

MILLWORK

(PART 1)

Serial 2178A

Edition 1

MILLWORK MILLS

INTRODUCTION

1. **Definition.**—There is no generally accepted definition of the term millwork. It is understood, however, that millwork is the finished woodwork used in buildings that has been prepared in woodworking shops or mills, where machinery is used as far as possible in its manufacture.

It comprises doors, sash, windows, transoms, frames, trim, moldings, stairs, columns, paneling, and built-in cabinets. These articles are manufactured in the mills, sent to the building, and set in place by the finishing carpenter.

2. **Kinds of Millwork Mills.**—There are various kinds of millwork mills or factories, some manufacturing only a few items and others making a full line of finished woodwork. The following list will give an idea of the kinds of work that are done at different factories.

1. Doors of stock sizes and design. Mills manufacturing such doors are called Stock Door Factories or Mills.

2. Sash and doors only, of stock sizes and designs. Mills making these materials are called Stock Sash and Door Factories.

3. Stock veneered doors only.

4. Stock columns, brackets, newels, and turned work only.

5. Columns and other turned work to special order or details.

6. Stock cabinet or case work only.

7. Stock window and door frames only.
8. Stock moldings, interior trim, and dressed finish.
9. Stock and special sash and doors put together or knocked down.
10. Stock and special sash, doors, and general line of millwork to detail or to order.
11. Doors and sash, to detail or to order, also general line of millwork.
12. Stock sash and doors, also general line of stock millwork.
13. Special millwork to order or to detail, except doors and sash.

3. Other Mills Making Woodwork.—There are mills that manufacture woodwork for use in buildings that are not generally considered as being millwork mills. In these mills are manufactured flooring, ceiling, siding, furring, framing lumber, veneers, grounds, bucks, lath, and shingles.

4. Composition, or plastic, work and hardware are not considered as parts of millwork, although they are sometimes put on by special arrangement at the mill. Sash pulleys that are put in the window frames are, however, considered as part of millwork.

5. Veneers are used in making millwork, but they are made by mills especially equipped for that purpose. The same is true in the case of laminated panels made of veneers. Veneer mills and veneer panel mills, although sometimes operated in conjunction with millwork mills, are not considered as millwork mills.

ROUTING OF WORK IN MILLWORK MILLS

6. Millwork mills or factories range in size from small wooden buildings to large brick or reinforced concrete buildings.

The routing of the work in a mill doing a general line of work is somewhat as follows: The mill lumber that is seasoned or kiln-dried is kept in a storage shed, room or building

until it is required for use. Some mills keep a stock of lumber in yards where it is properly piled on sticks and air-seasoned. From these piles it is taken to the dry kiln and dried, after which it is placed in the storage room or shed.

When lumber is needed for use in the mill it is taken either from the storage shed or from the yard and is conveyed into the mill by an electric or gasoline donkey engine with trailers, by power hoists, or by men who push it in on a two-wheeled cart. The lumber enters the mill in the department that is equipped with a machine called a *surfacer* or *planer* for surfacing, dressing or planing it to the thickness needed. This machine as well as other machines are described and illustrated in Part III of *Millwork*.

The lumber is next ripped or sized into long lengths and of desired widths, by the use of a machine called a *rip saw* or by a *ripping and jointing machine*, the latter being a more modern type than the former.

The lumber is then conveyed to a molding machine if it is to be worked into moldings, inside trim, stair or cabinet work, frame material, etc. If it is to be worked into sash, doors, or windows, it passes from the rip saw to the cutting department, where it is cut into such lengths as may be required. The work is done by the use of the *cut-off saw*, or *trim saw*.

In some mills the rough lumber is ripped into long lengths, which are cut into short lengths and then put through the *surfacer* instead of following the order explained above.

The lumber has thus far been cut into pieces of the proper sizes for manufacture into sash, doors, and other shapes.

ARRANGEMENT OF A MILL

7. Departments in a Mill.—The mill is usually arranged by departments, each of which performs some definite work. The lumber, as cut in the cutting department, or from the molder or planing mill department, as just described, is transported on factory trucks to these various departments. Where the mill has two or more floors, the trucks are conveyed up and down between these floors on platform elevators. In some cases the lumber is moved from the cutting,

molder or planing departments by means of traveling conveyers. A brief description of the more important departments in a mill, follows:

Frame Department.—In this department the frames for doors and windows are made.

Turning Department.—In this department are the lathes upon which columns, spindles, newels, balusters, etc. are turned.

Cabinet Department.—In this department the benchmen and inside carpenters make articles such as bookcases, china closets, cupboards, kitchen cabinets, pedestals, square columns, panel work, and all other kinds of cabinet work.

Stair Department.—All the stair work is made in this department. Stair building is a special trade and there are very few draftsmen capable of making the necessary drawings. There are also very few men who can bill-in the material.

Window, Door, and Wire-Screen Department.—This department does not occur in all mills, but generally is found in the larger mills where there is  a large demand for this class of work.

Stock Door Department.—In this department, stock doors are made exclusively.

Special or Odd Size Door Department.—All doors that are not of stock design, size, or not made in stock quantities are made in this department.

Stock Sash Department.—In this department all stock sash and windows are made.

Special or Odd Size Sash Department.—In this department, all sash, windows, and transoms that are not of stock size or are not made in stock quantities, are made.

Knife, Bit, and Tool Department.—This is a special department where all knives, bits, and edge tools are made, repaired, sharpened, etc.

Filing Department.—Band, scroll, and circular saws are filed and kept in repair in this department.

Glazing Department.—All windows, doors, sash, and transoms that are to be furnished glazed, or with glass inserted, are primed and fitted with the proper glass in this department.

Machinist Department.—In this department all repairs to machines are made. The power plant and equipment is usually handled here and it is through this department that the mill is assured of steady and regular operation. Where the power used is of sufficient importance, it is frequently necessary to employ special engineers and mechanics.

Supply Department or Store Room.—In this department are stored the supplies needed by the mill, such as glue, sandpaper, belting, nails, brads, screen-wire cloth, also tools and supplies for the machines, such as planer knives, blank steel used in making molding bits, mortising chisels, saws, wrapping and packing paper, twine, cord, and rope. The man in charge of this department is called the storekeeper or supply man.

Gluing and Veneering Department.—In this department the glue is prepared for use and all the compounding, laminating, and veneering is done. In small mills, this department is a small one. In larger mills it is often a highly developed and important department.

Shipping Department.—This department receives the work or material after it has been manufactured and is ready for delivery or shipment.

The shipping clerk is the man in charge of this department. He and his helpers check all material on the orders or shipping lists. If the material is found to be correct it is packed, and tagged or marked, and loaded for delivery in accordance with the instructions appearing on the shipping ticket. The shipping clerk obtains signed delivery tickets for local deliveries, or signed bills of lading for all deliveries to the railroad. These receipts are sent in to the head or management office.

The Office, or Managing Department.—This department is the one through which all sales are solicited and made, all orders entered, placed with the mills, and invoiced or billed, and all collections made.

It is this department that is responsible for the success of the business and for the operation and management of the mill. The direction is done through a factory superintendent, or in some cases, through a general superintendent, who directs the factory superintendent.

The Take-Off Man and the Estimator.—In small mills the take-off man and the estimator are one and the same, working under the direction of the office. In larger mills there is a separate man for each kind of work. The take-off man, from the architect's plans and specifications, makes a list of all the items that are to be furnished. These plans are generally in the form of blueprints.

The list made by the take-off man or the *lister*, as he is sometimes called, should contain all the articles of millwork that will be required, showing quantities, sizes, design, method of construction, the quality of material of which the articles are to be made, and exactly how they are to be furnished. This list is given to the estimator, who estimates the cost of producing and delivering every item.

Warehouse and Storage.—Practically all mills of any importance have adjoining storerooms or warehouses in which is carried a stock of the products of the mill. Some mills make stock articles, especially such as will sell readily, in large quantities for rapid deliveries.

Exceptions and Variations.—The foregoing departments are the ones found in the larger mills. Some mills do not have so many departments and a few mills have more. In small mills some of the departments mentioned above that do similar work are combined in one mill.

PERSONNEL OF THE MILL

8. Mechanics.—The mechanics or workmen who make the millwork in wood-working mills are called bench men, cabinet makers, stair men, machine men or machine operators, wood turners, inside carpenters, band-saw men, shaper men, bill cutters, frame makers, molder men, etc.

9. Draftsman or Detailer.—The draftsman or detailer is the person who makes the full-size drawing that shows how a piece of work is to be made. This drawing shows the exact finished size of each piece of lumber that is to be used in making an article or piece of work, and the finished shape or design of the work.

10. Billing-In Man.—The billing-in man makes out what is called the working ticket and cutting bill. The working ticket shows the number of pieces or articles to be made, the finished sizes, the kind of lumber to be used, and the date when the work is to be completed. The cutting bill shows a complete list of all the pieces of rough lumber, showing the kind, grade, and exact size of each piece.

To the working ticket the billing-in man attaches a full-size drawing made by the draftsman if such a drawing is necessary. If a drawing is not necessary he makes a rough sketch of the article or describes it in such a way that the workman who is to perform the work will fully understand what is required.

11. Foreman.—The foreman has charge of and directs the men who work in one of the departments already mentioned, such as the Frame Department or the Sash and Door Department.

The foreman usually receives his orders from the factory or mill superintendent or, where the mill is a large one, through the general foreman or factory superintendent.

12. Superintendent.—The superintendent has charge of the mill and directs its operation. The heads or foremen of the various departments take their orders from him and report to him or to his assistants.

MILLWORK PRODUCTS

MATERIALS USED IN MILLWORK

13. Millwork is usually made from lumber called *shop*, *shop grade*, *shop lumber*, *finish lumber* or *finish*, which is dried or seasoned lumber. It is sometimes air-dried or air-seasoned, and sometimes kiln-dried. In some localities, there are a few special items of millwork that are made from partially air-dried lumber. These items are heavy brackets, gate and fence posts, rafter ends and flag poles.

For most purposes, however, the lumber required for millwork must be well seasoned or dried, as this material is expected

to maintain the size and shape that it has when it is completed at the mill. It should not shrink, warp or twist after it has been placed in the building.

Unless the wood is thoroughly dry it will not hold paint. Glue will not hold together wood that is not thoroughly dry, and veneers will not hold or stick firmly to green or partly seasoned lumber.

LIST OF MILLWORK PRODUCTS

14. The following is a list of items that are generally included in the term millwork and are usually manufactured in a millwork factory or mill.

Sash	Pergolas	Wooden Gate Posts
Transoms	Storm Sash	Window Trim
Windows	Sash Frames	Door Trim
Doors	Transom Frames	Base
Side Lights	Window Frames	Chair Rail
Blinds	Door Frames	Picture Mold
Shutters	Side Light Frames	Moldings
Wooden Window	Stops	Cornices
Screens	Wainscoting	Plate Rail
Wooden Door Screens	Stairs	Panel Work
Wooden Porch	Rails	Ceiling Beams
Screens	Newels	Stools
Blind Doors	Columns	Aprons
Lattice Doors	Balusters	Panel Jambs
Toilet Doors	Pilasters	Casings
Sliding Doors	Colonnades	Jamb Linings
Folding Doors	Pedestals	Closet Shelving
Cabinets and Cases	Mantels	Buffets
Wardrobes	Seats	Pantry Cases
Medicine Cabinets	Bookcases	Linen Cases
Kitchen Cabinets	Sideboards	Fence Pickets
Ornamented Rafter	Brackets	Wooden Gates
Ends		

HOW MILLWORK IS FURNISHED

15. **Forms of Millwork.**—Millwork is constructed and sold in two forms; *set-up* or *complete*, and *knocked-down*.

16. **Set-Up or Complete Millwork.**—In the set-up form, the article is put together ready for the use intended so that

when it reaches the building in which it is to be installed, it can be set in place with little or no fitting.

In some mills the article is not finished to the exact size but some parts which come in contact with other work are left a little larger than necessary so that the finishing carpenter may trim off as much as may be necessary to fit the article in place.

