Jan. 6, 1970 P. A. D. EVANS 3,488,027

MOULDS FOR USE IN THE MANUFACTURE OF CONCRETE FLOORS AND CEILINGS

Filed Nov. 17, 1967 4 Sheets-Sheet 1

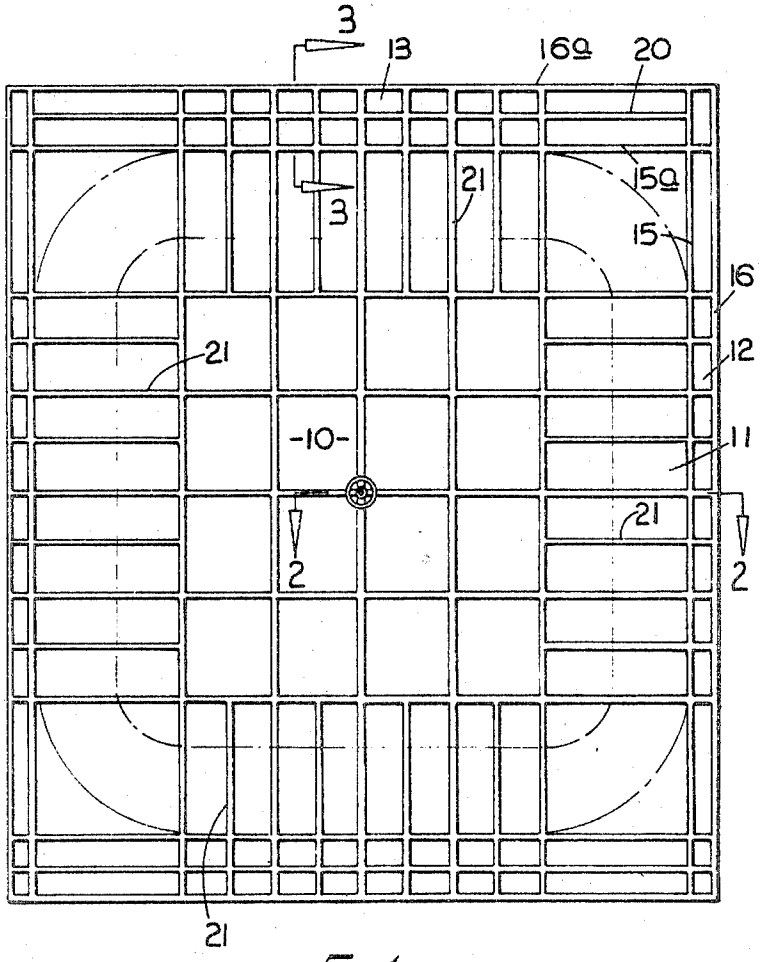


Fig. 1

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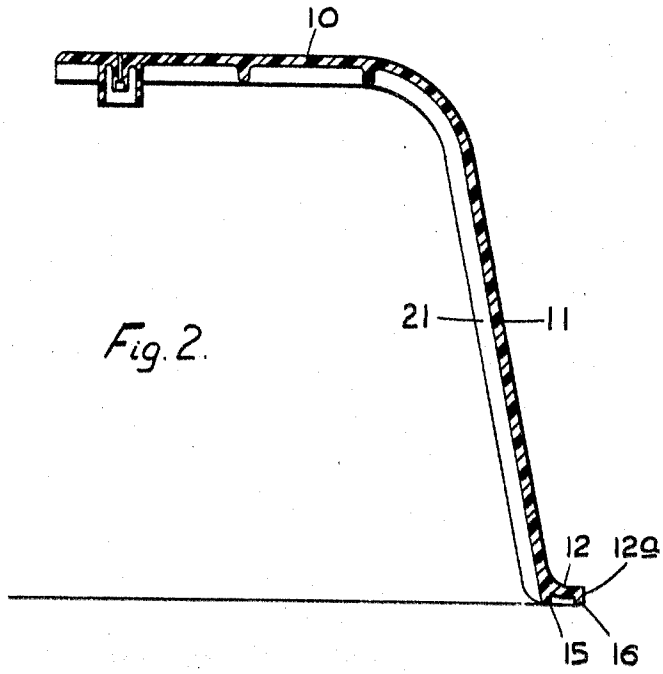


Fig. 2.

