2 Sheets-Sheet 2

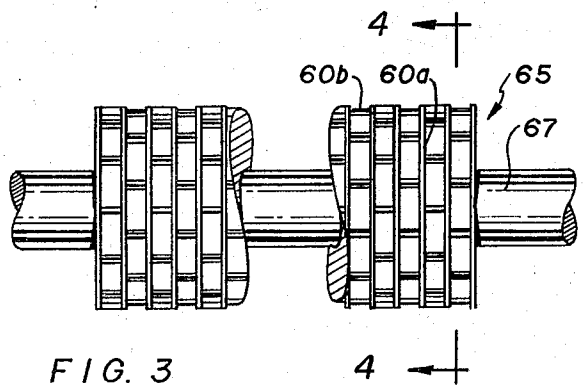

FIG. 3

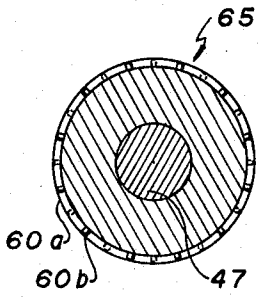

FIG. 4

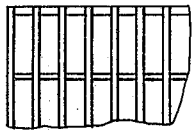

FIG. 5

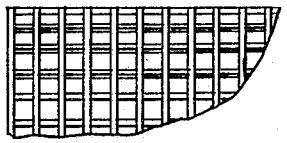

FIG. 6

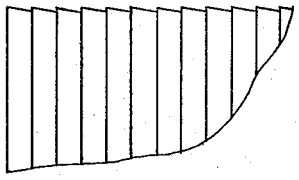

FIG. 7

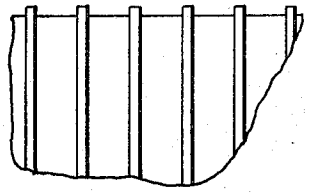

FIG. 8

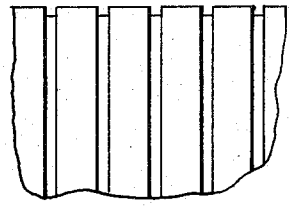

FIG. 9

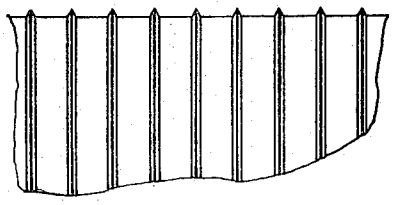

FIG. 10

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United States Patent Office 3,299,803 Patented Jan. 24, 1967

3,299,803

ENGRAVING APPARATUS FOR MAKING MODEL BUILDING MATERIALS

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Filed May 3, 1965, Ser. No. 452,835
5 Claims. (Cl. 101—5)

This invention relates to models such as scale models of homes, and more particularly relates to a method and tools for making novel materials to be employed in building such models which closely simulate the appearance of corresponding materials commonly used in the construction of full size homes and the like.

In designing and building homes, orthographic drawings are commonly employed to illustrate the various dimensions and details of the finished product. Such a type of drawing requires a plan view specifying the length and width of the different rooms of the house, and an elevational view specifying the height of the building in relation to either length or width. Many people are untrained in reading such drawings and find difficulty in coordinating both views in their minds in order to visualize the completed building.

As an aid for better visualization of the building of interest, isometric and perspective drawings have been employed with better results. Nevertheless, inherent limitations in illustration such as the impossibility of showing all the sides of the house in a single drawing, and thus the difficulty of illustrating important details, render such drawings relatively inadequate.

On the other hand, a model of the house at a suitable scale permits a true showing of all the dimensions and details of the house that is easy for all to see and appreciate. Heretofore, however, scale models have been utilized almost exclusively by architects because the materials commonly used for the models such as balsa wood, cardboard and plastics, require a high degree of skill in their use to obtain a realistic appearance.

This present invention is intended to provide materials that can be used easily and quickly for constructing models of homes, buildings and other objects. They are designed for use by the average person not skilled in the model building art, although not restricted thereto, for building models from orthographic drawings obtained from architects, or from plans found in various places such as magazines specialized in home building and furnishings.

Despite the ease of fabrication, the invention provides finished models in which the material employed closely resembles the materials used in building the actual full-size structure.

To this end, the method embodying the invention includes the step of grooving or engraving a rigid material, of the type having relatively low resistance to compressive forces and which permanently maintains the ensuing deformation, to simulate the joints of brick, stone, concrete, and other similar structural materials.