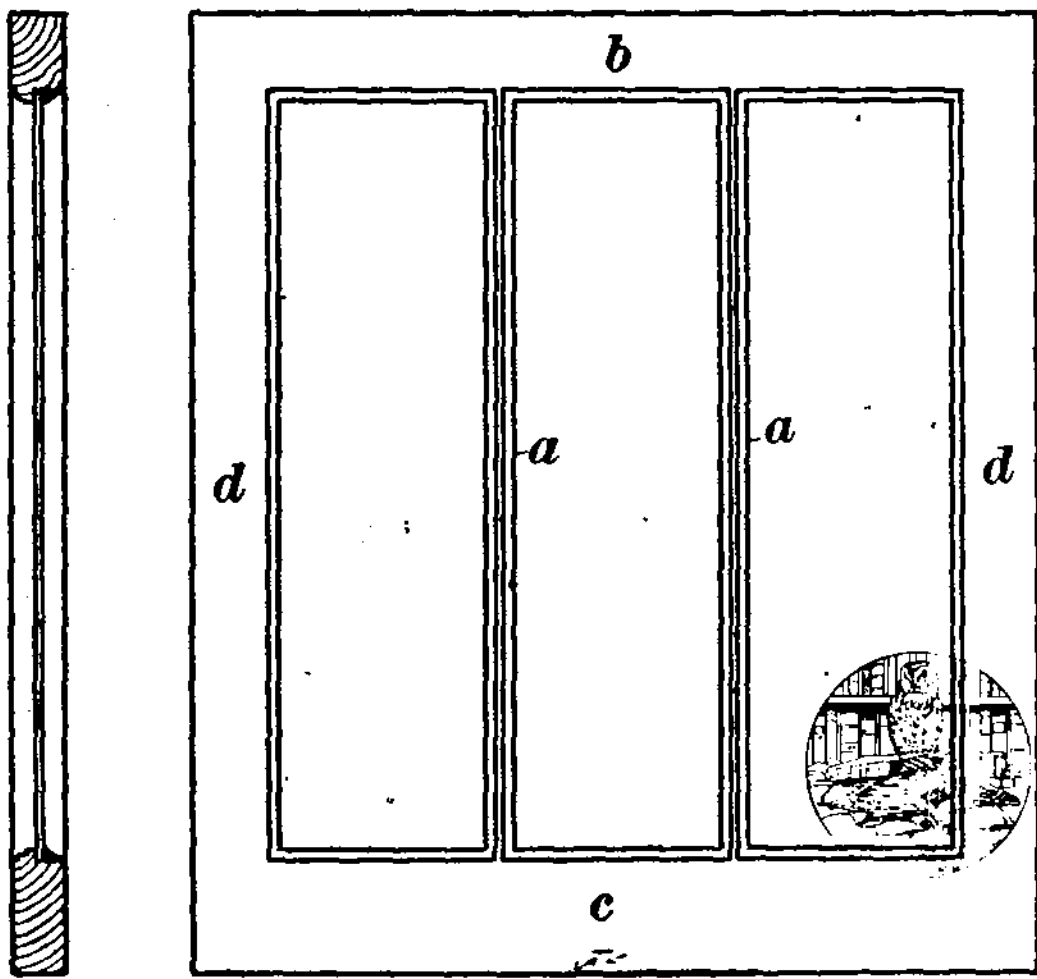


FIG. 1

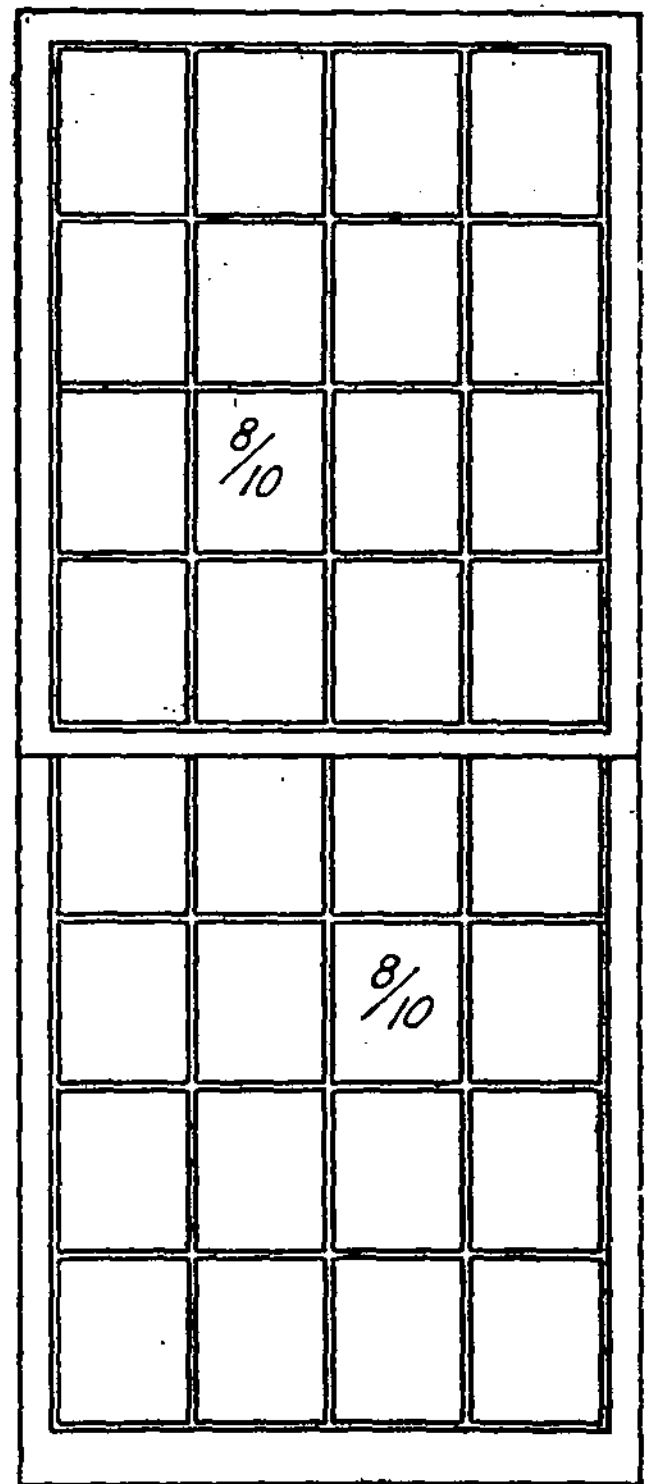


FIG. 2

17. Knocked-down Millwork.—In knocked-down form, each part of the article is manufactured as though the article were to be completed before shipping. The parts, however, are not put together but are tied up in bundles, or crated or packed together and properly marked so that the finishing carpenters may put them together at the building.

SASH AND WINDOWS

DEFINITIONS

18. In order that the terms used in connection with mill woodwork shall have a clear meaning, a series of definitions is here given. These definitions give the meanings of the terms as understood by millwork manufacturers.

A *sash* is a frame in which glass is set. It is in one piece as shown in Fig. 1 and fills a given opening. Sash are not always glazed at the mill.

A *casement sash* or a pair of casement sash are hung, or hinged, generally at their sides, and swing out of or into the building.

French windows or french doors are similar to casement windows but extend down to the floor like doors.

Factory sash or windows are divided into small lights for factory use. These sash are usually much larger than those used for residence purposes. They are illustrated in Fig. 2.

A *full bound sash* is one in which the rails and stiles are all of the same width as shown in Fig. 3.

A *window* consists of two sash, an upper and a lower, which fill the opening. They slide past each other vertically. A window is shown in Fig. 4.

A *window frame* is a frame attached to a building to receive a sash or window.

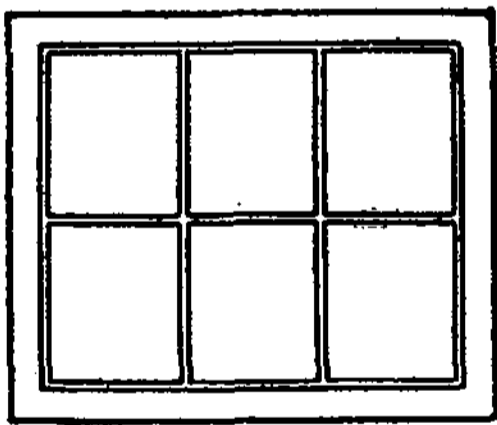


FIG. 3

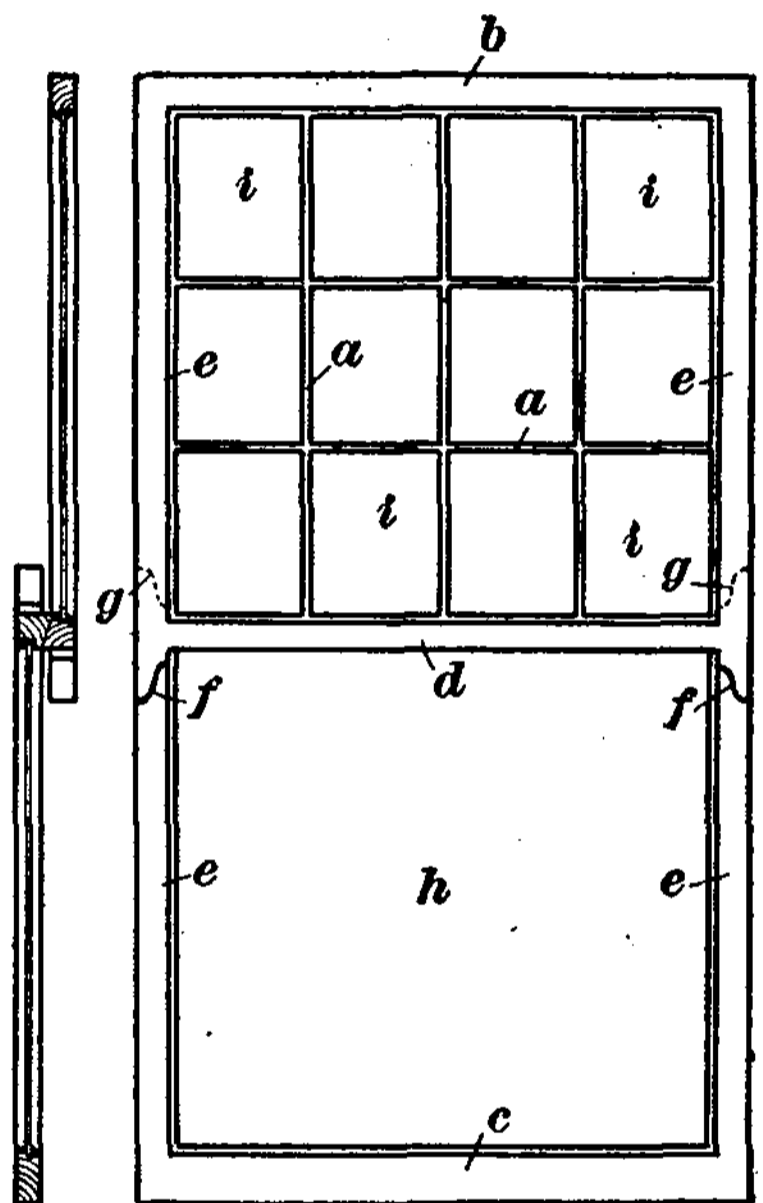


FIG. 4

Mullions are vertical members that divide a window frame into two or more parts, each of which contains a sash or window. The term mullion is also applied to an upright or vertical bar such as *a* in Fig. 1, wider than the ordinary sash bar, that separates the glass in a sash.

The term mullion is also applied to upright bars in a door.

The term *muntin* is applied to short or light bars, either vertical or horizontal, in a sash as shown at *a* in Fig. 4, or in a door between glass or panels, but which do not extend the full width or length of the article.

The term muntin is often applied to all the light sash bars that divide the glass in a sash.

Rails are the cross or horizontal pieces of the framework of a sash, door or blind. Sash rails are shown in Fig. 1 at *b* and *c* and at *b*, *c*, and *d* in Fig. 4.

The rails *b*, Figs. 1 and 4, are called *top rails*. The rails *c* are called *bottom rails*.

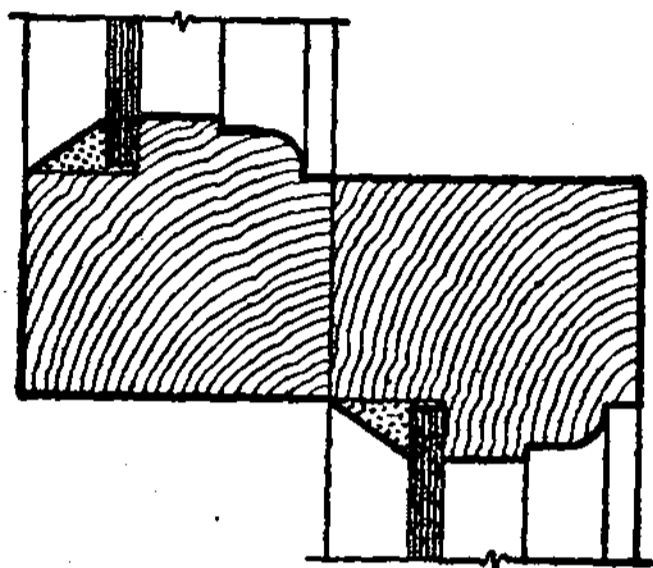


FIG. 5

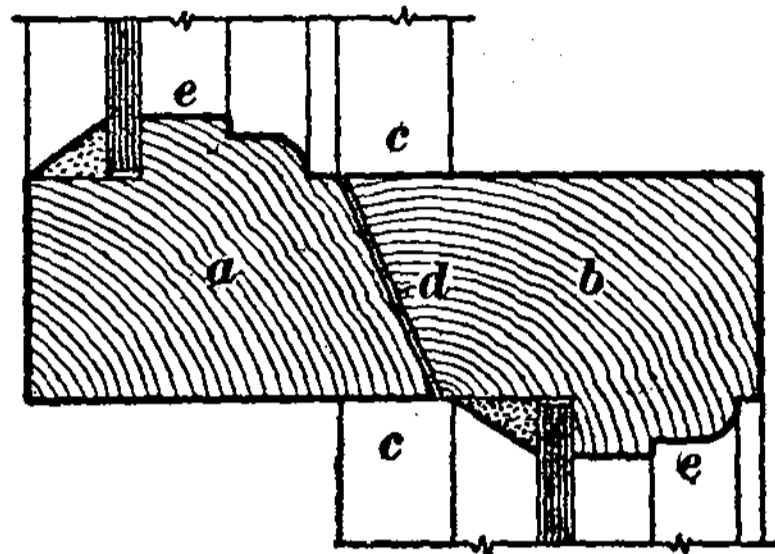


FIG. 6

Meeting rails are the rails of a window that meet when the window is hung and closed, as shown at *d*, Fig. 4. There are two kinds of meeting rails, known as *plain rails* and *check-rails*.

Plain meeting rails are of the same thickness as the window in general and are used in windows that are not counterbalanced. A cross-section through these rails is given in Fig. 5.

Check-rails are meeting rails that are thicker than the sash or window and are made as shown in Figs. 6 and 7. They are used on double-hung windows, or pulley windows, in which the sash are separated by a parting strip. In Figs. 6 and 7 the rail of the upper sash is shown at *a* and of the lower sash at *b*. At *c* is the parting strip.