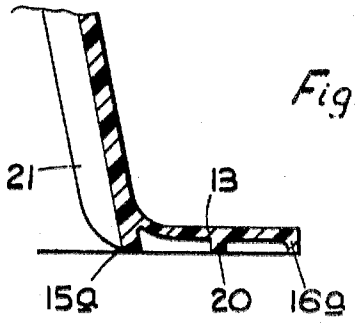


Fig. 3.

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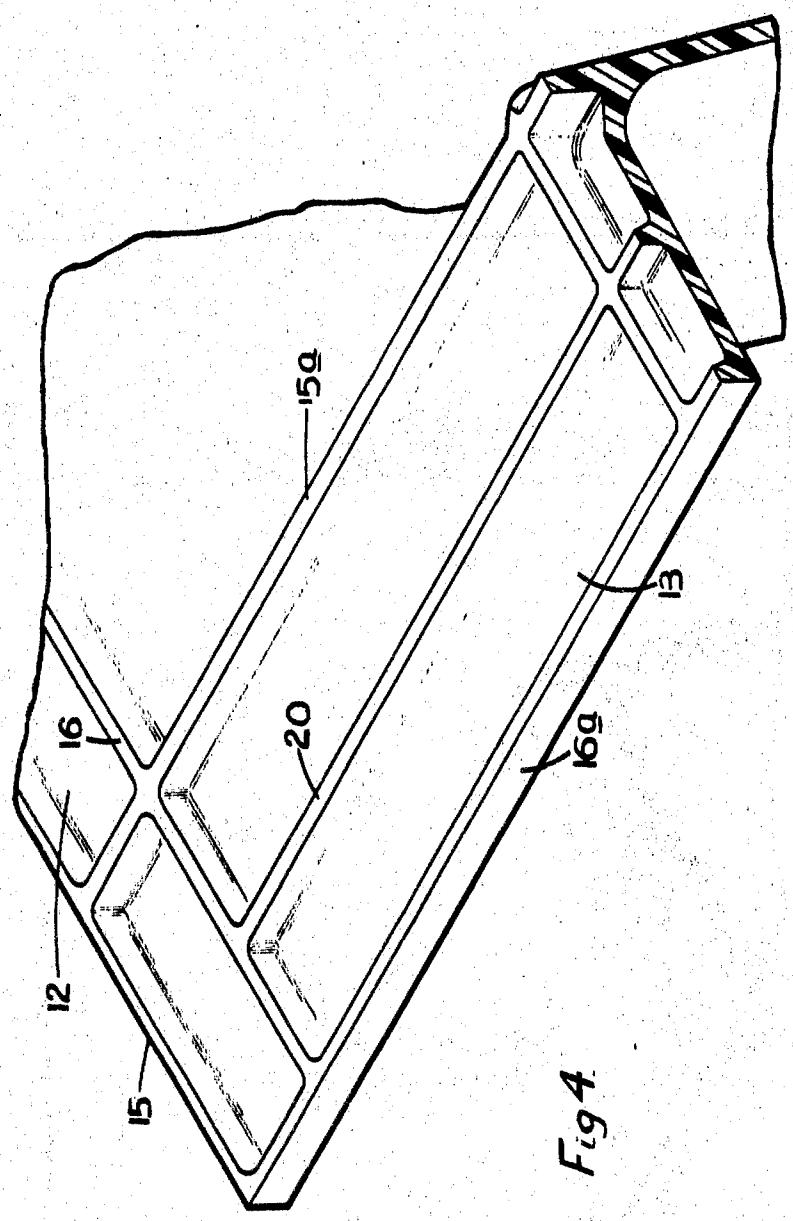


Fig 4.