To form the grooves, the present invention provides an engraving roller which selectively deforms the sheet of material used in building the model in predetermined areas. An engraving roller incorporating the present invention may comprise a substantially cylindrical drum made of aluminum, plastic, wood or other suitable material having outwardly extending circumferential ribs arranged on the periphery thereof in a predetermined pattern. The ribs are located on the periphery of the drum in the pattern desired on the surfaces of the model.

In view of the foregoing, one method for manufacturing materials for use in the construction of models in accordance with the invention comprises the steps of:

(1) Providing a sheet of material of the type deformable in selected areas by pressure and which retains

such deformation permanently, such as a rigid urethane foam,

(2) Coloring said sheet of material with a first colored surface coating such as the color of structural joints,

(3) Engraving simulated structural joints on the sheet with a roller including outwardly extending ribs disposed on the periphery thereof in a preselected pattern by applying compressive forces to said sheet with said roller, and

(4) Coloring only the nonengraved areas of the sheet with a second color, such as the color of siding material employed in the construction of a full-size structure.

The finished sheet may then be cut as for use in building models.

Other objects and advantages of the invention will become apparent upon reading the following specification in reference to the accompanying drawings, wherein:

FIG. 1 is a fragmentary side elevational view partly in cross section of an engraving roller apparatus embodying the invention;

FIG. 2 is a front view partly in cross section of the engraving roller apparatus shown in FIG. 1;

FIG. 3 is a fragmentary plan view of another roller usable in the engraving roller apparatus shown in FIG. 1;

FIG. 4 is a cross-sectional view taken along section line 4—4 shown in FIG. 3; and

FIGS. 5–10 are fragmentary views of typical alternate patterns which may be employed in the engraving roller apparatus shown in FIG. 1.

Reference is made to FIGS. 1 and 2 of the drawings wherein an engraving roller incorporating the invention is illustrated. The same numerals are employed to designate similar elements in both figures.

As shown in FIG. 1, an engraving roller assembly **10** embodying the invention comprises a substantially flat base **12**, adapted to contain a sheet of material **14**, used in building a scale model of a desired object or structure such as a house, a roller drum **16** in pressure engagement with material **14**, and a guide structure **20** for directing roller drum **16** in a predetermined path over material **14**.

The sheet of material **14** may be made of any suitable material that can be easily deformed by compressing the material in selected areas and which maintains such deformation indefinitely or for long periods of time. Preferably the material should be easy to cut with a knife and be readily attached to other similar pieces with glue, cement, or fasteners such as pins. Rigid urethane foam, for example, has been found to be very satisfactory.

Thus, by way of example, the sheet of material **14** may be a slab of rigid urethane foam having a nominal density of about four pounds per cu. ft., with a thickness varying from ⅛″ to ¼″ which is useful in building models at scales up to ⅜″ equals 1′0″. A typical commercially available material of this type is CPR 9002–4B made by the CPR Division of The Upjohn Co.

A substantially cylindrical roller **16** is adapted to engage the sheet of material **14** to engrave the desired pattern therein. As illustrated in FIG. 2, the roller **16** includes a plurality of outwardly extending circumferential ribs **18** formed on the periphery of said drum in a predetermined pattern.

The pattern of the ribs **18** is determined by the type of material to be simulated in the model, and as it will be explained later, a roller in accordance with the invention may be designed to engrave patterns simulating brick, stonework, board siding, batten siding, shiplap siding, shingles, tile, concrete blocks and other similar type materials.

To engrave the desired pattern on the sheet **14**, the roller **16** is pressed against the surface of the sheet **14** so that the ribs **18** form indentations in the areas in contact therewith providing a permanent deformation in the mate-

rial. Linear deformations may thus be made by moving the roller **18** along the entire length of the sheet **14**, or in the alternative by driving the sheet **14** on a moving platten under the pressure loaded roller **16**. The engraving roller apparatus **10** shown in FIGS. 1 and 2 illustrates the former method.

In order to direct the engraving roller **16** in a desired path on the sheet **14**, a guiding structure **20**, mounted on the base **12**, is coupled to the roller **16**. The guiding structure includes a pair of guiding rails or angles **21** and **22** extending along the entire length of the base **12** and mounted on appropriate posts **23**, in turn secured by conventional suitable means to the base **12**. A pair of support rails **13**, shown in cross section in FIG. 1, connect the posts **23** to each other to add strength to the structure **20**.

A bracket **25**, made of a rigid material such as aluminum or wood or any other suitable material, is coupled to the roller drum **16** and to the guiding rails **21** and **22** to insure that the drum **16** moves in a straight path.

As shown in FIG. 2 the bracket **25** comprises a pair of bars or legs **24** adapted to be coupled to a shaft **29**, on which the drum **16** is slidably mounted, and a transverse bar **31** integrally formed with the legs **24** and perpendicular thereto.