The check-rails are beveled as shown at *d*. In Fig. 7 is shown a check-rail in which the bevel is rabbeted so as to make a wind-tight joint.

In Fig. 6 the moldings *e* extend above or below the main part of the rails. In Fig. 7 this projecting mold is omitted, which makes the surfaces *e* even and level so as to take a sash lock or fastener.

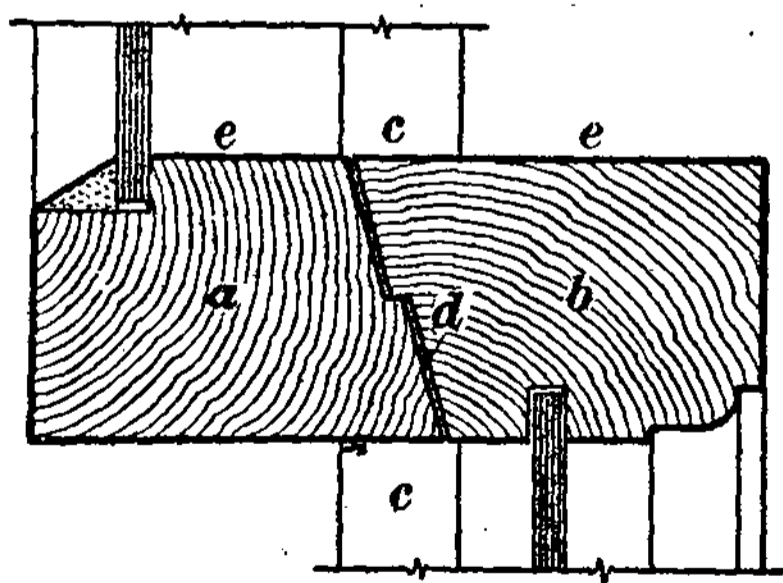


FIG. 7

Stiles are the upright or vertical outside pieces of a sash, door or blind. Window stiles are shown at *d*, Fig. 1, and *e*, Fig. 4.

Lugs or *horns* are extensions of the stiles above the meeting rail on the lower sash and below the rail on the upper sash of a window. They are usually finished with an ogee, or O-G, curve as shown at *f* in Fig. 4. The figure shows the exterior of this window and the lugs *f* are on the upper and outer sash. The lugs *g*, shown in dotted lines are on the lower and inner sash.

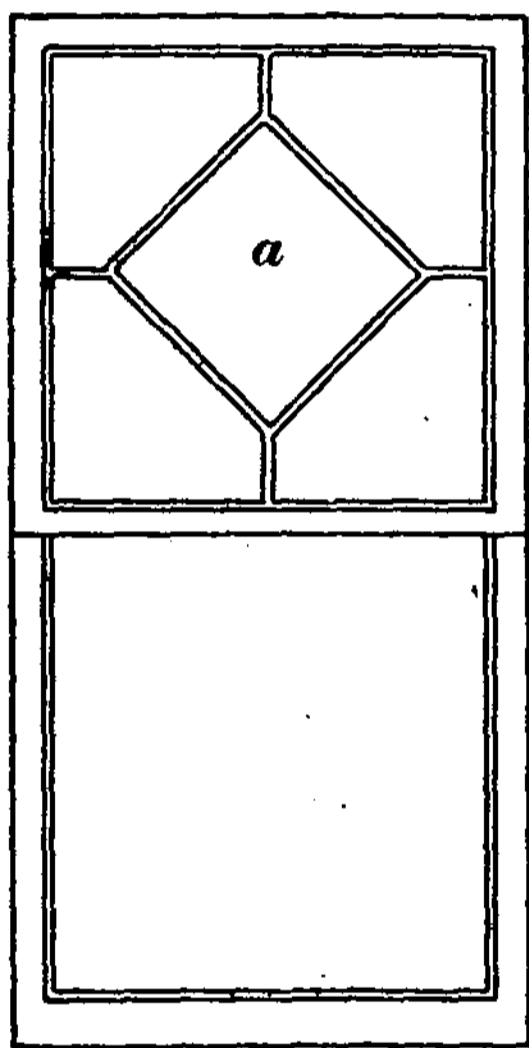


FIG. 8

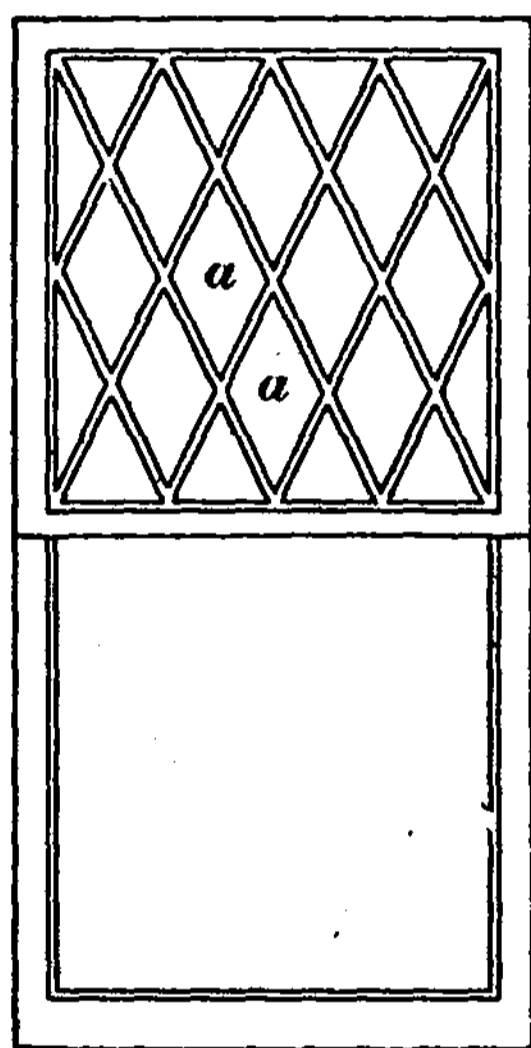


FIG. 9

In case the lower sash is raised to the full height suddenly the sash lock will not be broken or injured, as the lugs will strike the head of the window frame first.

The *lights* are the openings in the sash that are filled with glass. There may be a single light in a sash as shown at *h*, or 12 lights as at *i*, Fig. 4. The lights may be arranged in patterns as are shown in Figs. 8 to 15, inclusive.

Suspended lights are those that are formed in sash, windows or doors by straight bars, any of which must be attached to the free ends or the beveled joints of other bars, as shown in Fig. 8 at *a*.

Diamond lights are those that are formed in a sash or door with the muntins fitted diagonally as shown in Fig. 9, *a*.

VARIOUS SHAPES AND STYLES OF SASH AND WINDOWS

19. Sash and windows are varied in shape as illustrated in Fig. 10. The principal variations occur in the top or heads

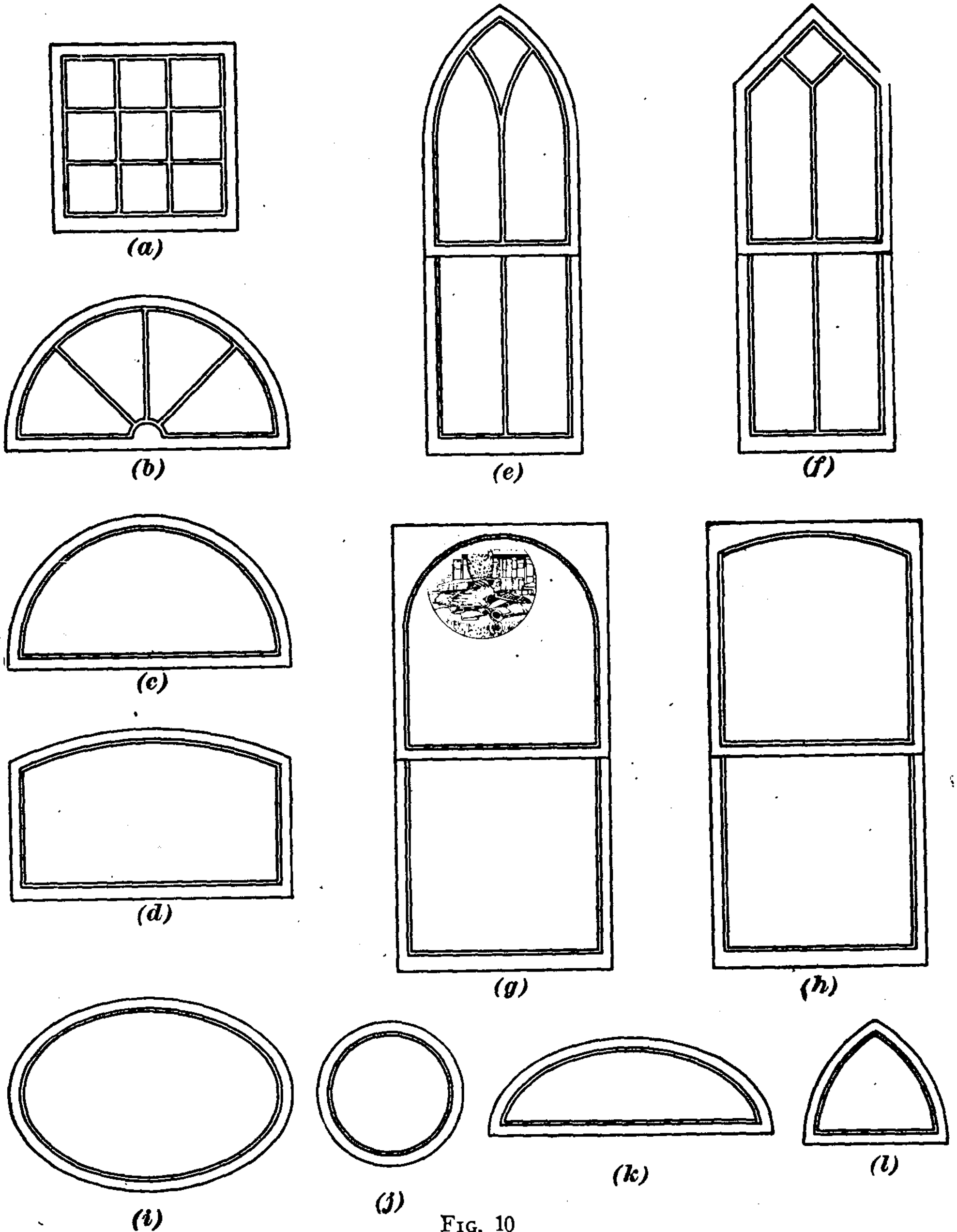


FIG. 10

of the sash. The sash shown in Fig. 10 are known by the following names:

(a) Square head or square-topped. This is the customary form of sash.

(b) Circle-head. This figure represents a transom sash such as might be used over a square-headed window. This sash is divided into four lights.

(c) Circle-head transom sash.

(d) Segment-top transom sash.

(e) Gothic-head window.

(f) Peak-head window.

(g) Square head showing inside and circle head showing on the outside.

(h) Square head showing inside and segmental head showing on the outside.

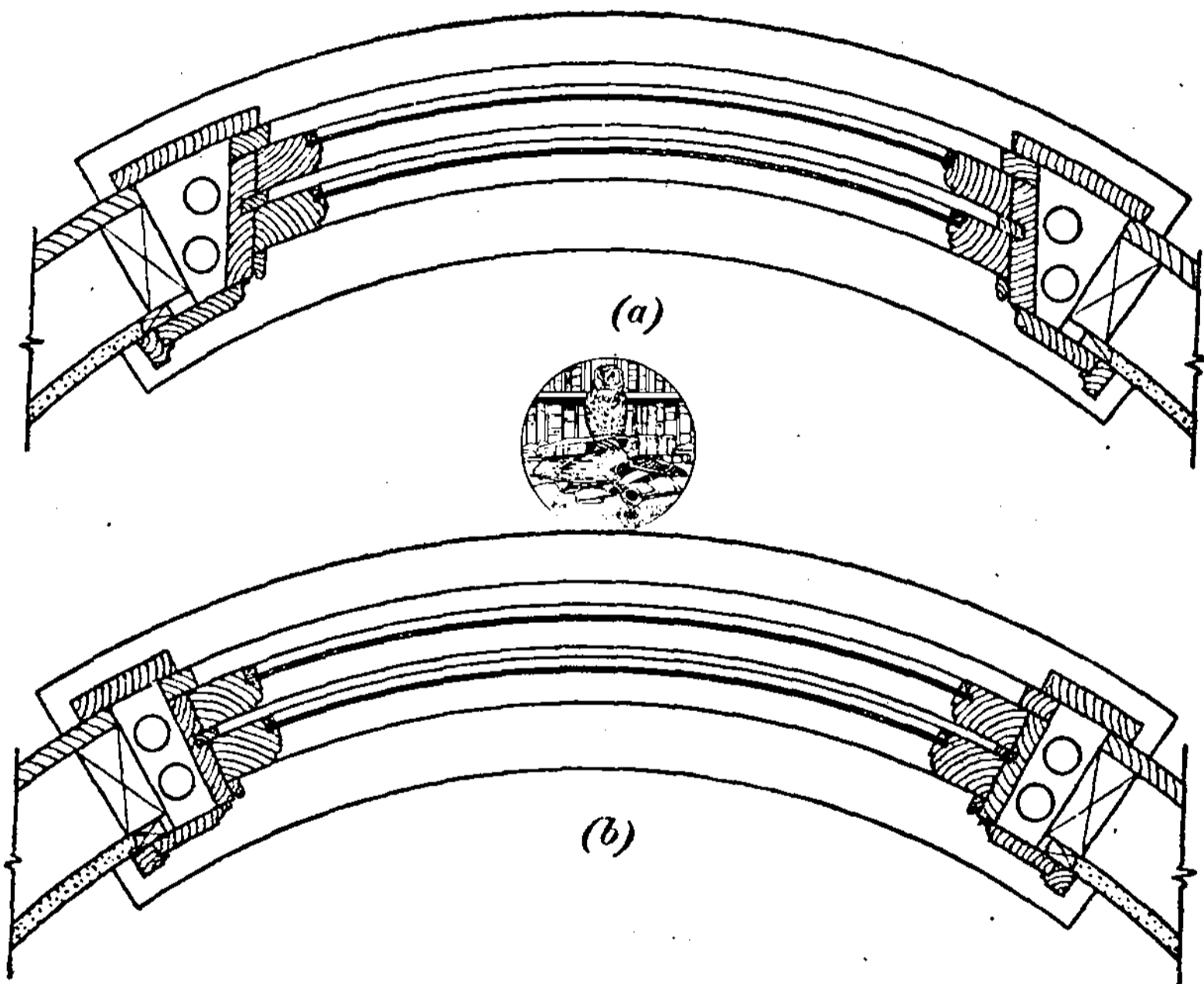


FIG. 11

(i) An elliptical sash such as would be used in a gable.