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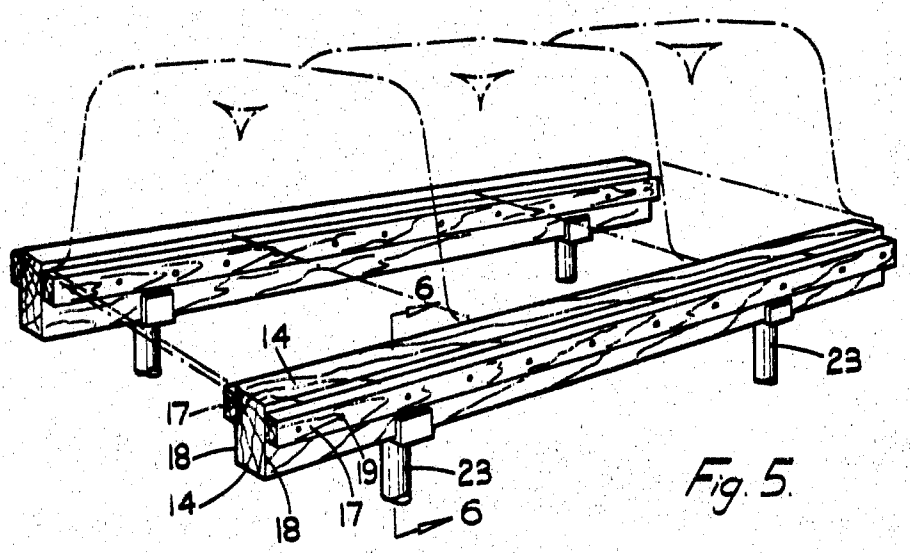


Fig. 5.

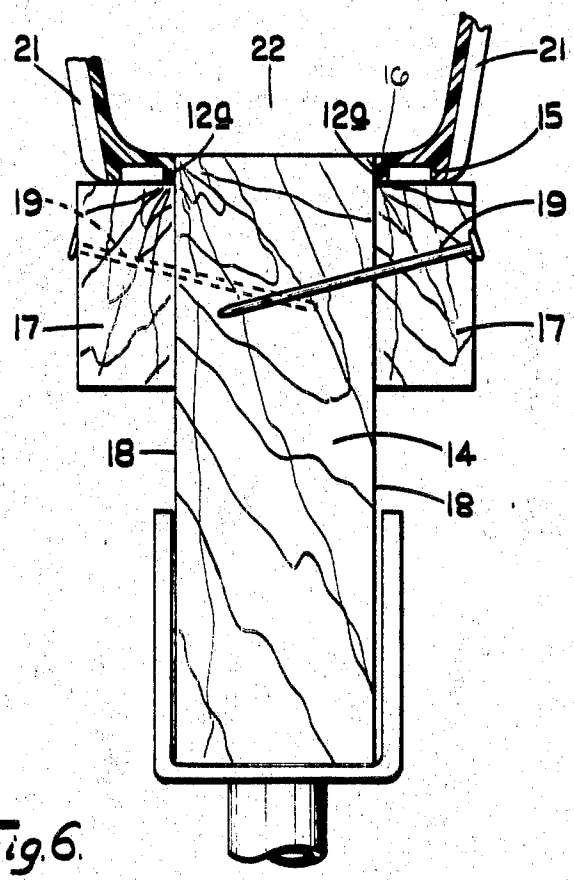


Fig. 6.

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United States Patent Office

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3,488,027

MOULDS FOR USE IN THE MANUFACTURE OF CONCRETE FLOORS AND CEILINGS

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Filed Nov. 17, 1967, Ser. No. 683,905
Int. Cl. B28b 7/28
U.S. Cl. 249—175 5 Claims

ABSTRACT OF THE DISCLOSURE

The specification discloses a mould of hollow dished configuration, generally rectangular in plan view, having a base bounded by a peripheral dependent wall, having edge flanges extending substantially parallel to but spaced below the level of the base, the mould being formed as a synthetic plastic moulding (preferably in polypropylene) and each edge flange being formed along its lower face with a pair of spaced apart dependent ribs extending longitudinally of the flange, one rib being aligned with the adjacent mould wall and the other rib being contiguous with the free edge of the flange.

BACKGROUND OF THE INVENTION

This invention relates to moulds for use in the manufacture of concrete floors or ceilings and which moulds are of the kind herein called the "kind specified" which are of hollow dished configuration embodying a base bounded by a peripheral dependent wall, having an edge flange extending substantially parallel to but spaced below the level of the base.