The shaft **29** is rotatably mounted on the legs **24** by means of suitable bearings formed in the legs **24** and which permit free rotation of the shaft **29**. Suitable spacing sleeves **42** are mounted on the shaft **29** in a well-known sliding-type fit between the engraving roller or drum **16** and the legs **24**. The shaft **29** is held in the desired axial position relative to the legs **24** by suitable means such as a pair of nuts **43** in engagement with the threaded portions of the shaft **29** and by suitable well-known cotter pins, for example.

It should be noted that the engraving roller drum **16** may be designed with different lengths so that, if desired, drums with different patterns may be used simultaneously to engrave a plurality of patterns on the same sheet **14**.

The bracket or frame **25** is adapted for motion along the guiding rails **21** and **22** by means of two pairs of guide rollers **30** and **33** in rolling engagement therewith. To this end, the guide rollers **30** are made with a central groove **35** between a pair of suitable flanges to receive the upper narrow edge of the corresponding guiding rail, while the guide rollers **33** comprise a central cylindrical surface **34** formed between a pair of suitable flanges to receive the lower wide portion of the guiding rails as illustrated in FIG. 2.

The guide rollers **30** and **33** are respectively mounted on a pair of parallel shafts **32** and **37** coupled to the bracket **25**. In order to permit free rotation of the guide rollers when the engraving apparatus **10** is in motion, the roller guides **30** and **33** are slidably mounted on the corresponding shaft, and suitable means are provided to secure their axial position relative to the corresponding shaft. To this end cotter pins or other suitable means may be used to limit the outward axial motion of the guide rollers. In the case of the rollers **33**, additional means such as the spacing sliding sleeves **41** and the nuts **43** are employed. It should be noted, however, that the engagement provided between the rollers **30** and **33** and the guiding rails **21** and **22** is sufficient to maintain the rollers in the desired positions.

The shaft **29** is secured to the transverse bar **31** of the bracket **25** by suitable means such as welding. In turn, the shaft **37** is coupled to the legs **24** of the bracket **25** by means that control the angular position of the bracket **25** relative to the plane defined by the base **12**, and which control the depth of deformation in the sheet **14**.

Such depth control means includes a pair of shafts **50**, each in threaded engagement with the spacing sleeve **51** at one end, and in sliding fitting engagement with a mounting sleeve **53** integrally formed with the corresponding leg **24** at the other end thereof. Suitable means such as nuts **55** and **57** are mounted in the shaft **50** to control the position of the shaft **50** relative to the mounting sleeve **53**.

As illustrated in FIG. 1, the position of the bracket **25** relative to the plane defined by the base **12** is determined by the points of contact of the guide rollers **30** and **33** with the guide rails **21** and **22** and the point of contact of the drum **16** with the sheet **14**. By adjusting the relative positions of nuts **57** and **55** with respect to the shaft **50**, the angular position of the leg **24** is varied, which in turn varies the penetration of the ribs **18** into the sheet **14** (point of contact of the drum **16** with the sheet **14**).

The roller **16**, shown in FIG. 2, is suitable for indenting the sheet **14** in a pattern that simulates shingle roofing and siding for example. Thus, the ribs **18** are cylindrically shaped and made to extend outwardly from the drum **16** the maximum amount of desired deformation, i.e. the difference in radius between the drum **16** and the ribs **18**.

Prior to engraving, in order to closely simulate the desired material, the sheet **14** is first painted to the color of structural joints which will remain at the completion of the process in the indented or deformed portions of material. After engraving, the nondeformed portions in the sheet **14** are again painted to the color of the particular material used in the construction of the object or building being simulated. Subsequently, the sheet **14** may be cut into the desired shape.

It should be noted that after the engraving operation is completed, the sheet **14** should be painted by means such as a roller of foam rubber which does not introduce paint into the engraved portions. These areas should retain the joint color that was applied before engraving.

FIGS. 3 and 4 of the drawings illustrate an alternate engraving roller **65** that may be used in the engraving apparatus **10** embodying the invention. The roller **45** is suitable for engraving a pattern that simulates a brick structure. As illustrated in FIG. 3, the roller **65** is mounted on a shaft **67** which is in turn rotatably mounted on the bracket **25**, as described in connection with the embodiment shown in FIG. 1. The roller **65** includes a plurality of outwardly extending ribs **60***a* and **60***b* arranged in a pattern that is complementary to the brick-type pattern to be engraved in the sheet **14**, shown in FIG. 1.

