Oct. 21, 1952 R. M. JAMES 2,614,310

UNDERCUT FORMER

Filed Aug. 21, 1948 3 Sheets-Sheet 1

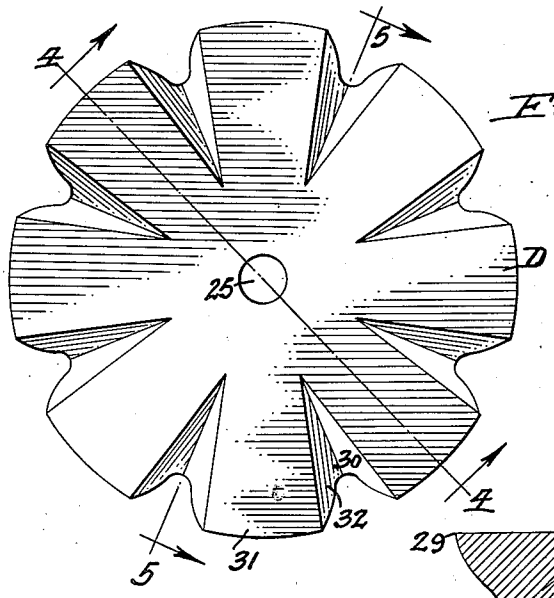


Fig. 1.

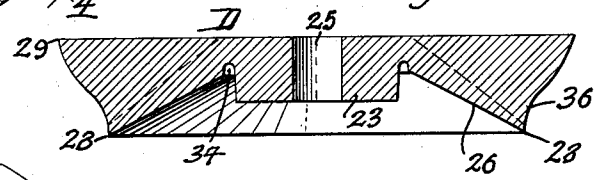


Fig. 4.

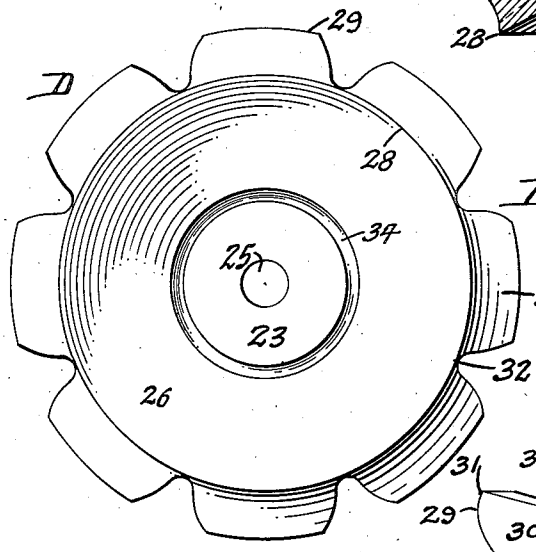


Fig. 2.

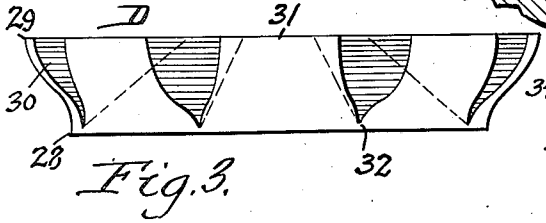


Fig. 3.

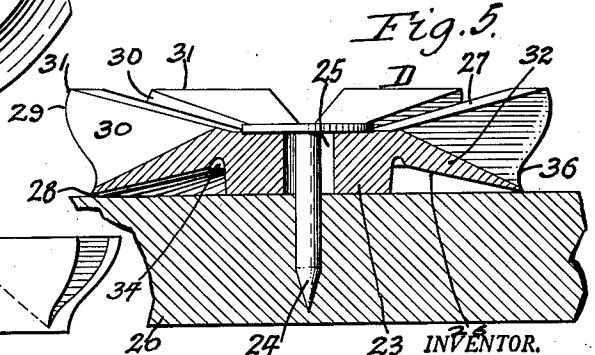


Fig. 5.

INVENTOR.
Robert Maxwell James
BY
Pollock & Cowan
Attorneys.

Oct. 21, 1952 R. M. JAMES 2,614,310

UNDERCUT FORMER

Filed Aug. 21, 1948 3 Sheets-Sheet 2

Fig. 6.

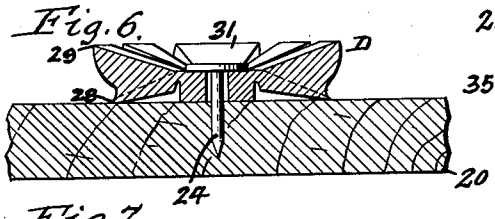


Fig. 7.

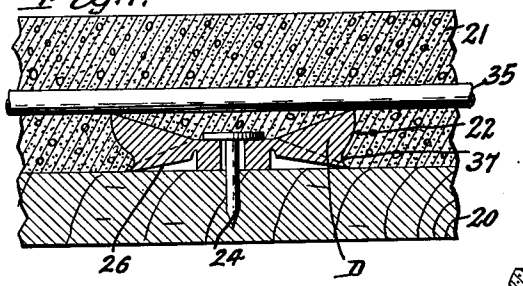


Fig. 8.