(j) A circular sash such as would be used in a gable.

(k) An elliptical-head transom sash that could be used in a gable.

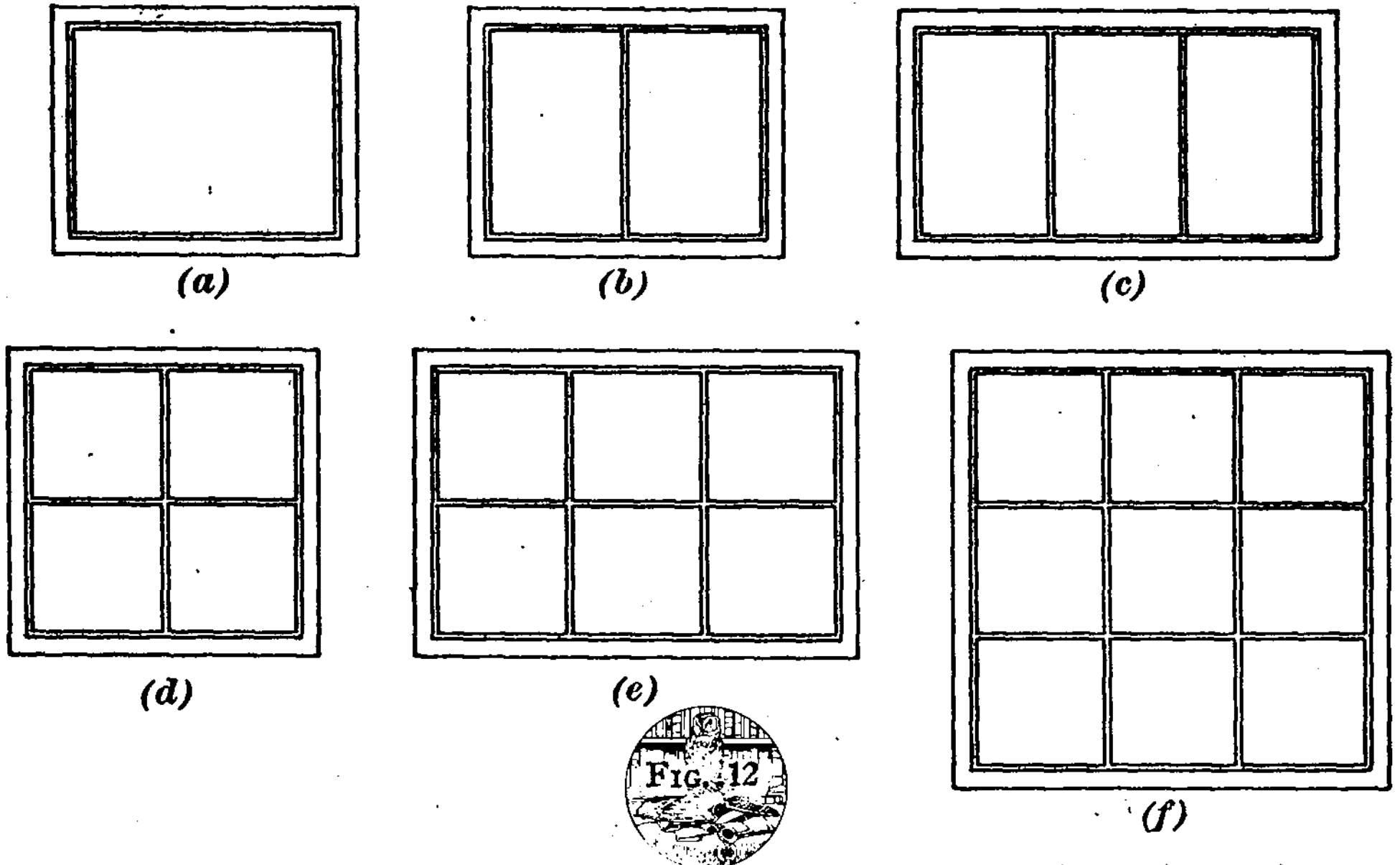
(l) A Gothic-head transom sash that could be used in a gable.

In Fig. 11 (a) is shown a plan of a bow-face or bent-face window. In this plan the jambs of the window are not at right angles to the curves.

In (b) is a bow-face or bent-face window shown in plan. In this window frame the jambs are perpendicular to the curves of the frame.

CLASSIFICATION ACCORDING TO NUMBER OF LIGHTS

20. **Classification of Sash.**—Sash may be classified according to the number of lights contained in each sash. Thus in Fig. 12, *a*, is a one-light; *b*, a two-light; *c*, a three-light; *d*, a



four-light; *e*, a six-light; and *f*, a nine-light sash. A sash may be divided into a greater number of lights if desired and if the sash is large enough.

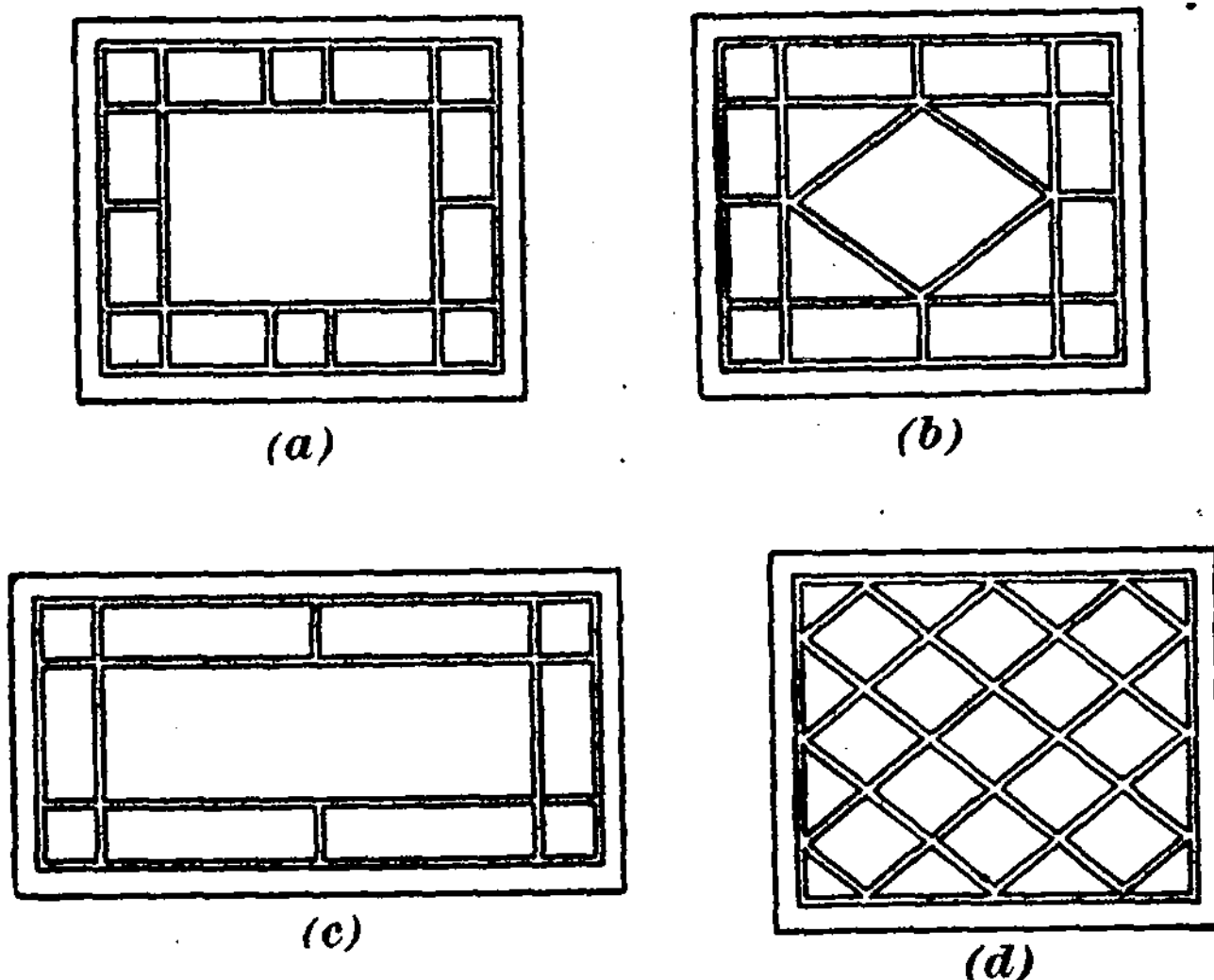


FIG. 13

21. Another class of sash is that known as *Queen Anne* or *Bungalow* sash. In these the muntins form patterns such as

shown at (a), (b), (c), and (d) in Fig. 13. There is an endless number of patterns that can be used in this class of sash.

22. Classification of Windows.—Windows are grouped or classified similarly to sash. In Fig. 14 are shown a few illustrations of these windows. In these examples both sash are

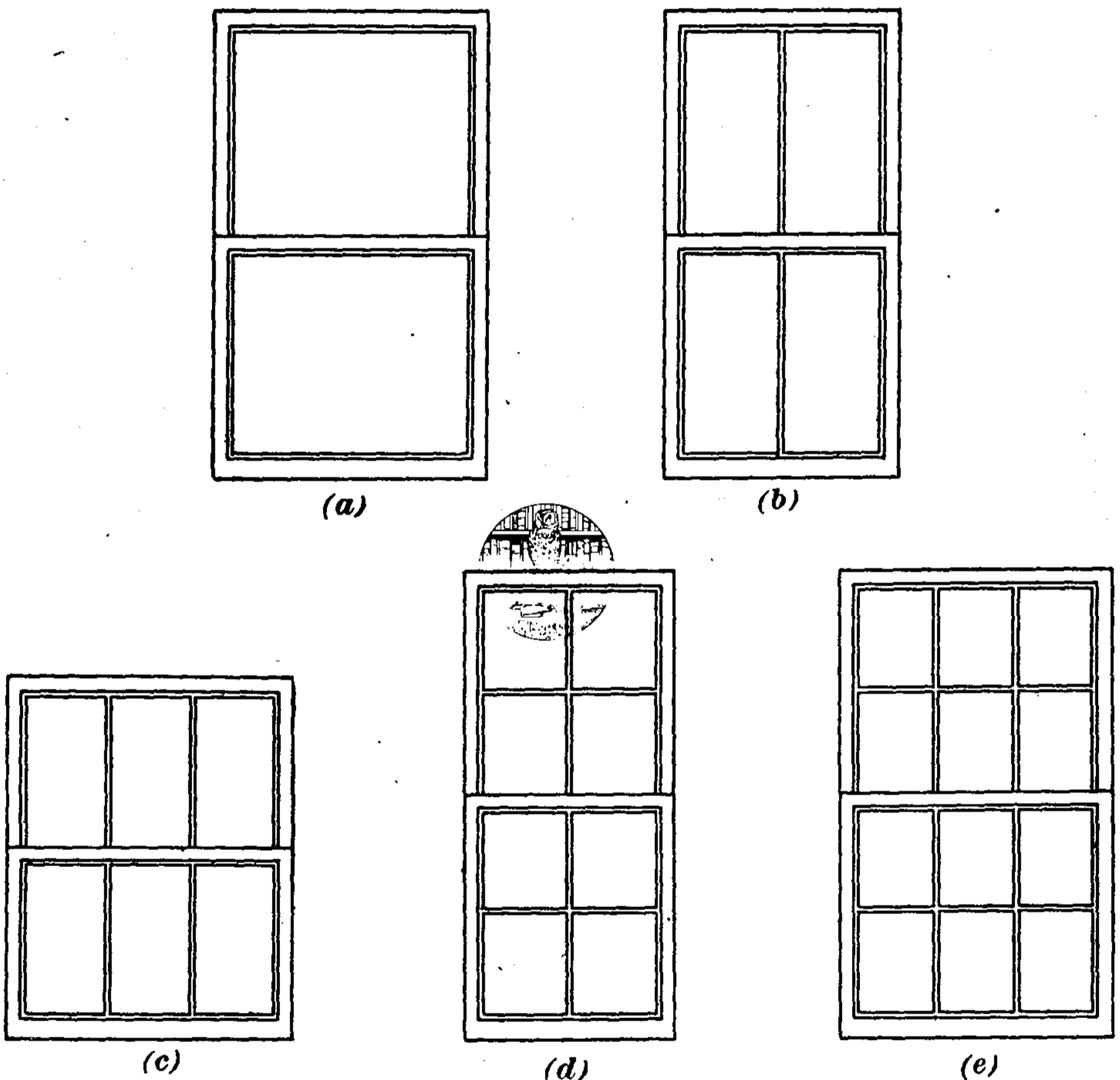


FIG. 14

similarly divided, making a two-light window, (a); four-light, (b); six-light, (c); eight-light, (d); and twelve-light, (e). There may be more lights if desired or if the windows are large.

23. Another group of windows, also called Bungalow or Queen Anne windows, have the top and bottom sash subdivided differently as illustrated in Fig. 15 (a), (b), (c), (d), and (e). This division of the upper sash into equal-sized lights can be varied to suit the taste.

24. The upper sash in Bungalow windows are also made with fanciful arrangements of the muntins as shown in Fig. 16 (a), (b), (c), (d), and (e). The bottom sash is not subdivided but is provided with a single light of glass so that the view through the window will not be obstructed.

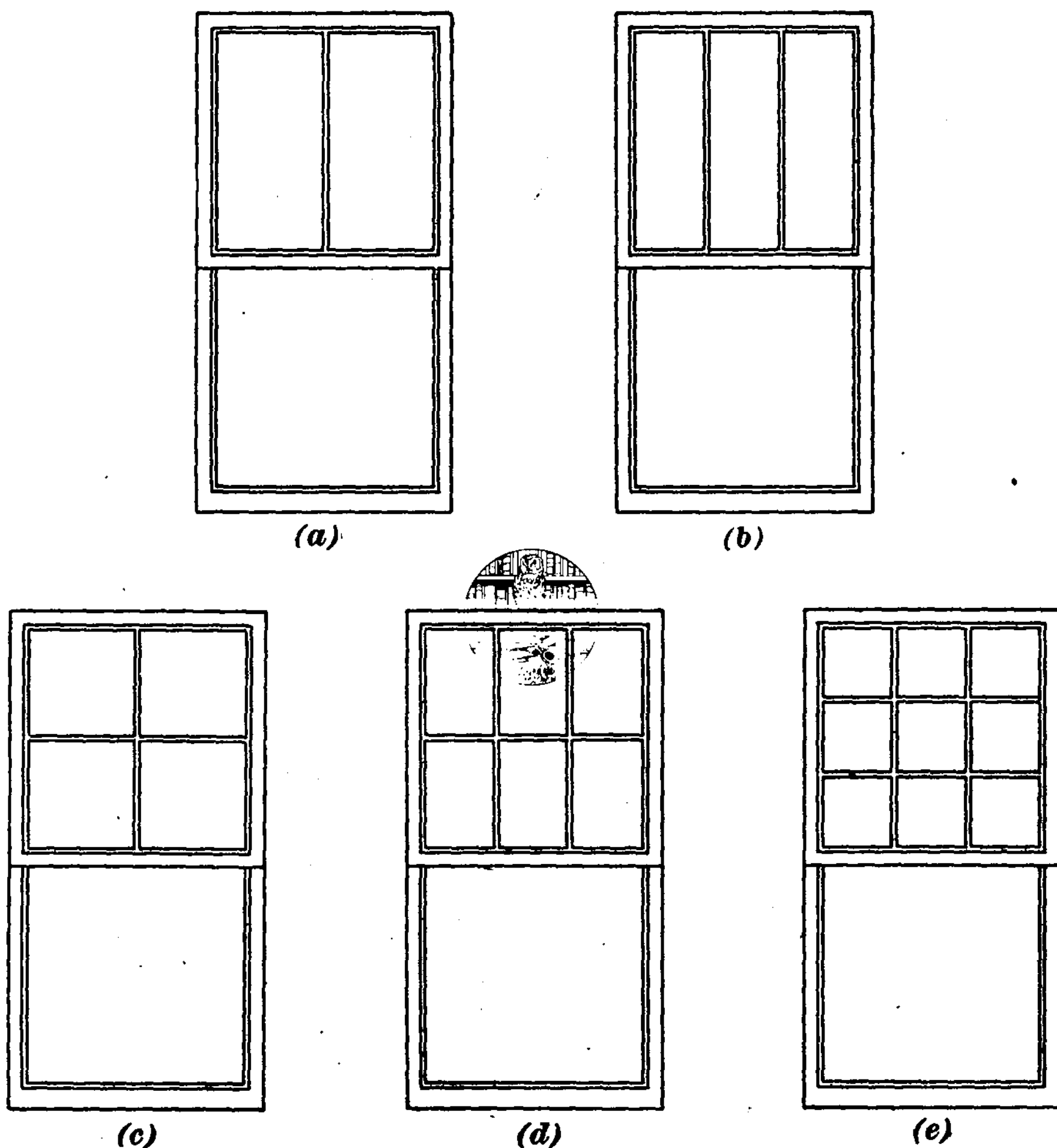
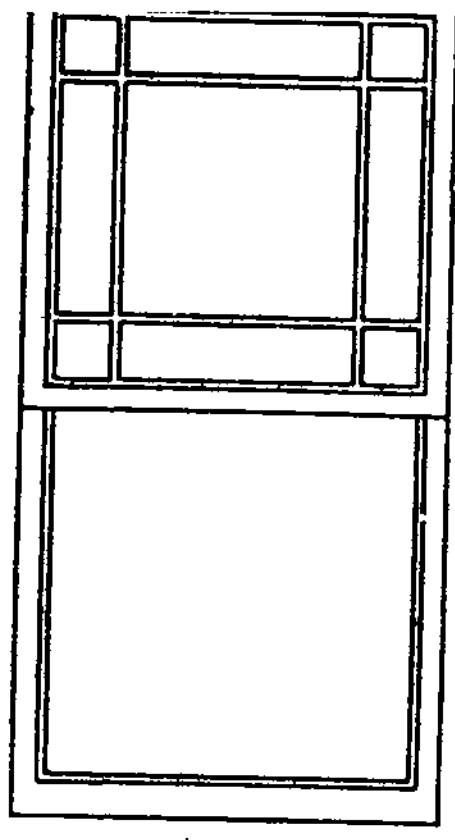
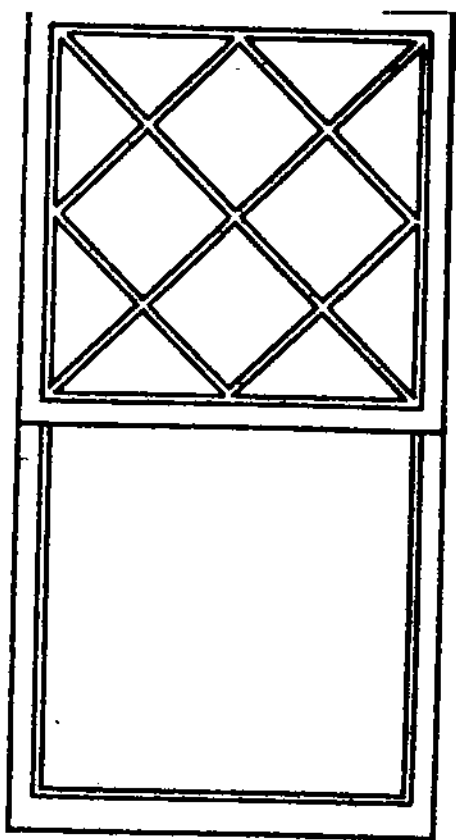


FIG. 15

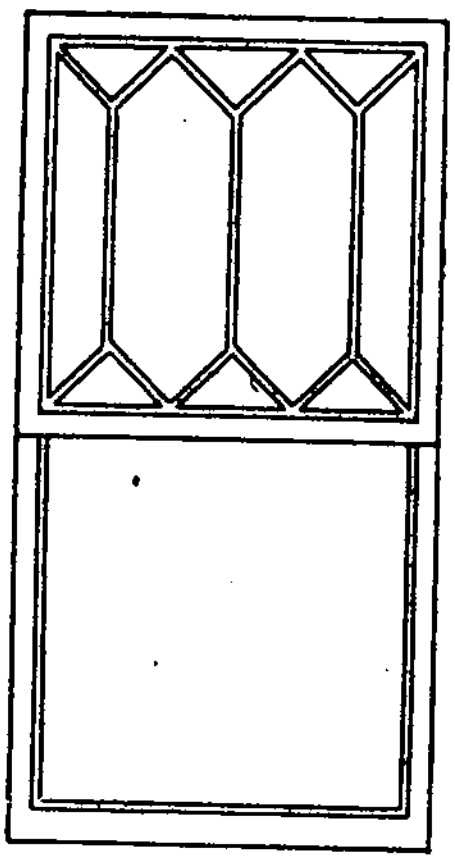
25. **Details of Finishing Inside Edges of Stiles and Rails.** The stiles and rails are rabbeted to receive the lights of glass. The other exposed edge is generally molded or "stuck." In Fig. 17 (a), is shown a typical section through the stiles and rails of an ordinary sash. The rabbet for the glass is shown at *a* and the glass at *b*. The sticking is shown at *c*. There are many different designs that are used to form the sticking such as the ovolo at *c* in (b), the ogee, O-G, in (c) the cove-and-



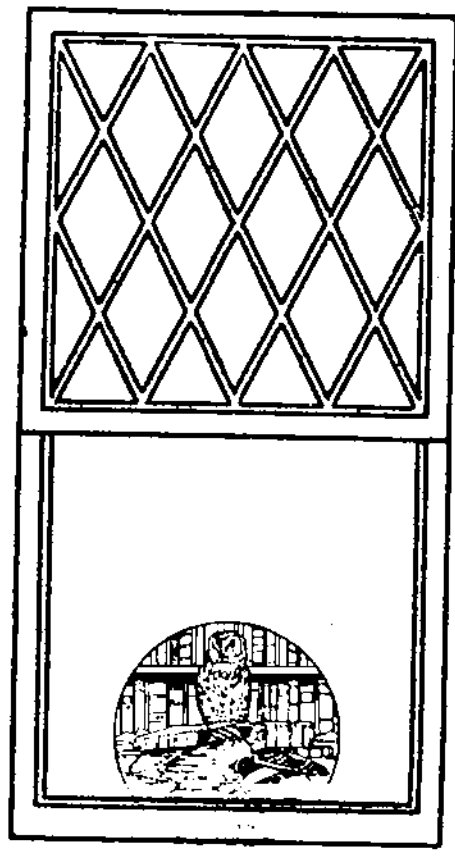
(a)



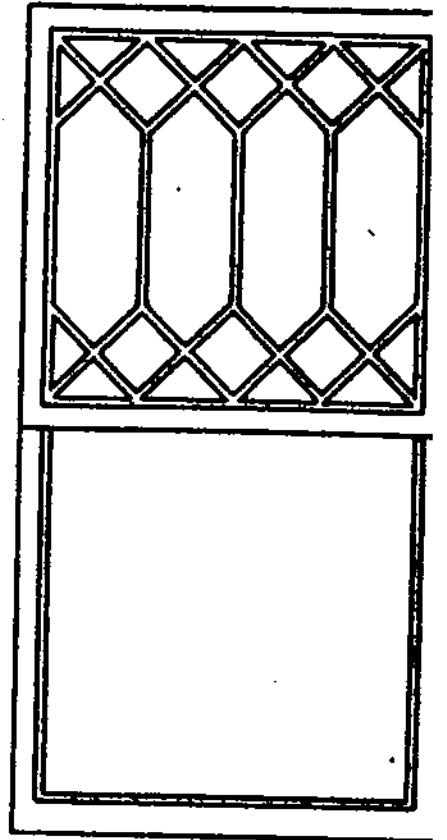
(b)



(c)

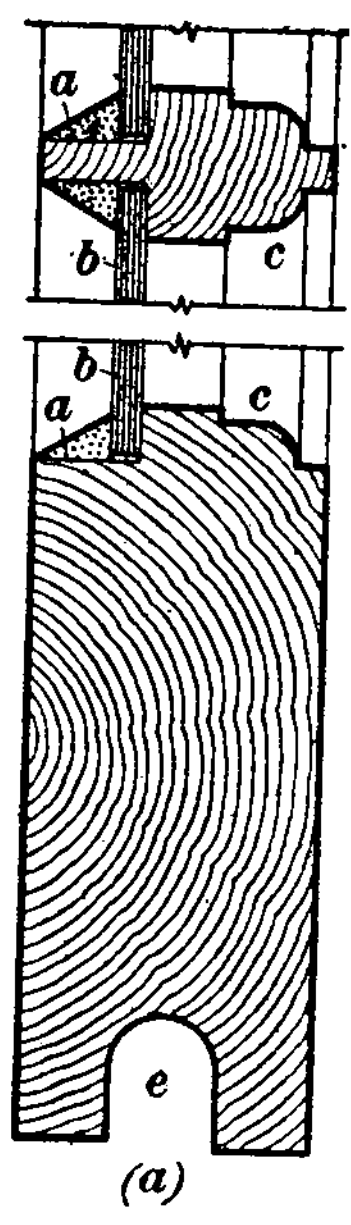


(d)

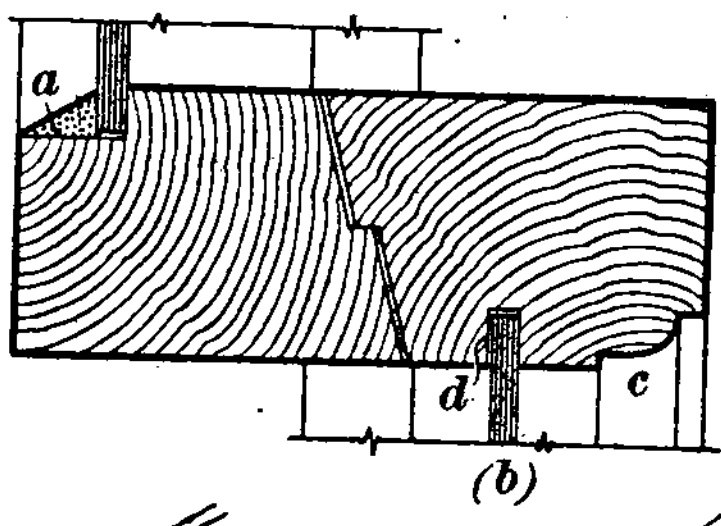


(e)

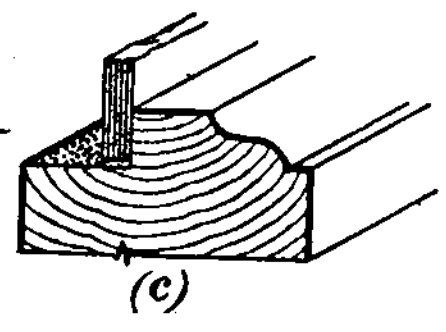
FIG. 16



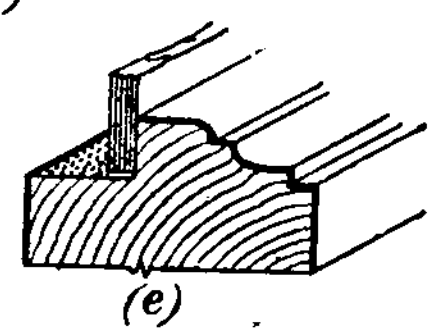
(a)



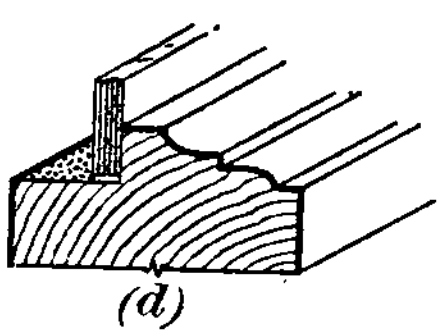
(b)



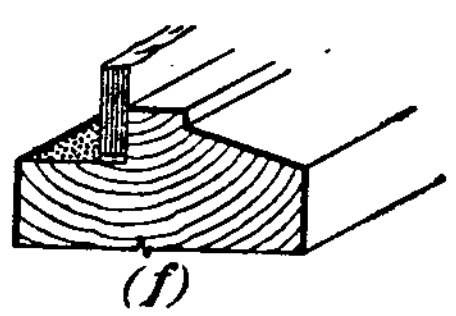
(c)



(e)



(d)



(f)

FIG. 17

bead in (*d*), the bead-and-cove in (*e*), and the craftsman in (*f*). The muntin in (*a*) has the ovolo sticking and corresponds to and miters with the sticking *c*.

The top rails and the stiles of a double-hung window generally show a 2-inch face, and the bottom rail shows a 3-inch face.

In the stiles of each sash, grooves *e* in (*a*) are cut to receive the sash cord or chain that connects the sash with the weights.

A section through the meeting rails is shown in (*b*), in which the sticking is at *c*. In the top rail of the lower sash the glass is received in a groove at *d* instead of in a rabbet as at *a*.

DOORS

DEFINITIONS

26. Parts of a Door.—The principal parts of a door are the rails, stiles, mullions, panels, etc., definitions of which follow.

The *rails* are the horizontal members of the door and are shown at *a*, *b*, *c*, and *d* in Fig. 18 (*a*) to (*f*).

The rail *a* is a top rail, *b* is a cross-rail, *c* a bottom rail, and *d* a lock-rail.

Stiles are the outside vertical members of a door and are shown at *e*.

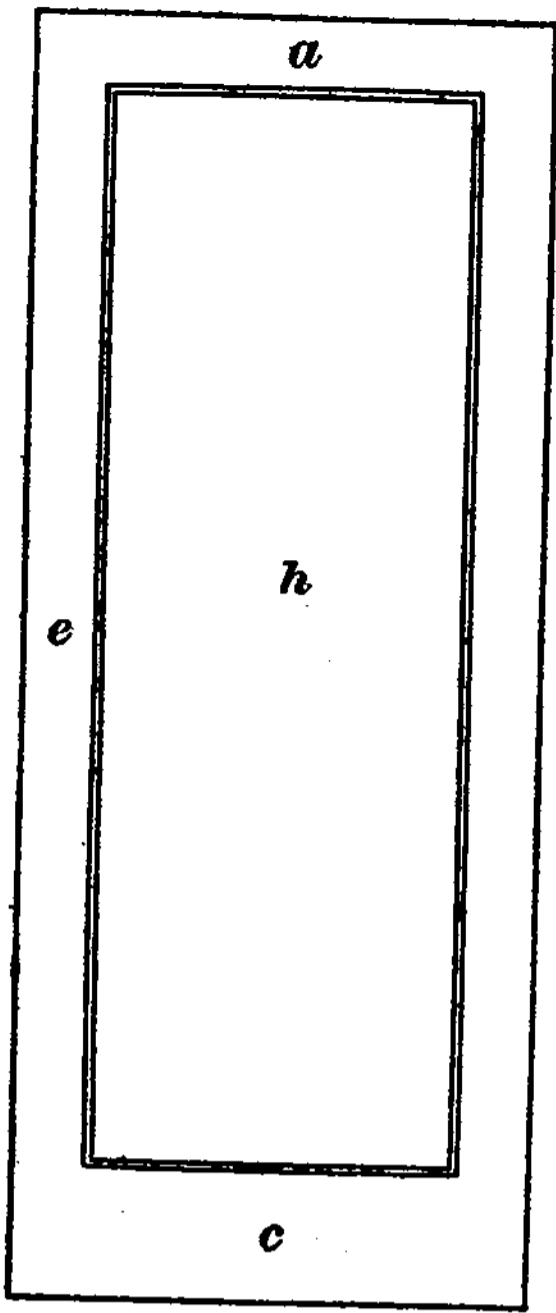
Mullions are the long vertical members *f* between the panels.

Short vertical members, such as *g*, are sometimes called *muntins*.

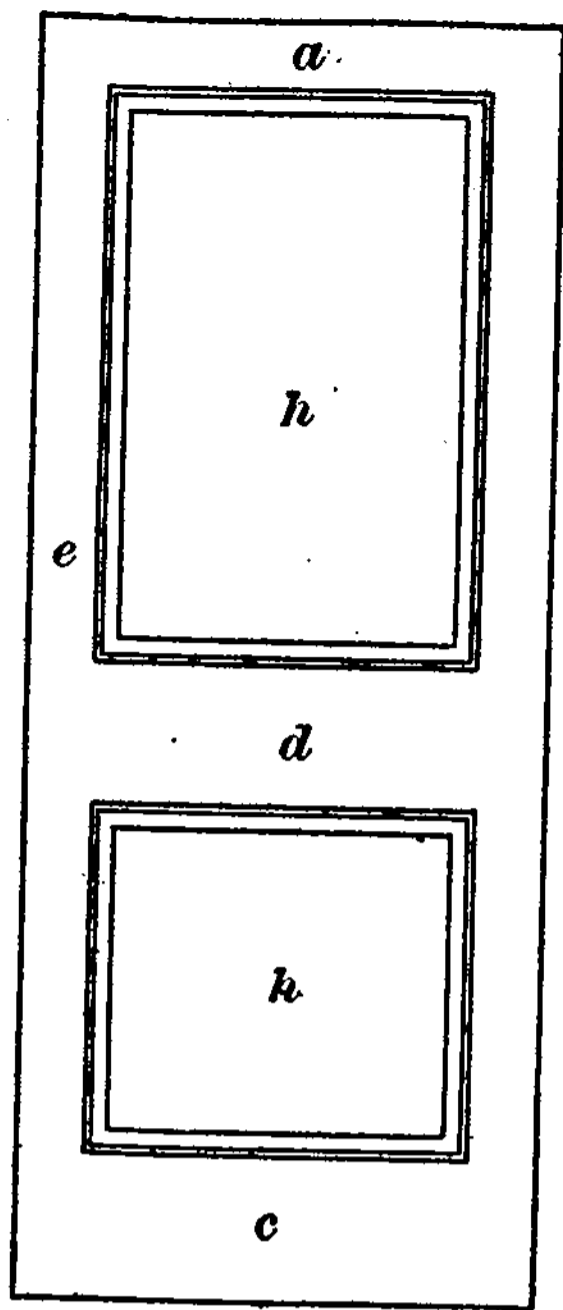
The spaces between the rails, stiles, and mullions are generally filled with panels *h*, in Fig. 18, formed of thin slabs of wood. These spaces may be filled with glass as shown at *a* in Fig. 19. The abbreviation GL signifies glass.

Panels extending horizontally between the stiles as at *h* in (*d*), Fig. 18, are called *cross-panels*. The door in (*d*) is called a cross-panel door. Panels such as the lower four panels in (*e*), Fig. 18, and the two panels in (*b*), Fig. 19, are called *vertical panels*.

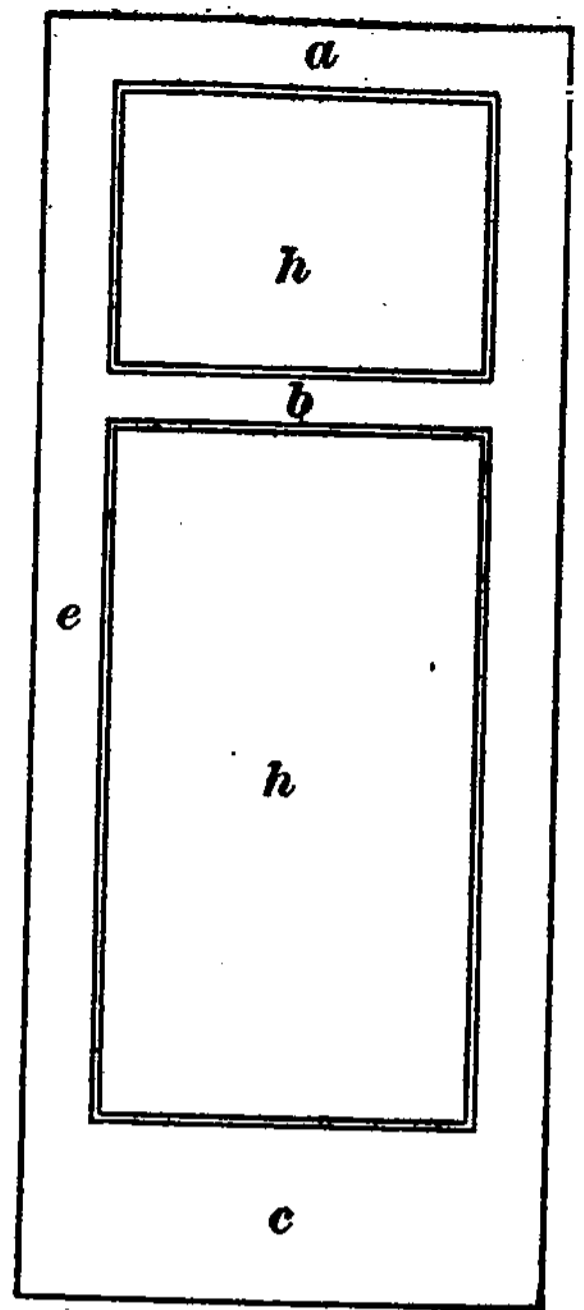
Panels are called *flat panels* when they have the same thickness throughout, as shown at *a* in (*a*) and (*b*), Fig. 20, and in



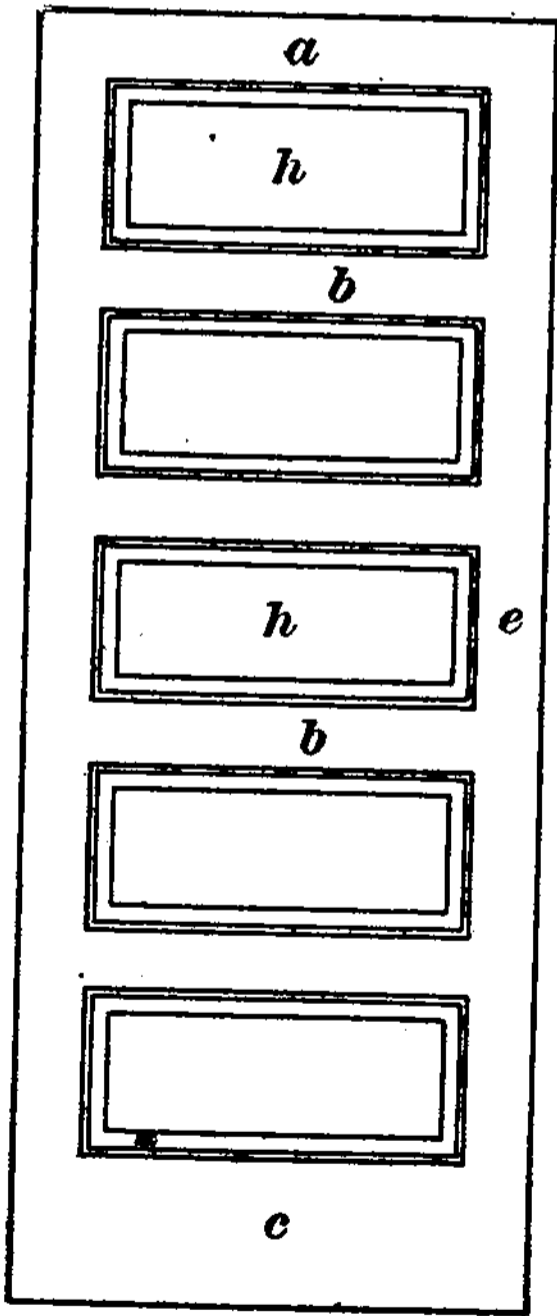
(a)



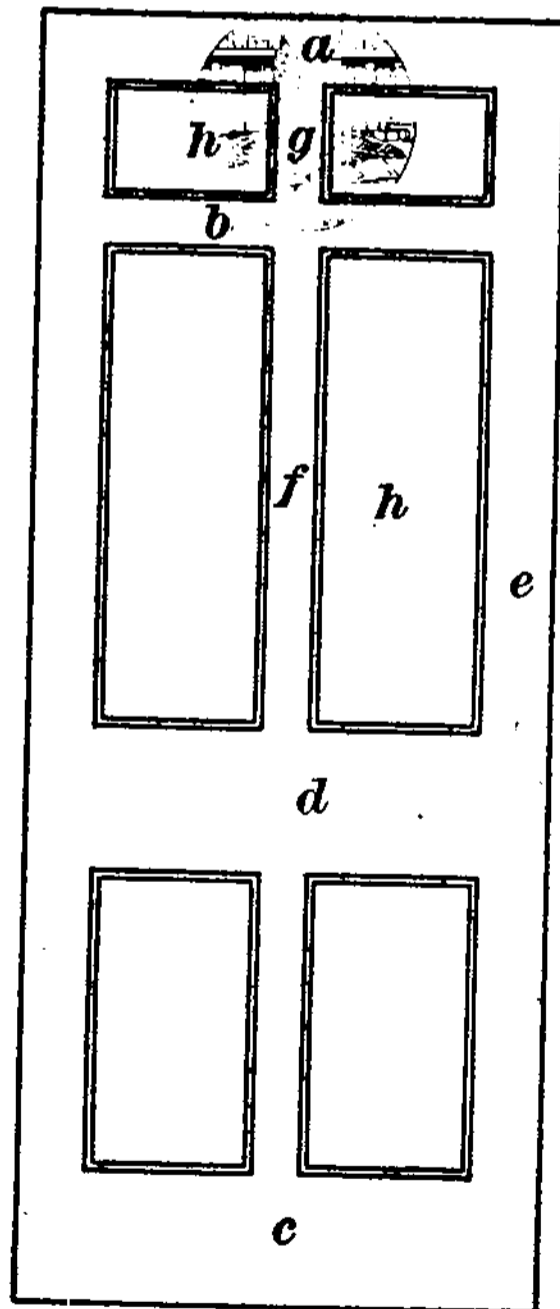
(b)



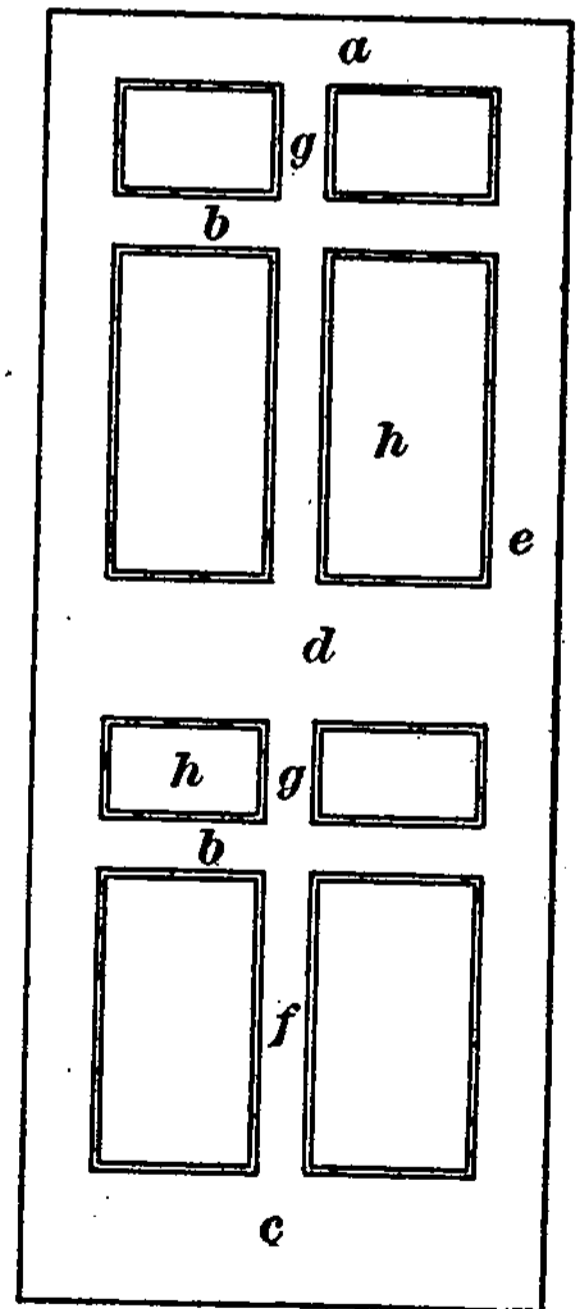
(c)



(d)

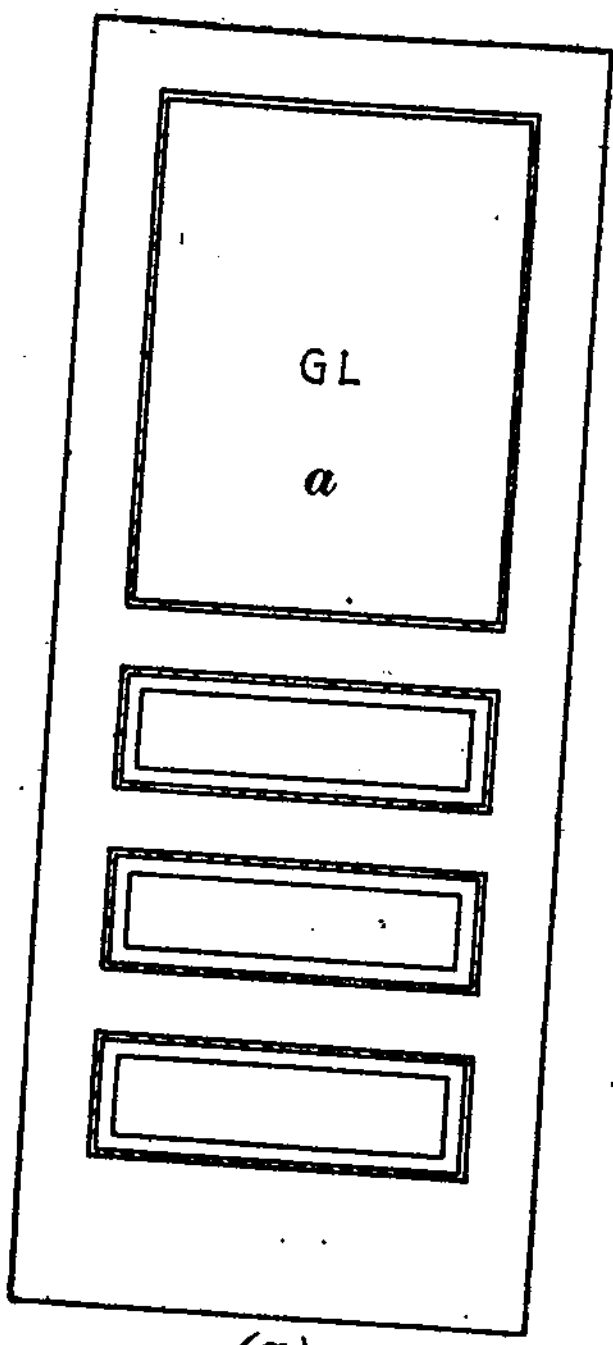


(e)

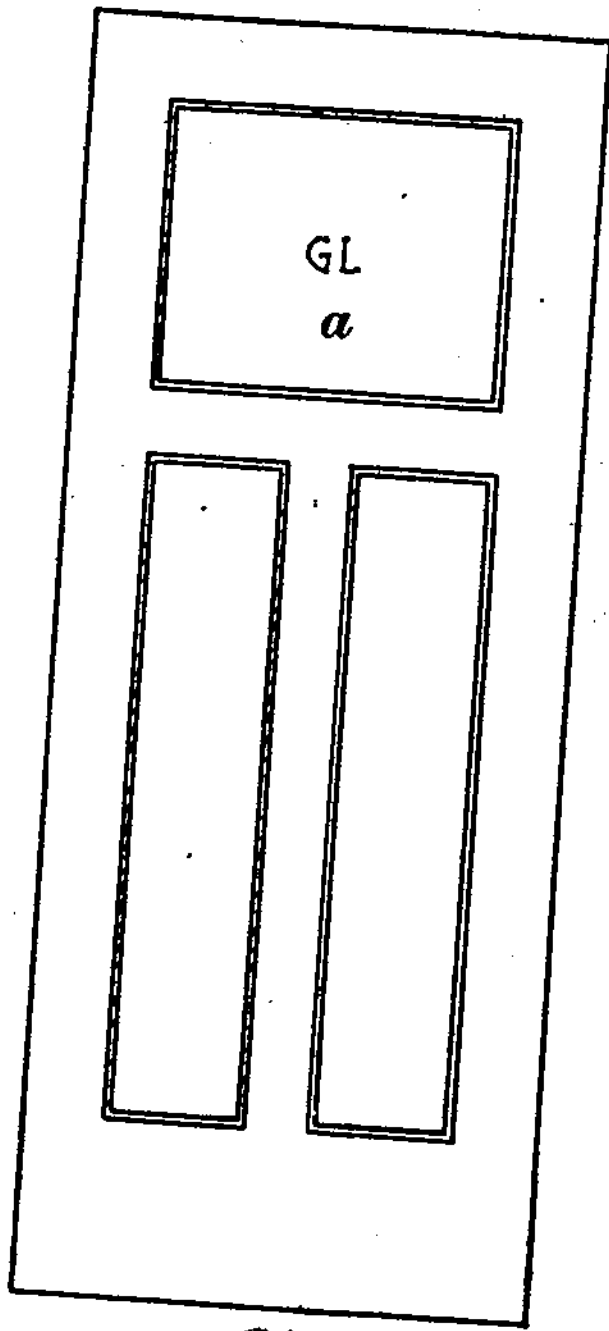


(f)

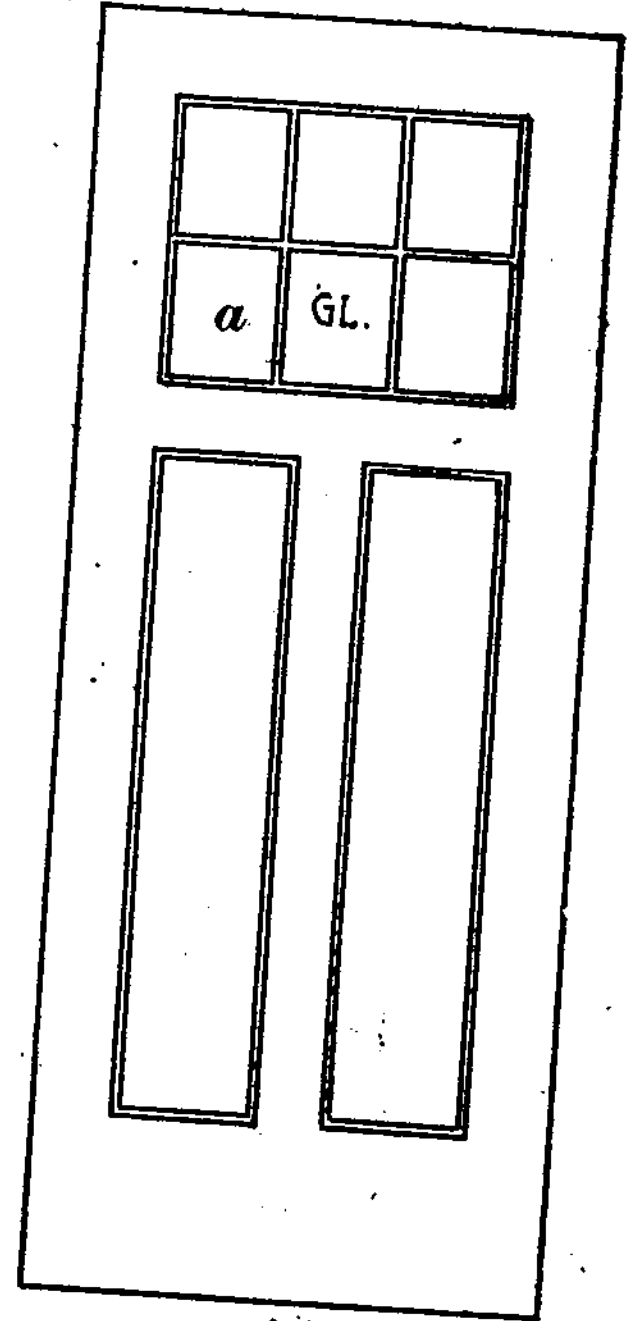
FIG. 18



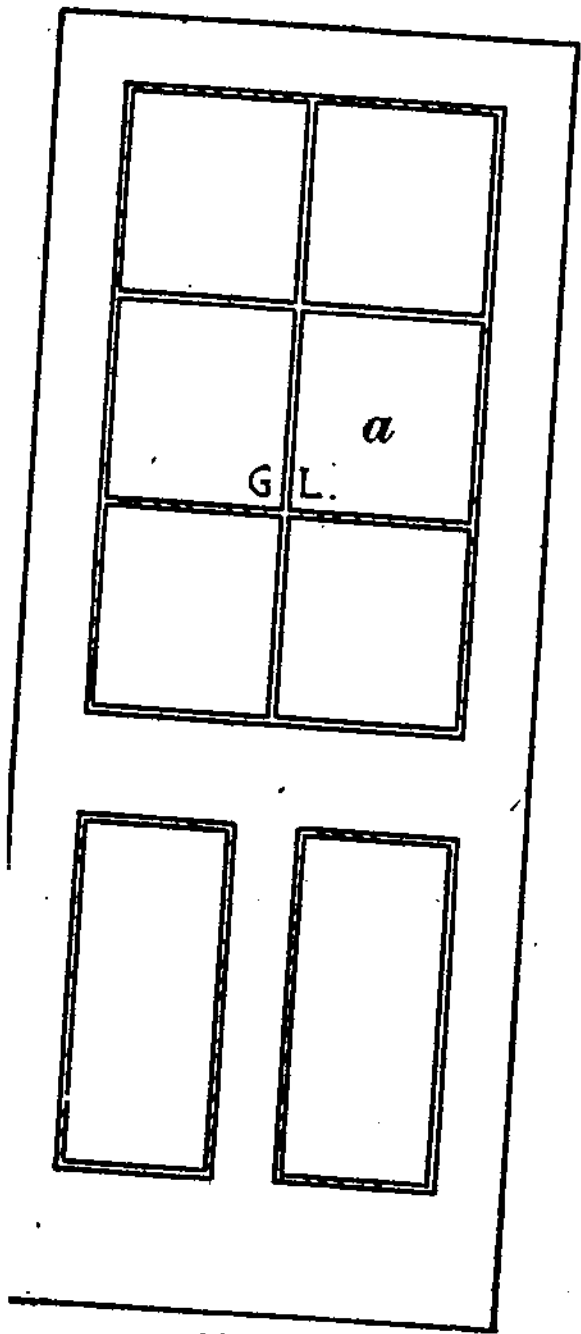
(a)



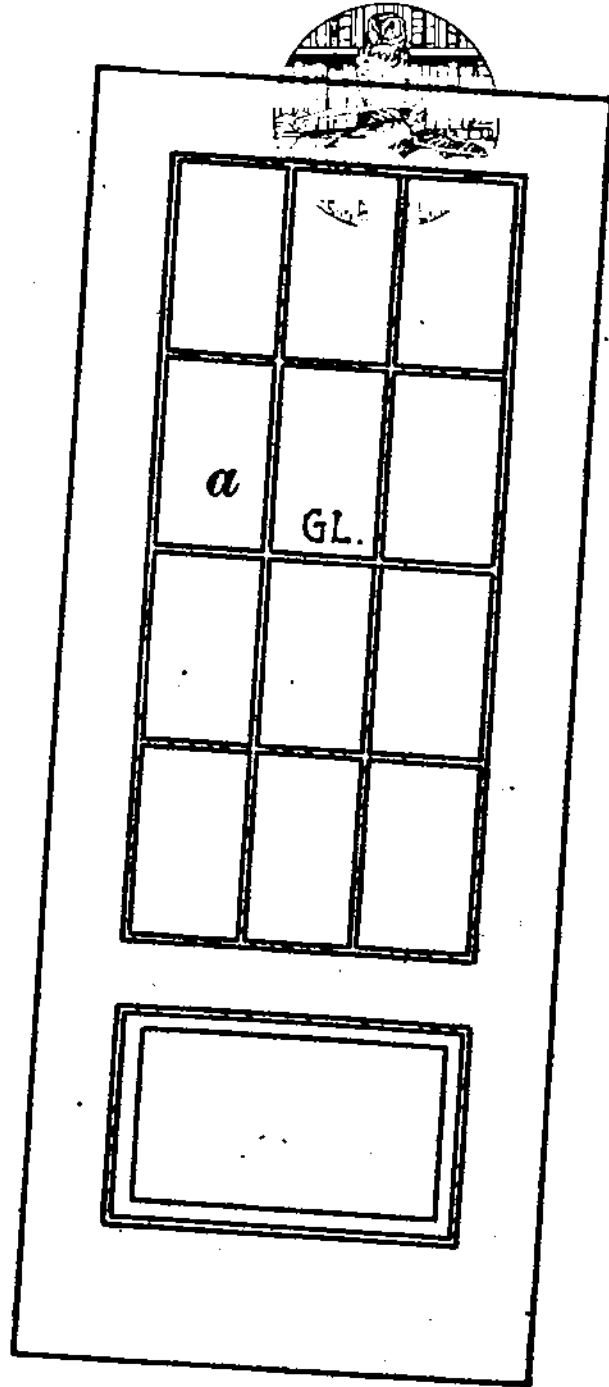
(b)



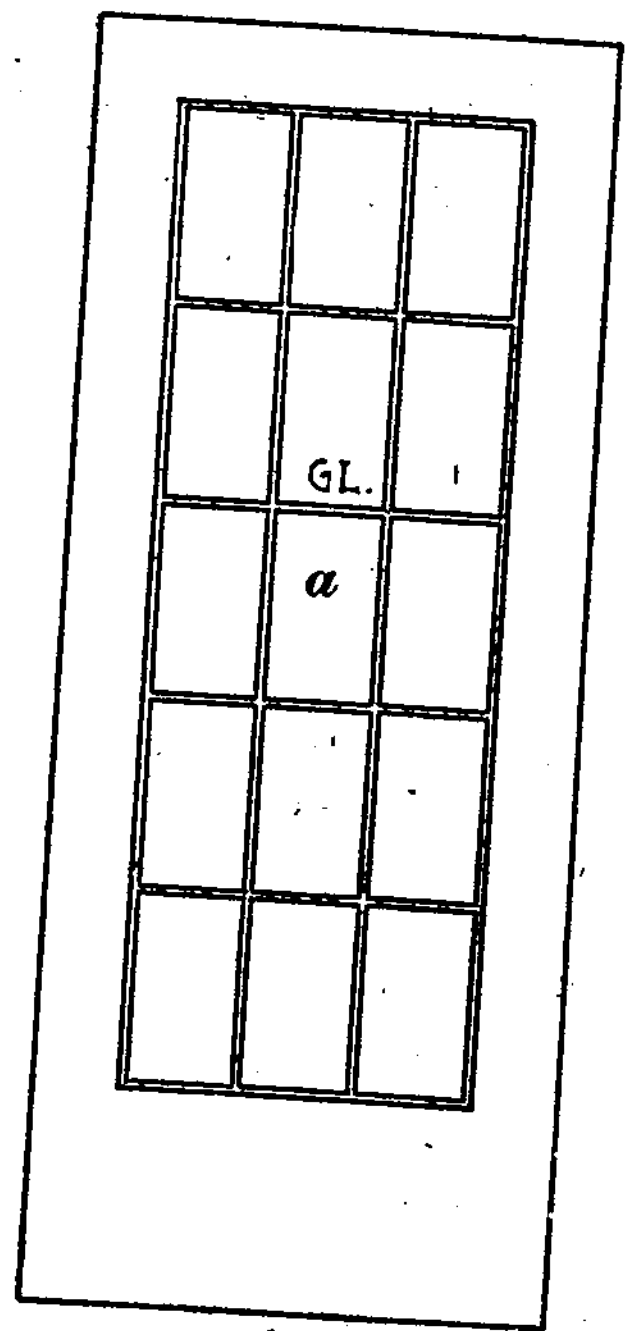
(c)



(d)



(e)



(f)

FIG. 19

(*g*) and (*h*). They may be laminated or compounded, that is, composed of three or more sheets of veneer glued together as shown at *a* in (*a*), and in (*g*) and (*h*). The panel shown at *a* in (*b*) is called a solid flat panel.

Raised panels are thin at all edges and thicker in the middle as shown at *a* in (*c*) and (*d*) in Fig. 20.

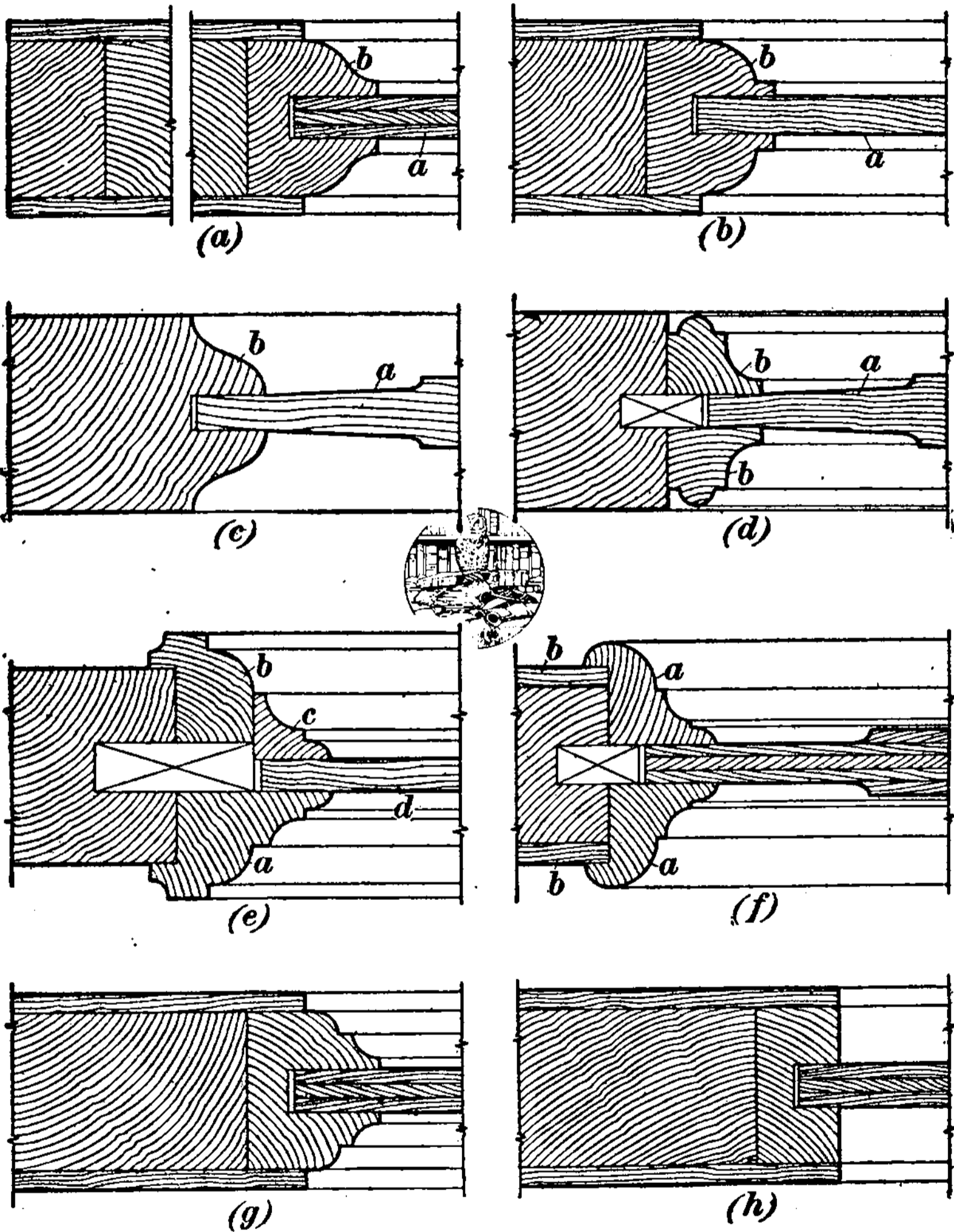


FIG. 20

Moldings are frequently placed in the corners formed by the panels and the rails and stiles as shown in Fig. 20 in (*d*), (*e*), and (*f*). These moldings are called applied moldings, as they are put on the door after the rails, stiles, and panels have been assembled. The word *mold* is frequently used instead of molding when used with a prefix as in *flush mold*, *crown mold*, etc.

A *flush mold* is an applied molding that finishes flush with or below the surfaces of the surrounding rails and stiles as shown in Fig. 20 at *b* in (*d*).

A *raised mold* is an applied molding which partly covers or which extends above the faces of the surrounding rails and stiles and is illustrated in (*e*) and (*f*). In (*e*) the molding is shown in one piece at *a*, and cut in two parts *b* and *c* on the other side. The part *a* is set first and then *b*. The panel *d* is then put in place and the molding *c* is nailed in place to hold the panel. At *a* in (*f*) the moldings are alike and partly cover and also extend beyond the face of the rail or stile *b*. The moldings on one side are first applied, then the panels and finally the moldings on the other side.

A *solid mold* or *stuck mold* is a molding that is worked on the article itself and is not applied. Thus in Fig. 20 in (*a*), (*b*), (*c*), (*g*), and (*h*) are shown solid moldings worked on the edges of the rails and stiles surrounding the panels in a door. Forming a stuck mold on the edge of the stile or rail is called sticking. The molding itself is called sticking.

In (*a*) is what is called Colonial sticking; in (*b*) ovolo sticking; in (*c*) ogee, O-G, sticking; in (*g*) bead-and-cove sticking; and in (*h*), craftsman or square sticking.

Rabbets are used when pairs of folding doors are used and are hung on the sides and swing in or out. They are worked on the edges of the meeting stiles as shown at *a* in (*a*), (*b*), and (*c*), Fig. 21. In (*a*) is a plain rabbet and in (*b*) a bead rabbet.

Astragal joints are worked on the edges of a pair of sliding doors as shown in (*c*), Fig. 21. Part of this joint on one door, projects into a groove in the other door, making a joint that prevents seeing through.

Astragal molds or *strips* are shown in (*d*) to (*h*), inclusive. In (*d*) is a *clover leaf astragal* joint in which the stiles of the doors are square and an astragal strip *a* is fastened to one door so as to form a rabbet and cover the joint between the stiles when the doors are closed.

In (*e*) is a **T**-astragal joint in which a **T**-shaped astragal mold or strip *a* is glued or nailed to the stile of one of the doors, and