To this end, the ribs **60***a* comprise outwardly extending rings in concentric relation with the shaft **67**, and are equally spaced from each other along the shaft **67**. The ribs **60***b*, in turn, are disposed transversally in relation to the concentric ribs **60***a*, and hence in parallel relationship with the longitudinal axis of the drum **65**.

In addition, to provide the stagger joint effect of a brick structure, the transverse ribs **60***b* are disposed between adjacent concentric ribs in a plurality of rows, the ribs of every second row being in common alignment while being in staggered relation with the ribs in the adjacent rows.

A variety of other patterns may be provided by the engraving rollers of this invention, as illustrated in FIGS. 5–10, in addition to the patterns illustrated in FIGS. 2 and 3. Such patterns may simulate concrete block, clay or concrete tile, shingle or bevel siding, board and batten siding, and V-type rustic siding as shown in FIGS. 5–7 and 9–10, respectively. Engraving rollers made with the patterns illustrated in FIGS. 5 and 6 would include transverse ribs formed in rows similar to the rows described above, except that the transverse ribs in each row would be aligned with all the corresponding ribs in the other rows.

It should be noted that in order to simulate wood, the sheet **14** shown in FIG. 1 is painted to the desired color before rolling, but no subsequent painting after engraving is necessarily needed in that case.

A peculiar problem is presented in engraving a sheet of the preferred rigid urethane foam type material to simulate shingle or bevel siding with a roller having the pattern shown in FIG. 7. The drum **16** is formed in such case with a plurality of cylindrical discs having a tapered surface axially aligned along the corresponding support shaft, or in the alternative, a single cylindrical drum having equally spaced surface portions ground at the desired slope may be utilized.

Because most of the surface of the sheet is compressed in such a case, and because the material is naturally resilient, the engraving roller must be made with a slightly convex surface, providing a slightly concave indentation in the sheet **14**, to overcome the spring back characteristics of the material in order to obtain substantially linear tapering. Otherwise, the surface of the sheet **14** would spring back beyond the desired deformation, exhibiting a slightly convex surface.

Obviously, many modifications of the present invention are possible in the light of the above teachings. It should therefore be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. Apparatus for engraving a sheet of urethane foam type material to simulate part of a structure comprising in combination: an elongate base having a substantially flat surface adapted to support said material to be engraved, an engraving drum in rolling engagement with said sheet having a plurality of circumferential areas outwardly extending from the surface of said drum, said outwardly extending areas being spaced apart along the longitudinal axis of the drum and adapted for compressing portions of said sheet contacted thereby during rolling engagement, guiding rails mounted on said base extending along the edges of said base in parallel relation with the longitudinal axis thereof, a shaft, a bracket including first and second legs and a transverse bar integrally formed with said legs and substantially perpendicular thereto, said legs being adapted for rotatably mounting said shaft on said bracket in a sliding fit, said engraving drum slidably mounted on said shaft for rotation therewith, first and second guide rollers mounted in rolling engagement on the upper edge of said pair of rails, second and third guide rollers mounted in rolling engagement on the lower portion of said pair of rails, means for mounting said first and second guide rollers on said frame, means for mounting said third and fourth guide rollers on said frame, and means integrally formed with said transverse bar adapted to receive an impulse force to impart motion to said drum in the direction of said guiding rails.

2. Engraving roller apparatus for preparing materials for use in model building comprising: a smooth flat elongate base for receiving a sheet of material to be engraved; guide rail means spaced above said base along its longitudinal axis; means mounting said guide rail means on said base; a cylindrical engraving roller having outwardly extending portions for contacting said sheet of material to be engraved; means supporting said engraving roller on said guide rail transversely of said base so that the roller is spaced above and adjacent thereto, and movable back and forth over said base; said support means being adapted for adjusting the space between said roller and base and the pressure applied by the roller to a sheet of material which is on said base for engraving.

3. Engraving apparatus in accordance with claim **2** wherein the means for supporting said roller from said guide rail includes a bracket supporting the ends of said roller and guide rail engaging bearings for connecting said bracket to said guide rail to permit sliding movement of said bracket along said rail.

4. Engraving apparatus in accordance with claim **3** wherein said means adapted to adjust the space and pressure between the engraving roller and the base and a sheet which may be on said base for engraving comprises adjustable mounting means for mounting at selected ones of said guide bearings on said bracket to vary the distance of said bearings from said bracket.

5. Engraving apparatus in accordance with claim **4** wherein said guide rails comprise a pair of parallel, spaced-apart rails, said guide rail engaging bearings comprise two pairs of rollers with one pair above said guide rails and one pair below said guide rails, the pair of rollers below said guide rails being mounted on said adjustable mounting means.

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