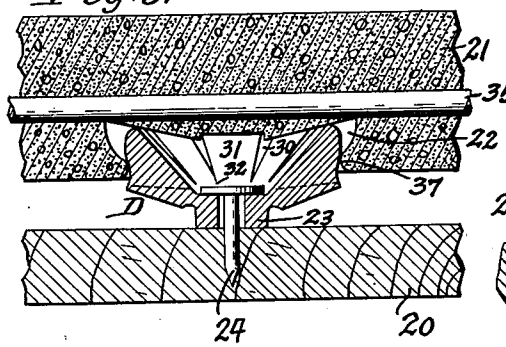


Fig. 9.

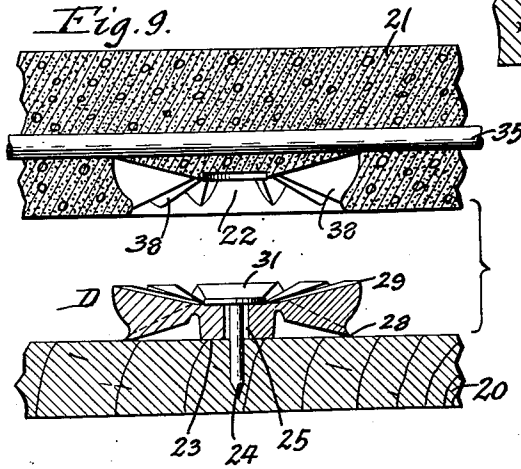


Fig. 10.

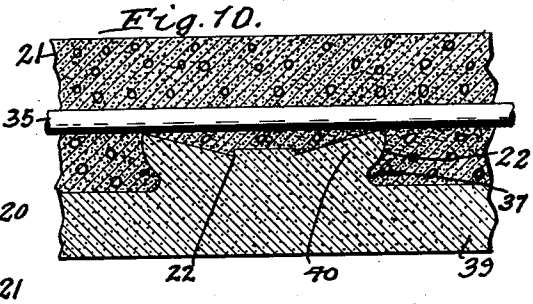


Fig. 11.

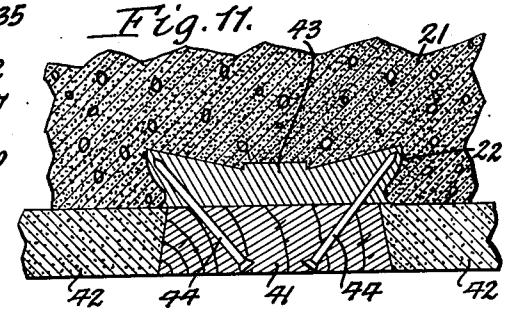
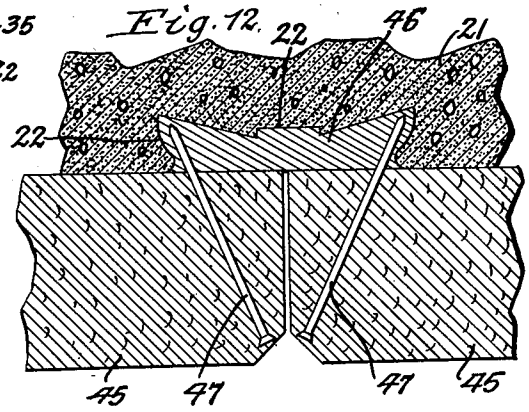


Fig. 12.



INVENTOR.

Robert Maxwell James

BY

Popp & Popp

Attorneys.

Oct. 21, 1952 R. M. JAMES 2,614,310

UNDERCUT FORMER

Filed Aug. 21, 1948 3 Sheets-Sheet 3

Fig. 15.

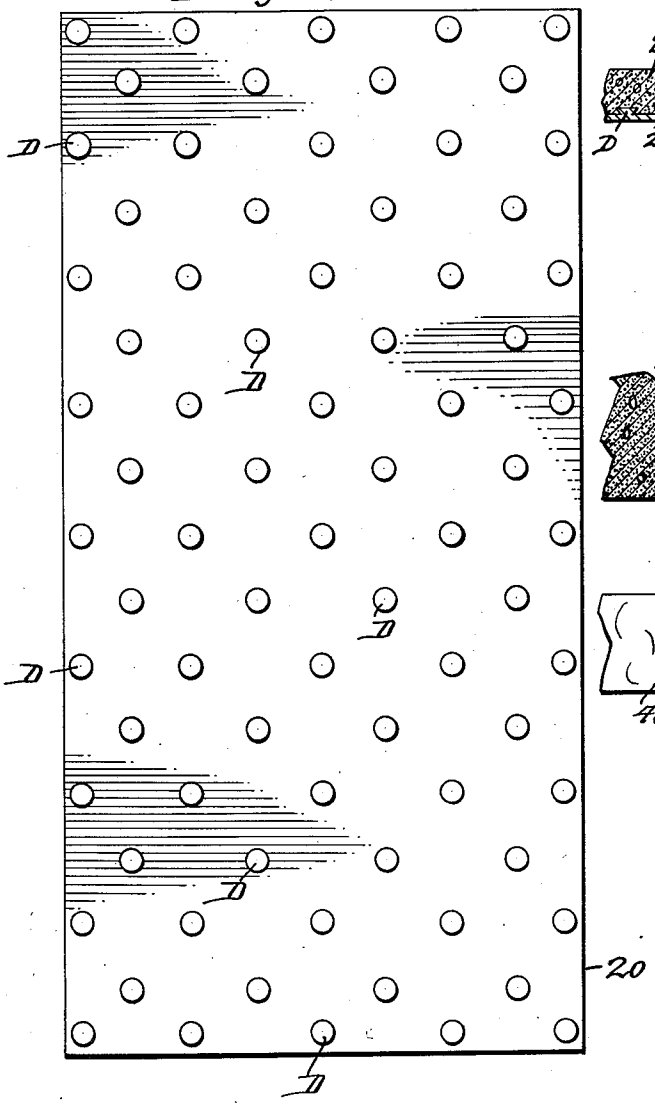
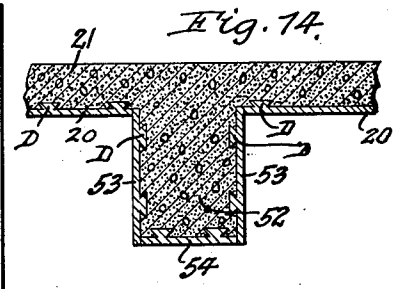


Fig. 14.



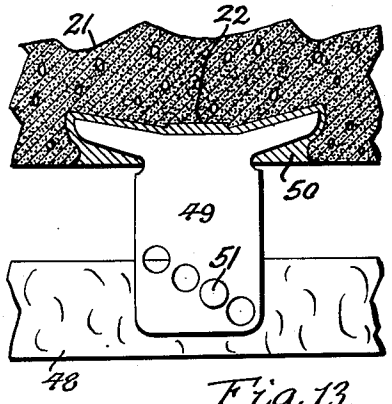


Fig. 13.

INVENTOR.

Robert Maxwell James

BY Pope & Pope

Attorneys.

Patented Oct. 21, 1952 2,614,310

UNITED STATES PATENT OFFICE

2,614,310

UNDERCUT FORMER

Robert Maxwell James, Buffalo, N. Y.

Application August 21, 1948, Serial No. 45,504

14 Claims. (Cl. 25—128)

1

This invention relates to a method and means for applying a covering of finishing plaster or other covering to the front side or face of a backing for concrete walls, ceilings and the like in building construction.

It has been found in actual practice that it is difficult, if not impossible, to satisfactorily apply a coat of finishing plaster directly to the surface of a concrete mass due to the lack of perfect cohesion between these materials.

Heretofore mechanical means were attached to or suspended from the supports which carried the concrete mass and upon these mechanical means the finishing plaster or other covering was applied.

This method is not only very expensive but the same also requires additional head room for its installation so that the overall height has to be greater to permit of applying plaster or other covering to the concrete mass and thus increases the cost of the structure accordingly.

It is the object of this invention to provide a method and means for reliably and economically applying a covering of plaster or other covering directly to the face of a concrete mass as an improvement over the means and methods heretofore employed for this purpose. With this end in view this invention consists generally of a plurality of flexible or resilient molding disks, of special design, which are individually attached in suitably spaced relation by means of nails, screws, bolts or like fastenings to one side of a rigid board of wood, metal, fiber or the like, such as are commonly used for forms or molds when pouring a concrete mass in building constructions.

Each of these disks is so designed that when the form board is withdrawn from the concrete mass or slab, after the latter is hard, the disk which has been embedded in concrete is also withdrawn from the concrete with the form board, and thereby leaves a negative or female undercut key niche, recess or impression in the surface of the concrete which will provide anchorage for an anchoring button or equivalent means whereby a covering is secured to the front side of the concrete mass or slab.

The disks are individual units which may be so located with respect to each other as to obtain the maximum efficiency from each disk and meet varied conditions such as forming concrete around beams and projections of various kinds commonly encountered in building construction.

Since the disks are individual units, they may either be left in place on the forming board after

2

removal from the concrete mass for reuse or the same may be removed from the forming board for use in other places to meet odd conditions. The ability to thus vary the placement of the disks on the forming board is highly economical in that the spacings need not be exact and it is only necessary to apply a few hammer blows for fastening the disk to the forming board in accordance with the desired location of the anchorage.

It is assumed that on standard sizes of plywood form boards, usually 4' x 8', the disks will be left permanently in place on these boards for repeatedly using the same until the forms are worn out, after about 20 to 30 uses. It will therefore be readily seen that in such instances, where the architectural design requires a smooth concrete surface or slab without any provisions for subsequent application of a covering material, the form boards may simply be reversed with the smooth side in front and facing the work to be poured. This feature is of great importance to a builder since it avoids the necessity of stocking both types of forms.

In addition to providing key niches for the reception of anchoring buttons on a plaster covering, the niches may be filled with a plug of plastic wood or other suitable material having nail holding characteristics for use in fastening wood grounds or strips to the anchoring buttons preparatory to applying the plaster to the concrete flush with these grounds, Such plastic wood buttons in the key niches may also receive nails and similar fastenings for securing acoustical tile and the like to the face of the concrete.

These key niches may also be utilized as anchoring means for mounting stone slabs of marble, slate or the like on the face of the concrete, this being accomplished by embedding the rear ends of metal clips, brackets or the like in plugs of plaster of Paris or mortar in the key niches and connecting the outer ends of the brackets or clips with the stone slabs or facing.

Although the molding disks may be constructed of any suitable resilient or flexible material such as rubber, it is preferable to make the same of neoprene for the following reasons:

It is a common practice for builders to oil the form boards to prevent concrete from sticking thereto. Oil is detrimental to rubber but does not attack neoprene.

Moreover neoprene is more rigid than rubber but can be withdrawn more easily from the concrete niches without liability of fracturing the lip of concrete around the edge of the small outlet of

the niche. This greater rigidity of the molding disks enables the same to be used as a support for the concrete reinforcing means, such as rods and woven mesh wires, whereby the concrete is reinforced and thus dispense with the metal chairs and the like which have heretofore been employed for this purpose as well as eliminating the cost of the same.

The savings in construction costs over other approved methods of installing a plaster ceiling under a concrete slab can be illustrated in connection with 1439 dwelling units recently erected in this locality as Federal Housing Projects. The floor slabs were to be of reinforced concrete construction with asphalt tile laid directly on the slabs as a floor finish. Each unit contained approximately 800 square feet of floor and the same number of feet of ceiling. After many conferences with the United States Housing Authority as to whether the concrete ceiling might, in the interest of economy, be left exposed and merely painted, it was finally decided that the ceilings should be plastered irrespective of cost. The only method acceptable to the government by which the ceilings could be plastered was the usual method of suspending metal channels and metal lath from the concrete slabs and applying the plaster covering to the lath.

The cost of the lath and supporting steel channels, to which must be added the cost of the additional height of the buildings of approximately 4 inches for each story in order to maintain the same maximum specified clear ceiling heights, resulted in spending to no useable advantage, an extraordinary amount which would not have been necessary if the present invention had been available.

Although the construction of this invention may vary in detail the same is preferably constructed and operated as follows:

In the accompanying drawings:

Fig. 1 is a top plan view of one form of the molding disk embodying this invention and adapted to be mounted on a rigid form board for producing an undercut key niche in a mass of concrete in accordance with this invention.

Fig. 2 is a bottom plan view of the same.

Fig. 3 is a side view thereof.

Figs. 4 and 5 are diametrical sections taken on the correspondingly numbered lines in Fig. 1;

Fig. 6 is a sectional view showing a molding disk of the form shown in Figs. 1–5 secured to a rigid form board preparatory to being used.

Fig. 7 is a sectional view showing a mass of concrete poured against a form board and embedding a molding disk mounted on the same and a reinforcing rod embedded in the concrete and resting on the molding disk.

Fig. 8 is a view similar to Fig. 7, but showing the form board removed from the side of the concrete and the molding disk partly withdrawn from the key niche in the concrete.

Fig. 9 is a view similar to Fig. 8, but showing the form board and molding disk wholly withdrawn from the concrete after the latter has hardened.

Fig. 10 is a sectional view showing a covering of plaster applied to the face of a mass of concrete and an undercut anchoring button on the plaster covering engaging with an undercut key niche on the concrete for interlocking the same in accordance with this invention.

Fig. 11 is a sectional view of a mass of concrete provided on its face with an undercut niche containing a plug shaped anchoring button of plastic wood to which is nailed a ground strip which is engaged by plaster applied to the face of the concrete.

Fig. 12 is a similar view showing acoustical tile fastened by nails to a plastic wood plug or anchoring button in accordance with this invention.

Fig. 13 is a sectional view showing a slab of stone, such as marble, slate and the like mounted on the face of a mass of concrete by means which embody this invention.

Fig. 14 is a sectional view showing the manner in which a covering of plaster may be applied to the flat surface of a concrete ceiling and also around a concrete beam in accordance with this invention.

Fig. 15 is a plan view of a form or mold board of rigid material which is provided on one side with a plurality of molding disks for molding the side of a concrete mass and forming a plurality of spaced undercut key niches or recesses on the face of said concrete, in accordance with this invention.

In the following description the same reference characters indicate like parts in the several figures of the drawings.

The numeral **20** represents a form or mold board which constitutes one of the sections of a mold against which a mass of soft concrete is poured for producing the flat front side or face of a concrete slab or mass **21** in constructing various parts of a building. This form board is preferably flat on its opposite sides and is made of rigid wood, metal or fiber board and of any desired shape as best suits the requirements of the particular work in hand then.

In practice, however, this board is preferably made of rectangular form, as shown in Fig. 15, so to permit of readily assembling a number of such boards to produce the desired mold area for the slab which is to be poured. In use these form boards are supported in their operative position by means of suitable props in the usual and well-known manner so that the soft concrete may be poured against the same and maintained in position until the concrete has dried and hardened after which the form boards are removed and used for another job.

On its front side each of the form boards is provided with a plurality of molding disks each of which is indicated generally by the letter D and is adapted to be embedded in the soft concrete which is poured against this board and produce an undercut key niche **22** in the mass of concrete which will serve as part of the anchoring means for mounting a covering on the front side or face of the concrete slab. These disks are distributed in any suitable manner over the entire area of the front side of the form board and each one of them is spaced from the adjacent disks and serves individually to produce an undercut key niche in a part of the front side of the concrete slab.

Each of these molding disks is generally of mushroom form in cross section so that when the soft concrete is poured against the form board each disk will be embedded in the concrete and form an undercut or inwardly flaring niche or recess **22** in the front side of the concrete mass. The molding disk is made of resilient material so that when the concrete has dried and hardened the disk can be withdrawn from the respective niche due to its capacity to contract sufficiently in diameter so as to be capable of being withdrawn through the small or reduced

outer end of the niche which was formed by this disk.

This molding disk is preferably constructed in its entirety of relatively stiff but resilient material such as neoprene, hard rubber and the like and in its detail formation the same is preferably constructed as follows:

The numeral 23 represents the hub of the molding disk which forms the central part thereof and is secured to the front side of the form board by means of a nail 24 passing through a hole 25 in the central part of this hub and driven into the front side of the form board. Any other suitable fastening may be employed for this purpose such as a screw, nail, rivet or the like. Around this hub is arranged an annular body or rim the rear side 26 of which is of forwardly tapering conical form and the front side 27 of the same is of forwardly flaring conical form, when the disk is mounted on a mold board, as shown in Fig. 5. Due to this formation of the rim or body the same is comparatively thin adjacent to the hub and relatively thick adjacent to the periphery of this body, as shown in Figs. 4 and 5. The rear part of the periphery of the body or rim is of relatively small diameter and forms a reduced neck 28 thereon and the periphery of the front part of this body is of comparatively large diameter so as to form an enlarged head 29 thereon, as shown in Figs. 4 and 5, and thereby causing this head to overhang this neck and impart a generally mushroom shape to this body.

On its front side the body of the disk is provided with an annular row of radial notches, channels, or grooves 30, thereby producing an annular row of comparatively thick wings 31 and an annular row of comparatively thin webs 32 which alternate with said wings. Due to this formation of the body of the disk the annular row of wings are moderately stiff and an annular row of webs are flexible which causes the disk as a whole to provide a substantial support and maintain its shape while the concrete is being poured on the same and yet permit the same to collapse or contract a sufficient extent when the same is pulled outwardly to permit of withdrawing the same from the niche which it formed in the concrete mass.

When the molding disk is initially formed the hub thereof is elevated relative to the rim of the same so that the underside of the hub is above the peripheral neck portion 28 of the rim, as shown in Fig. 4. When, however, the molding disk is nailed on the front side of the form board the under side of the hub engages with the front side of the form board and the annular neck of the disk is flexed and turned upwardly flush with the underside of the hub, as shown in Fig. 5. Due to this inclination of the rim of the molding disk the relatively stiff wings of the same are tipped upwardly and inwardly to a moderate extent and rendered somewhat more rigid and better able to withstand the load which is imposed upon the same and still leave them sufficiently resilient so that the enlarged head of the disk can contract sufficiently to permit the same to be readily withdrawn through the small end of the niche in the concrete.

In order to render the connection between the rim and the hub of the disk still more resilient and permit of bending the rim readily inwardly into contracted form relative to the hub, an annular groove 34 is formed on the rear side of the disk between its hub and rim, whereby this section of the disk is reduced and serves as a hinge about which the rim can readily bend inwardly toward the axis of the disk and thereby facilitate the withdrawal of the same from the niche of the concrete slab. In addition to drawing the hub downwardly against the form board when nailing the same thereto the neck is flexed outwardly on the form board from the position shown in Fig. 4 to the position shown in Fig. 5 and produce a rounded annular concave molding surface 36 about the neck, as shown in Fig. 5 for a purpose which will presently appear.

In addition to serving as molding members for producing undercut niches or cavities on the front side of the concrete slab for the reception of anchoring members whereby covering means may be mounted on the front side of the slab, these molding disks serve the additional purpose of supports upon which reinforcing members may rest while the soft concrete is poured upon the form boards and the forming disks and embedding the reinforcing means therein for the purpose of strengthening the concrete slab. As shown in Figs. 7, 8, 9 and 10 these reinforcing members have the form of rods 35 but if desired any other suitable form of reinforcement may be employed such, for example, as woven wire having a mesh suitable for the particular work in hand.

By utilizing the molding disks as supports for the concrete reinforcement members the use of separate chairs, standards or like means may be dispensed with, thereby further effecting a saving in doing work of this character.

Briefly the operation of producing a concrete slab preparatory to receiving a covering on its front or face side in accordance with this invention is as follows:

Assuming that a slab 21 is to be formed of which the underside is subsequently to be provided with a covering such as plaster, the form board is first placed in a horizontal position with its several molding disks projecting upwardly therefrom, as illustrated in connection with one of such disks in Fig. 6. The reinforcing means, represented by one rod 35 in Fig. 7, are then placed upon the upper side of the molding disks so the latter support this rod and in spaced relation with reference to the upper side of the mold board.

A soft concrete mass 21 is now poured upon the upper side of the form board so as to embed each molding disk on its top and lateral sides and also embed the reinforcement.

When the soft concrete has thus been poured upon the form board a niche or cavity 22 is produced in the concrete the top wall of which is of substantially outwardly flaring conical form while the side wall thereof is generally of downwardly tapering form, as shown in Fig. 7. Due to the rounding formation 36 on the reduced neck portion of the molding disk the annular lip formed around the edge of the niche is made of rounding form, as shown at 37 in Fig. 7 and thereby renders the same stronger and less liable to be broken when the molding disk is withdrawn therefrom.

After the concrete has dried and hardened sufficiently the form board 20 is withdrawn from the concrete slab and the molding disk is withdrawn from the recess. The first stage of this withdrawal of a molding disk from a niche in the concrete slab is indicated in Fig. 8 in which the several wings of the peripheral part of the collapsible rim are shown in a position in which the same have been contracted or moved inward-

ly toward each other almost to their fullest extent by engagement of the under sides of these wings with the rounded lip **37** around the outlet of the niche. Upon continuing the downward movement of this molding disk from the position shown in Fig. 8 the same will be completely withdrawn from this niche, this being possible due to the resilience of the flexible material of which the molding disk is constructed and the capacity of the same to contract upon being pulled outwardly.

As the rim of the molding disk is turned inwardly toward the axis of the same by engagement of the rounded lip **37** on the outlet end of the niche, wings and webs of the molding disk are lifted from the surface of the form board a sufficient extent to permit the wings and webs to contract and move out of the respective anchoring niche.

After the molding disk has been completely withdrawn from the niche the resilience of the material of which the disk is constructed again returns the several wings and webs of the rim to their normal position in engagement with the face of the form board, as shown in Fig. 9.

As the soft concrete is poured over the top and side of the molding disk the notches **30** on the front side of the rim are filled with concrete and when the molding disk is withdrawn from the concrete a plurality of strengthening ribs **38** are formed within the respective key niche which ribs are arranged in an annular row about the axis of the respective niche and each rib extends along a part of the side wall of the niche and the adjacent bottom portion of the same, as best shown in Fig. 9. By thus forming ribs on the inner side of the niche which extends to the narrow outlet portion thereof the lip of each of these niches which is represented by the rounded portion **37** thereof is materially strengthened and the liability of breaking of the same upon withdrawing the molding disk from the respective niche is reduced to a minimum.

After the several molding niches **22** have been formed on the face of the concrete slab a covering is applied to this face in accordance with the character of the work in hand.

If a finishing covering of plaster is desired a coat **39** of the same is spread over the face of the concrete slab in sufficient quantity to cause some of this plaster to fill each of the niches and thereby produce in each of these niches a plaster undercut anchoring button **40** which corresponds in shape to the anchoring cavity or key niche in the concrete slab. Each of these buttons engages its reduced neck with the reduced outlet of the respective niche and also engages the enlarged outer part of its rim with the enlarged inner part of the niche or recess so that each of these buttons is of undercut form and engages with the correspondingly shaped niche in the concrete slab and forms an interlocking connection between the same, as shown in Fig. 10.

This interlocking effect is produced without increasing the thickness of the slab or the covering of plaster. It is therefore possible to not only dispense with the usual hangers, brackets and the like for suspending the lath which was necessary heretofore when covering concrete work by means of a separate layer of finishing plaster, but it also permits of reducing the ceiling height of each floor of a building and the attended cost.

For the purpose of enabling grounds or ground strips **41** to be used in connection with concrete work in which a coat **42** of finishing plaster, is applied to the concrete on opposite sides of the ground strip, this may be accomplished in accordance with the present inventions by filling each undercut key niche **22** with a plug **43** of plastic wood so that the same is flush with the front side of the concrete slab, as shown in Fig. 11. The grounds or ground strips may be secured to this plastic wood by means of nails **44** or the like and the finishing coat of plaster **42** may be applied to the concrete and in engagement with opposite sides of the ground strip, as shown in Fig. 11.

Acoustical tile **45** may also be mounted on the face of a concrete wall in accordance with this invention by filling the undercut niche **22** with a plug **46** of plastic wood, in the same manner as indicated in Fig. 11 and then securing the acoustical tile to the front side of the concrete slab and the plastic wood plug by means of nails **47**, passing through the tile and into the plug **46**, as shown in Fig. 12.

In Fig. 13 means are shown whereby plates **48** or slabs of marble, slate or other stone may be mounted on the concrete slab in accordance with this invention. In this case the rear or inner end of a metal holder **49**, such as a clip, or bracket of metal is secured in an undercut niche **22** formed on the face of the concrete slab in accordance with this invention by embedding the rear end of this clip in a plug **50** of plaster of Paris which is filled in the niche and after this plaster of Paris is hard the front or outer end of the clip is secured to an edge of the marble slab by means of one or more dowels or pins **51** passing through this clip and through an opening in the marble slab.

When preparing a concrete ceiling for receiving a covering of plaster or other material it is possible to produce the undercut niches for receiving the anchoring buttons and the like by using mainly form boards which are of standard dimensions, but when odd jobs are encountered which cannot be entirely completed by the use of standard sizes of form boards then temporary small boards may be employed of the desired size and shape on which the required number of molding disks may be attached to meet the particular conditions, this would also be necessary when producing the required form boards and molding disks for use around any beams or projections on the concrete slabs such, for example, as the beam **52** in Fig. 14 in which the form boards on the underside of the ceiling slabs **21** are used in connection with vertical form boards for use in producing the covering **53** on opposite sides of the beam and a horizontal form board for use in molding the covering **54** on the underside of this beam.

Although the molding disks are preferably of rounded shape because this permits of maximum hinging action and arching effect obviously other shapes could be utilized such as square, rectangular, polygonal or oval.

In the preferred construction the form boards are preferably flat on both sides of the same and only the front side of each board is provided with a plurality of molding disks. It is thus possible to use the form boards for producing molding surfaces against which concrete may be poured which has an even and un-niched surface, while the opposite side which is provided with a plurality of undercut molding disks may be utilized solely for producing undercut niches in a concrete mass, thereby avoiding the necessity of the

stocking both types of forms and effecting a substantial saving in expense.

The molding disks which embody this invention are of simple, durable and inexpensive construction, they require little labor and inspection and enable great economies to be effected in the building industry.

I claim:

1. A mold for producing a plurality of spaced undercut niches on the surface of a concrete mass for receiving undercut buttons which form parts of means for attaching a covering to the face of said concrete mass, said mold comprising a rigid board forming the wall of a mold which receives the concrete mass, and a plurality of spaced undercut disks mounted on the face of said board each of said disks having a central hub which initially is spaced from said board and an annular rim which surrounds the hub and has a rear peripheral part of small diameter which engages said board and a front peripheral part of large diameter which overhangs the rear part thereof, and a fastening for deflecting the hub of said disk backwardly relative to the rim thereof and into engagement with said board and tilting the front large peripheral part of said rim inwardly, the annular part of said disk between the hub and the rim thereof being reduced in thickness to form a hinge to facilitate bending of the rim relative to the hub.

2. As an article of manufacture, a resiliently flexible insert for forming an undercut recess in plastic material, said insert consisting of a disk-like body member having an inclined peripheral edge portion arranged at a re-entrant angle to the plane of the insert, the smallest face of said disk-like body member having a recess formed therein, said insert having a hub portion extending into said recess, said insert further having a recessed hinge area in the locale between said hub and said inclined edge portion, said inclined edge portion being flexible relative to said hub portion to selectively radially collapse the insert upon hinging around said hinge portion.

3. A flexible key form substantially in the form of a disk, said disk defining an integral construction a plurality of spaced grooves on one face thereof, a skived peripheral edge along the portions of said disk between said grooves, a circular lip on the other face thereof lying substantially at the base of said skived peripheral edge, a recessed portion interiorly of said lip and on said other face, a central hub forming a fastening means and extending into said recessed portion but terminating short of the plane developed by said lip, and an annular recessed hinge area at the base of said hub.

4. A flexible key form for use with a rigid mold form defining a flat liner surface, comprising, a disk-like form, said disk defining in an integral construction a plurality of spaced grooves on one face thereof, a skived peripheral edge along the portions of said disk between said grooves, a circular lip on the other face thereof lying substantially at the base of said skived peripheral edge, a recessed portion interiorly of said lip and on said other face, a central hub forming a fastening means extending into said recessed portion, and an annular recessed hinge area at the base of said hub.

5. A flexible key form for use with a rigid mold form defining a flat liner surface and shaped substantially in the form of a disk, said disk comprising in an integral construction an upper face defining a plurality of spaced grooves, the portions of said disk between said grooves defining a skived peripheral edge, a circular lip on the other face thereof lying substantially at the base of said skived peripheral edge, a recessed portion interiorly of said lip and on said other face, a central hub providing a fastening means extending into said recessed portion but terminating short of the plane developed by said lip and an annular recessed hinge area at the base of said hub.

6. As an article of manufacture, a flexible key form made of rubber or the like, said form defining a substantially circular disk skived along its peripheral edge to form a truncated conical segment, said form further defining a plurality of V-shaped grooves arranged in spaced radial relationship to one another on one face of said disk, the pieces of said grooves lying on a common circular axis of an inner portion of said form concentric with its periphery, said form including an angularly inclined conical lip on the opposite face of said form terminating in an inwardly disposed annular recess and a circular hub portion extending away from said annular recess, the hub portion terminating in substantial co-planar relation with the outermost portion of said lip when said form is held on a flat surface, said key form being deformable within the limits prescribed by the hinging action of said annular recess and the contraction action of said V-shaped grooves.

7. A flexible key form for the liner surface of a mold form and adapted to shape a dovetail recess in a mass of plastic aggregate hardened in the mold form and comprising a truncated conical body portion, a flexible lip on the body portion adapted to engage the liner surface of the mold form, said body portion having a recess interiorly of said lip, a hub providing a fastening means and extending into the recess, said hub terminating short of the plane normally developed by said lip, said body portion being made of a flexible material whereupon movement of said hub toward the liner surface of the mold form will flex said lip at the liner surface to form a curved recess, whereby the dovetail recesses formed in the plastic aggregate will have curved edge portions, and a flexible hinge portion situated between said hub and said body portion to permit flexure of the body portion about said hub upon withdrawal of the key member from the hardened plastic aggregate.

8. A flexible key form for the liner surface of a mold form and adapted to shape a dovetail recess in a mass of plastic aggregate hardened in the mold form and comprising a truncated conical body portion, a flexible lip on the body portion adapted to engage the liner surface of the mold form, said body portion having a recess interiorly of said lip, a hub providing a fastening means and extending into the recess, said hub terminating short of the plane normally developed by said lip, said body portion being made of a flexible material whereupon movement of said hub toward the liner surface of the mold form will flex said lip at the liner surface to form a curved recess, whereby the dovetail recesses formed in the plastic aggregate will have curved edge portions, a flexible hinge portion situated between said hub and said body portion to permit flexure of the body portion about said hub upon withdrawal of the key member from the hardened plastic aggregate, said body portion being provided with a plurality of radially spaced tongues and grooves to promote radial contractability of the key member and to form reinforcing fins in the dovetail recess.

9. A key form for forming undercut recesses in plastic material, comprising, a flat key member having a first face and a second face of smaller size than said first face, the peripheral edge portions of said key member being arranged at a re-entrant angle relative to the plane of said key member, the smallest face of said key member having a recess formed therein, a hub portion extending into said recess and having a hinge portion formed at the base of said hub portion, the peripheral edge portions of said key member being flexible relative to said hub portion to radially collapse the key member upon hinging around said hinge portion.

10. A key form for forming undercut recesses in plastic material, comprising, a flat key member having a first face and a second face of smaller size than said first face, the peripheral edge portions of said key member being arranged at a re-entrant angle relative to the plane of said key member, the smallest face of said key member having a recess formed therein, a hub portion extending into said recess and having a hinge portion formed at the base of said hub portion, the peripheral edge portions of said key member being flexible relative to said hub portion to radially collapse the key member upon hinging around said hinge portion, said first face having a plurality of peripherally spaced tongues and grooves formed therein, said tongues and grooves improving the flexibility of the peripheral edge portions and being arranged to form reinforcing ribs to strengthen the lip of an undercut recess formed by said key form.

11. A key form for forming undercut recesses in plastic material, comprising, a flat key member having a first face and a second face of smaller size than said first face, the peripheral edge portions of said key member being arranged at a re-entrant angle relative to the plane of said key member, the smallest face of said key member having a recess formed therein, a hub portion extending into said recess and having a hinge portion formed at the base of said hub portion, the peripheral edge portions of said key member being flexible relative to said hub portion to radially collapse the key member upon hinging around said hinge portion, said first face having a plurality of peripherally spaced tongues and grooves formed therein, said tongues and grooves improving the flexibility of the peripheral edge portions and being arranged to form reinforcing ribs to strength the lip of an undercut recess formed by said key form, said second face having a peripheral lip portion adapted to engage the liner surface of a mold form, said lip portion being inclined to extend outwardly away from said recess, thereby to provide a rounded lip for the undercut recess formed by said key form.

12. A key form to provide an undercut notch in a plastic material, comprising, a disk constructed of yieldable material and including a circular body, the central part of said circular body forming a hub, said hub being apertured to receive fastening means for securing the disk to the liner surface of a mold board, the peripheral part of said circular body being inclined to form a re-entrant lip in the notch, said peripheral part being divided into an annular row of relatively stiff sections and an annular row of recess sections which alternate with the stiff sections to improve the flexibility of the peripheral part of said body and to form reinforcing fins in the notch, said peripheral part being flexibly hinged to said hub and being radially collapsible with respect thereto.

13. A key form to provide an undercut notch in a plastic material comprising a disk adapted to be mounted on the face of a mold board, said disk having an apertured central hub having a flexible hinge portion at the base thereof, said hub being spaced from the face of said board initially, and an annular rim which surrounds the hub and has a rear peripheral part of small diameter adapted to engage the face of said board, and a front peripheral part of larger diameter and overhanging the rear part thereof, and a fastener received by said apertured hub deflecting the hub of said disk backwardly relative to the rim thereof and into engagement with the face of said board and tilting the front large peripheral part of said rim toward the axis of the disk, the peripheral parts of the disk flexing relative to the hub portion for radially collapsing the key form.

14. A key form to provide an undercut notch in a plastic material comprising, a disk having an apertured hub adapted to be firmly assembled to the liner surface of a mold board, a rim surrounding said hub and having a rear neck which is of small diameter, a front head which is of larger diameter and being arranged to overhang said neck, and a plurality of notches arranged on the upper side of said head, said hub and the neck and head of said rim being adapted to form the undercut part of said notch in the plastic material and said plurality of notches being adapted to form reinforcing ribs in said notch of said plastic material, said rim being flexibly hinged relative to said hub for radial collapsing thereof.

ROBERT MAXWELL JAMES.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,641,147	Barton	Sept. 6, 1927
1,821,951	Thompson	Sept. 8, 1931
1,848,014	Horn	Mar. 1, 1932
1,917,062	Reinhard	July 4, 1933
2,000,409	Minutoli	May 7, 1935
2,037,545	Sexton	Apr. 14, 1936
2,311,479	Shugart	Feb. 16, 1943
2,318,692	Johnson	May 11, 1943
2,394,227	Barber	Feb. 12, 1946
2,593,456	James	Apr. 22, 1952
2,596,028	James	May 6, 1952