In practice a plurality of such moulds are provided and disposed in side-by-side relationship with the flanges supported on spaced apart substantially horizontally extending beams, with the open side of each mould facing downwards to form the concrete floor or ceiling of recessed configuration on its underside, so as to embody a plurality of spaced apart mutually transverse dependent reinforcing webs.

It is advantageous in moulds of the kind specified to be able, after the concrete forming the floor or ceiling has partially set, to be able to remove the moulds, leaving the floor or ceiling supported at a plurality of spaced apart positions by the supporting beams until the concrete has fully set and hardened.

SUMMARY OF THE INVENTION

The present invention has for its object the provision of an improved form of mould of the kind specified which effectively takes care of the foregoing requirement.

According to the present invention, the mould is formed as a synthetic plastic moulding, and the edge flange is formed along the lower face thereof which is directed away from the adjacent mould wall, with a pair of spaced apart dependent stiffening ribs, one of which ribs is aligned or substantially aligned with the adjacent mould wall, and the other of which ribs is contiguous with the free edge of the associated mould flange.

A mould according to the present invention possesses the following important advantages:

(a) The cost and in particular the weight of the mould for an overall size is reduced as compared with previously known steel moulds, so that the handling and transportation of the mocld is made particularly easy.

(b) If the moulds are left exposed to the weather for any perior of time, there is no problem of corrosion of the concrete engaging surfaces of the mould as may occur with a steel mould, with the result that it is difficult

to remove the mould from the formed concrete without impairing the surface of the concrete.

(c) The rib of the edge flange of the mould which is aligned or substantially aligned with the adjacent wall, enables the edge flange to be carried on a support, itself carried on the supporting beam with the major part of the weight of the mould and concrete thereby supported, being transmitted from the mould walls to the support on the beam through the rib which is aligned or substantially aligned with the adjacent mould wall, without this weight passing through the flange itself, whereby local undue stressing of the flange is avoided and this in particular can then safely be formed of the same or, if desired, lesser wall thickness than is required for the mould base and walls, a feature which is of importance in moulding in a synthetic plastic, especially where as is preferred the mould is formed as an injection moulding.

(d) The dependent rib which is contiguous with the free edge of the mould flange enables each mould to be supported with the free edges of adjacent moulds being spaced apart out of contact with one another by a sufficient distance as to accommodate therebetween one of the several beams which is to continue to support the concrete when partially set, after removal of the moulds themselves, with each rib, as referred to in this paragraph, being adapted along its outer lateral face to be in face-to-face engagement with the adjacent lateral face of the supporting beam, so as thereby to prevent seepage of the concrete, after pouring, around the free edge of each mould, despite the spaced apart disposition of adjacent mould edges, which seepage if it occurred, would hinder the ready downward displacement of the moulds when the concrete had set sufficiently to allow these to be removed.

(e) The provision of two spaced apart dependent ribs of each edge flange as opposed to a single dependent very wide rib of the same width as the lateral width of the edge flange, is necessary to enable the mould itself to be moulded in a synthetic plastic, if undesirable local stresses or possible fracture of the material of the mould at the position where it is most heavily loaded by the weight of the concrete are t be avoided.

The advantage last mentioned is of especial importance where, as is preferred in accordance with a further feature of this invention, the moulds are formed by an injection moulding operation, for example, by moulding them in the particular synthetic plastic, polypropylene, which material, after extensive experiments, we have found to be particularly satisfactory insofar as such material possesses the required strength to enable large and thus economical size moulds to be produced, fully capable of supporting the adjacent mass of a floor or concrete ceiling, for example, moulds of a vertical depth as great as approximately 16 inches and of overall dimensions as viewed in plan of about 28.5" x 31.5".

Except in the case of very small moulds of dimensions very much less than those above specified, the moulds would be provided during the moulding operation with integral stiffening ribs on the underside of the mould base, and on the inner side of the mould walls, these stiffening ribs extending in mutually transverse directions.

BRIEF DESCRIPTION OF THE DRAWINGS

One preferred embodiment of the present invention is illustrated in the accompanying drawing, wherein:

FIGURE 1 is an inverted plan view of one form of mould in accordance with this invention.

FIGURE 2 is in a cross sectional view on the line 2—2 of FIGURE 1, but showing the mould in its normal as opposed to inverted position.

FIGURE 3 is a sectional view on the line 3—3 of FIGURE 1, again showing part of the mould depicted in its normal position.

FIGURE 4 is a perspective view of part of the mould inverted showing more clearly the configuration of the dependent ribs on two mutually transverse edge flanges.

FIGURE 5 is a perspective view illustrating the manner in which the moulds are relatively arranged and supported from the supporting beams.

FIGURE 6 is a cross sectional view on the lines 6—6 of FIGURE 5 showing in more detail the precise manner in which certain of the edge flanges of the moulds are supported from the supporting beams in such a manner as to permit of the moulds being readily removed.

DESCRIPTION OF PREFERRED EMBODIMENT

The mould illustrated in the drawings is formed as a one-piece injection moulding in polypropylene and comprises a base **10** of substantially square configuration and provided with four mutually transverse dependent walls **11** which extend at an inclination to the vertical, considering the base horizontal, so that the mould is of the usual tapered configuration, each wall being formed with a substantially horizontally outwardly extending edge flange **12, 13**, with the two edge flanges **12** at one pair of opposite sides of the mould being narrower than the two edge flanges **13** at the other pair of opposite sides, so that as viewed in plan the mould is of somewhat rectangular configuration.

The pair of edge flanges **12** serve as best shown in FIGURES 5 and 6 to support one pair of opposite sides of a row of moulds from spaced apart mutually parallel supporting beams **14**, with, as shown in FIGURE 6, the free edges **12***a* of adjacent moulds spaced relatively apart by a distance corresponding to the width of the supporting beam **14**.

As shown in FIGURES 2 and 4, the one pair of edge flanges **12** of each mould is formed on its lower face with a pair of dependent horizontally spaced apart integral ribs **15, 16**, of which the rib **15** is substantially aligned with the adjacent wall **11**, and the rib **16** is contiguous with the free edge **12***a* of the associated flange **12**.

As shown in FIGURE 6 these two ribs **15, 16**, are adapted on their outer edges to engage with and thus to be supported by mould carrying supports **17** provided on the upper part of each of the two lateral sides **18** of each supporting beam **14**.

These mould supports as in the case of the supporting beam **14** are of timber and are removably nailed by nails **19** at intervals along their length to the adjacent lateral side **18** of the supporting beam **14**.

The arrangement is that with the moulds assembled erady for the pouring of the concrete in the manner depicted in FIGURES 5 and 6, the weight of the concrete which is carried by the moulds is transmitted directly to the mould support **17** through the ribs **15**, which are aligned with the adjacent walls **11**, so that this weight is not transmitted through the adjacent mould flange **12** which is merely required to support the substantially lesser proportion of the total mass of the concrete which is directly thereabove, and undue local stressing of the flanges **12** is avoided and at the same time these flanges may, as shown in FIGURE 2, be formed to a thickness less than and certainly not greater than the thickness of the walls **11** and base **10**, whereby, as already explained, the manufacture of the moulds, particularly by an injection moulding operation, is greatly facilitated.

The other dependent flange **16** of each mould flange **11** and which is contiguous with the free edge **12***a* of the flange, is adapted on its outer vertical lateral face **12***a* to have flush engagement with the adjacent vertical lateral face **18** of the upper part of the supporting beam **14** which projects, as shown in FIGURE 6, a short distance above the upper horizontal face of the adjacent mould

support **17**, with the result that any seepage of the poured concrete around the free edge **12***a* of each mould flange **12** is prevented, and which seepage, if it occurred, could seriously interfere with the free removal of the moulds after partial setting of the concrete had taken place.

Although such seepage could in theory be prevented by the mere flush engagement of the free edge **12***a* with the adjacent lateral edge **18** of the beam support **14** without any rib **16** being provided, in practice such seepage would in these circumstances occur. This is because in the absence of rib **16** the vertical depth of the mould face in engagement with the adjacent lateral face of supporting beam **14** would not be great enough effectively to preclude such seepage, and furthermore, in the absence of rib **16**, the free edge portion of the edge flange **12** would not possess sufficient stiffness as to withstand bending or other deformation of such edge during the handling of the mould, whereby the potentiality of flush engagement with the adjacent supporting beam of the free edge **12***a* alone would be impaired.

It is, therefore, essential in practice to provide the dependent rib **16** contiguous with the free edge **12***a* of the adjacent mould edge **12**, and from a consideration of FIGURE 2, it will be appreciated that it is then essential also to provide the second spaced apart rib **15** for transmitting the weight as above described to the mould support **17** if undue stressing of the edge **12** is to be avoided consistent with this being made to a thickness not greater than that of the adjacent wall **11**.

In the arrangement described, one pair of mould flanges **13** are not intended to be supported by supporting beams, e.g., transoms extending at right angles to the beams **14** and the edges **13** as already mentioned are made wider and are provided with three dependent stiffening ribs **15***a*, **16***a*, corresponding to the above described ribs **15, 16**, with an intermediate rib **20**, and in the case of these flanges **13**, these along their free edges in respect of adjacent coulds, would be in flush engagement with one another with the dependent ribs **16***a* in face-to-face engagement to prevent seepage of the concrete between the moulds at these positions.

Where the edges **13** are supported from transoms or beams extending between the beams **14**, then these edges **13** may be made of the same width as the edges **12** and provided with only one pair of dependent ribs as shown in FIGURES 2 and 6.

The moulds are reinforced along the under face of the base **10** by mutually transverse reinforcing ribs **21** which, as shown in FIGURE 1, are extended along the inner side of the walls **11**, so as to continue right up to the ribs **16**, **16***a*.

These ribs **21** are formed to the same or substantially the same thickness as that of the base **10** and walls **11**, which latter thickness may be as low as 0.175", i.e., not greater than about 0.2", such relatively small thickness with its consequent saving in material and the mass of the moulds being obtainable, where, as above described, the moulds are made as an injection moulding in polypropylene.

As will be apparent from FIGURE 6, after the concrete has been poured and has partially set, the timber mould supports **17** are removed by knocking out the nails **19**, whereupon the moulds can be lowered and removed so as to be immediately available for forming a further floor or ceiling, leaving the dependent floor or ceiling webs **22** between adjacent moulds, supported by the still in-situ supporting beams **14** at positions where these beams are provided until the setting of the concrete is completed so as to allow of the beams **14** and their supporting scaffolding **23** being removed.

What I claim then is:

1. A mould for use in the manufacture of concrete floors or ceilings, said mould being of inverted hollow dished configuration comprising an upper base bounded by four peripheral dependent walls each wall including a

bottom edge outwardly extending flange substantially parallel to the level of the base, said mould being of synthetic plastic and wherein each edge flange includes at least a pair of spaced apart dependent stiffening ribs, one of which ribs is aligned or substantially aligned, with the adjacent mould wall, and the other of which ribs is contiguous with the free edge of the associated mould flange.

2. A mould according to claim 1 having integral stiffening ribs on the underside of the mould base, and on the inner side of the mould walls, these stiffening ribs extending in mutually transverse directions.

3. A mould according to claim 1, wherein the mould is of generally rectangular form in plan view, the edge flange on each of one pair of opposed sides having only said two stiffening ribs and the edge flange on each of the other two sides having said two stiffening ribs and a third dependent stiffening rib disposed intermedate said two stiffening ribs.

4. A mould according to claim 2, wherein the integral stiffening ribs on the underside of the mould base and on the inner side of the mould walls extend to the rib which

is contiguous with the free edge of the associated mould flange.

5. A mould according to claim 1, wherein the material of the mould is polypropylene.

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U.S. Cl. X.R.

249—28, 134

PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,488,027 Dated January 6, 1970

Inventor(s) Patrick A. D. Evans

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading, between the penultimate line and the last line, insert:

Claims priority, British application No. 51,772/66, filed November 18, 1966

SIGNED AND
SEALED
MAY 12 1970

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents