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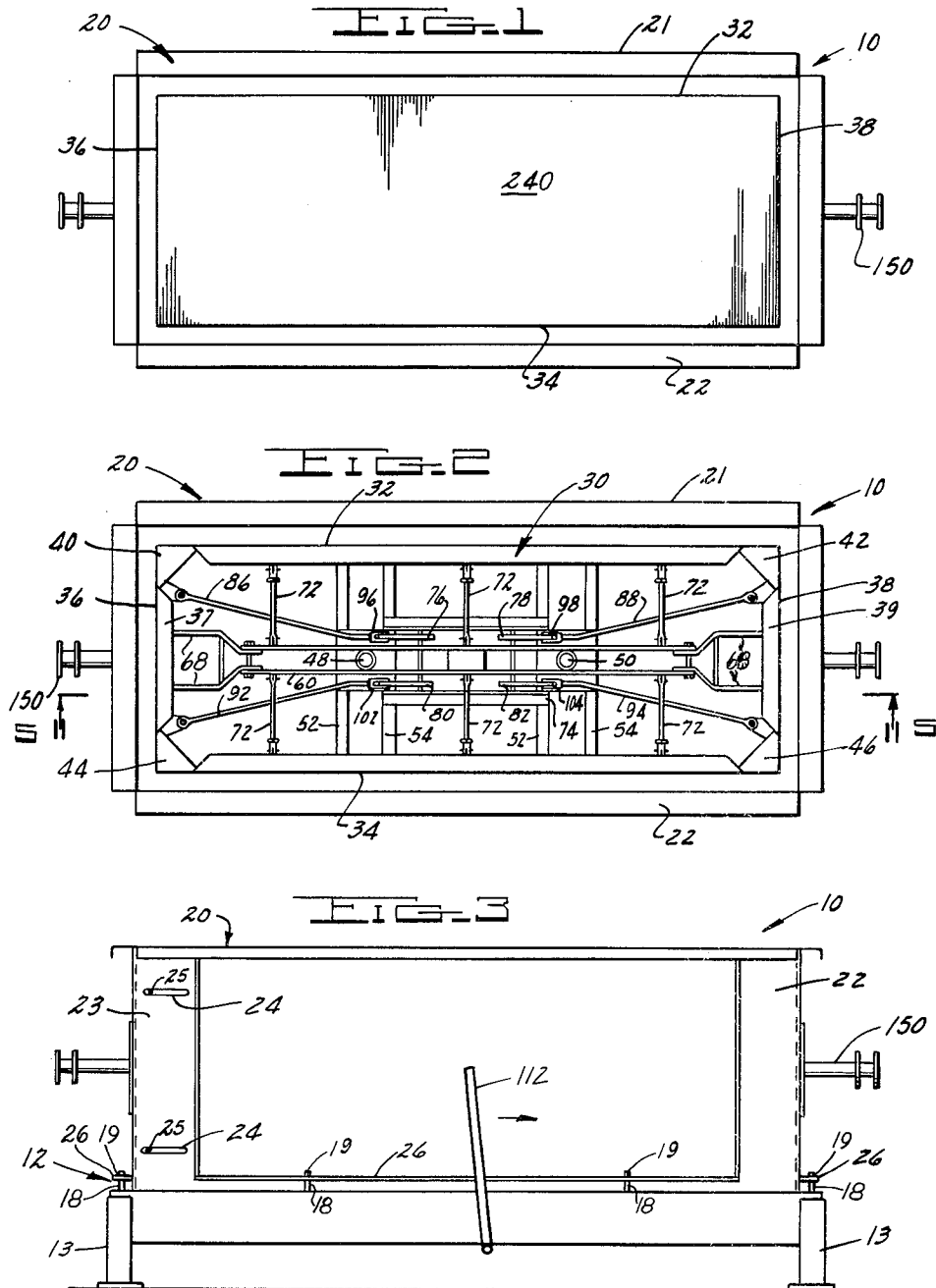
S. G. JOHNSON ETAL

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CONCRETE FORMS

Original Filed Oct. 31, 1961

4 Sheets-Sheet 1



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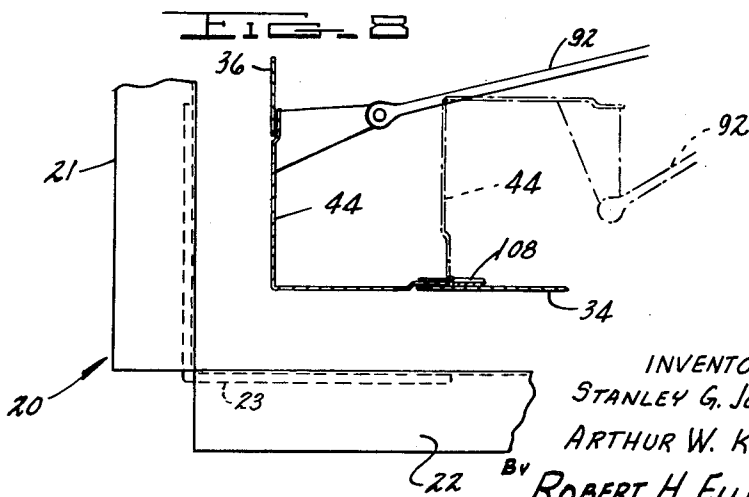
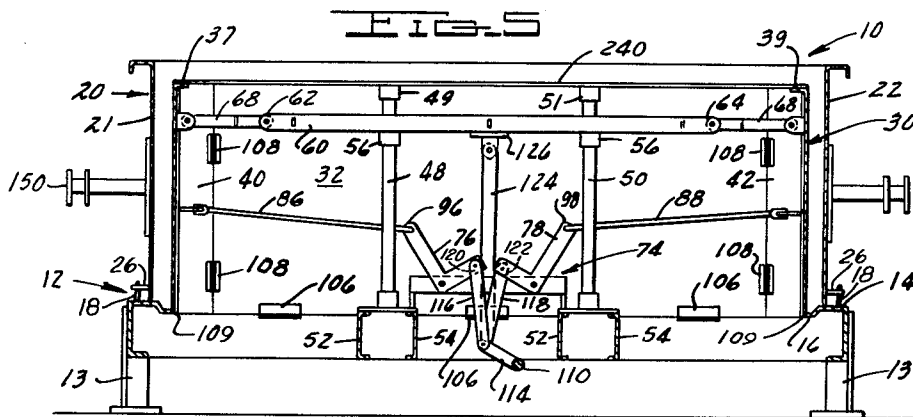
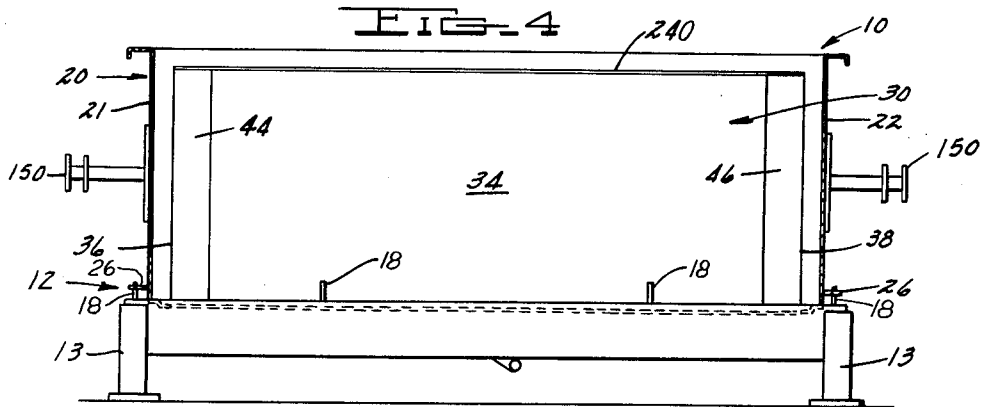
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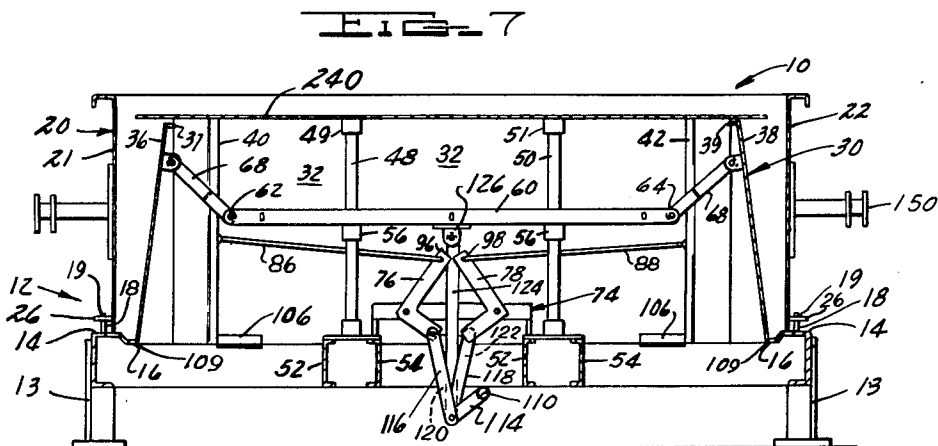
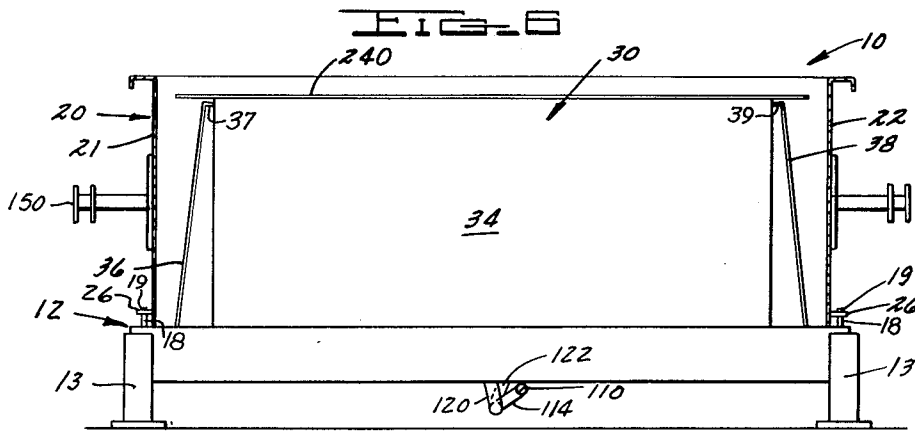
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4 Sheets-Sheet 3



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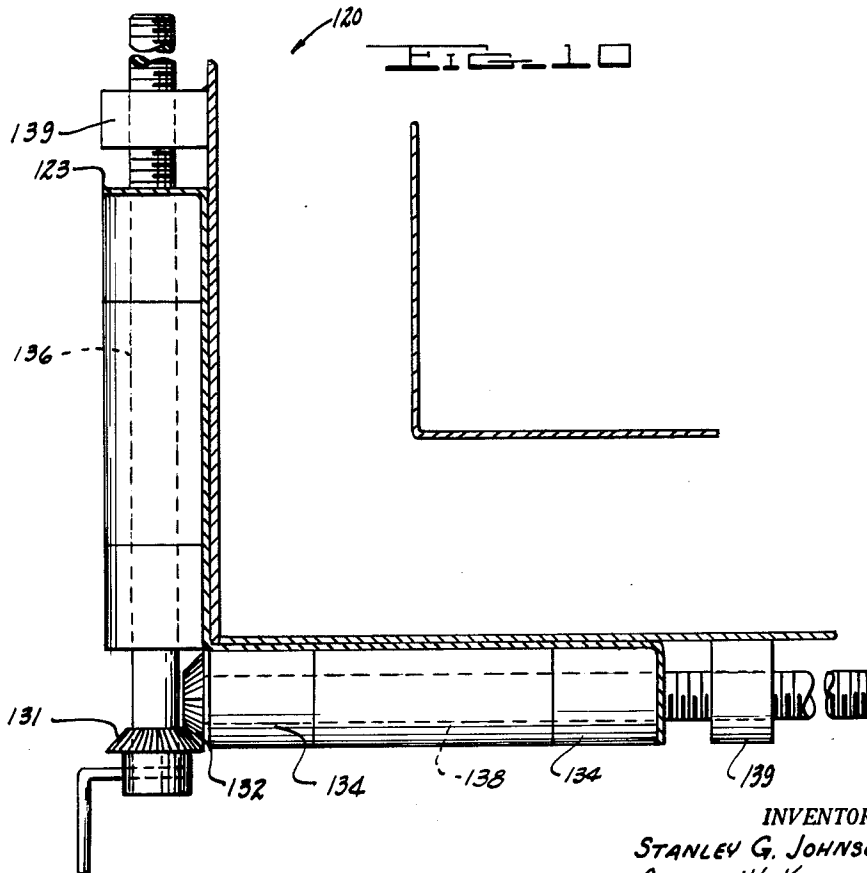
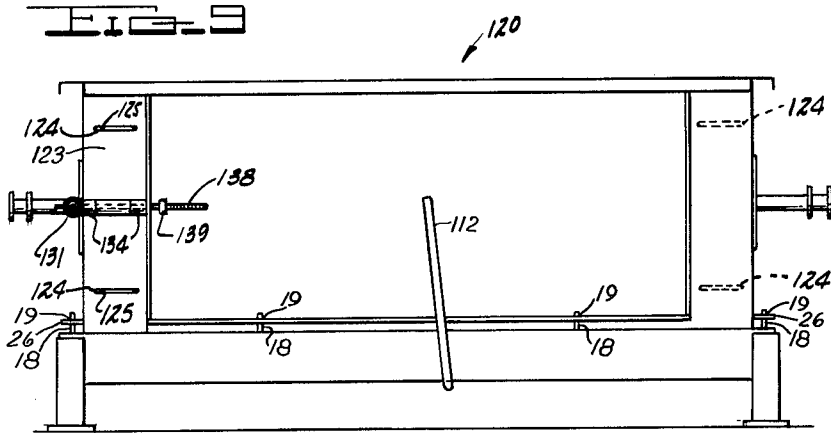
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3,205,552

CONCRETE FORMS

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Original application Oct. 31, 1961, Ser. No. 152,707.
Divided and this application Oct. 10, 1963, Ser. No.
315,218

1 Claim. (Cl. 25—130)

The present invention is a divisional application of our
copending application Serial Number 152,707, filed
October 31, 1961, and contains the same general subject
matter as our application Serial Number 49,924, filed
August 16, 1960 (now abandoned).

The invention relates to improvements in expandible
concrete forms of the type used in the casting of gen-
erally hollow concrete products of rectangular configura-
tion, such as septic tanks, burial vaults and the like.
While particular reference has been made to septic tanks
and burial vaults, it must be understood that this disclo-
sure is made for the purpose of description, since the
principles involved may be used on many other similar
type rectangular type concrete products.

It has been well established throughout the years that
it is advantageous to cast hollow concrete products in an
inverted position, due to the simplified pouring technique
which can be employed. The concrete form of the pres-
ent invention is poured so that the casting is formed in the
inverted position. The natural force of gravity acts upon
the wet concrete to fill the form. In addition to the gravi-
tational forces, the form is also subjected to external
vibration, thereby eliminating the necessity of accurately
directing the wet concrete between the sidewalls of the
forms. The use of external vibration also insures the
production of a finished casting that is not porous.

The present invention employs the use of a two part
concrete form, wherein the inner form is retractable while
the outer form is of two part construction and is readily
expandible in two directions, so as to permit quick and
easy removal of a finished casting. Although the release
and removal of the outer form is a relatively simple mat-
ter, considerable difficulty has been encountered in other
forms because of the lack of draft in the finished product.

This application is directed to the expandible outer form
and it is a primary object of this invention to provide an
expandible concrete form which will readily release a
finished casting, without employing draft on either of the
surfaces of the castings.

Another object of the invention is the provision of a
two part concrete form wherein the outer expandible form
can be readily released without necessity of releasing the
inner form, thereby permitting the manufacture of a
double walled structure which is completely waterproof,
whereby a first thin wall casting is formed after which
the outer form is released so as to permit the application
of a waterproofing material, which operation is followed
by the re-positioning of the outer form whereby a second
pour is made to bring the wall thickness up to the desired
thickness.

Still another object of the present invention is the pro-
vision of a relatively simple concrete form which is not
only durable, but can be readily fabricated, using modern
mass production methods.

These and other objects can be accomplished by the
provision of a generally rectangular casting device having
a retractable inner form and an expandible outer form,
the outer form being of generally symmetrical configura-
tion and mounted on a substantially flat base member
in uniform spaced relationship to said inner retractable
form; said outer form of two part construction and sepa-
rable on two diametrically opposed corners; each part of

said expandible form being of generally L-shaped con-
figuration; a flange substantially circumscribing the out-
side of each of said L-shaped form sections; a plurality of
spaced openings in said flange along the sides and ends of
said form sections; a plurality of dowel pins extending
upwardly from said flat base member in alignment with
said openings, said dowel pins adapted to cooperate with
the openings in said flange member, to align said outer
form with the base and said inner form; a right angle
member secured between each of the open corners of said
L-shaped form sections; a plurality of horizontal slots in
each of said right angle corner members, said horizontal
slots cooperable with a similar number of studs which
extend from each of said form members to effect accu-
rate alignment thereof; and clamping means for clamping
said form members together when assembled, which
clamping means include means for equally expanding said
corner members to effect the release of a finished casting,
when same has been removed from the retractable inner
form which is retractable.

Other objects of this invention will appear in the fol-
lowing description and appended claim, reference being
had to the accompanying drawings forming a part of this
specification, wherein like reference characters designate
corresponding parts in the several views.

In the drawings:

FIGURE 1 illustrates a plan view of a concrete form
which embodies the present invention.

FIGURE 2 is also a plan view of the concrete form
shown in FIGURE 1, with the top removed.

FIGURE 3 is an elevational view of the concrete form
illustrated in FIGURE 1.

FIGURE 4 is an elevational view similar to that of
FIGURE 3, with the outer expandible form broken away.

FIGURE 5 is a cross sectional view taken substantially
along the plane 5—5 of FIGURE 2 with the inner form
in the closed position.

FIGURE 6 is an elevational view of the present inven-
tion with the outer form broken away and with the inner
form shown in the inoperative position.

FIGURE 7 is an elevational view of the concrete form
with both the outer form and the inner form broken away,
with the inner form illustrated in the inoperative or open
position.

FIGURE 8 is a cross section of a corner structure with
the outer form shown in plan view.

FIGURE 9 is an elevational view of a concrete form
which illustrates a modified outer form.

FIGURE 10 is a cross section taken along the plane
10—10 of FIGURE 9.

Before explaining the present invention in detail, it is
to be understood that the invention is not limited in its
application to the details of construction and arrangement
of parts illustrated in the accompanying drawings, since
the invention is capable of other embodiments and of
being practiced or carried out in various ways. Also, it
is to be understood that the phraseology or terminology
employed herein is for the purpose of description and not
of limitation.

Referring to FIGURE 1, this drawing illustrates a plan
view of a two part concrete form 10, which embodies the
present invention. The complete concrete form assem-
bly 10 is mounted on a flat, generally rectangular frame
or base structure 12. The complete concrete form as-
sembly 10 is made up of two major components, an inner
retractable form 30 and an outer form 20 which is
expandible.

The base structure 12 is of generally rectangular con-
figuration and has four leg members 13 depending down-
wardly therefrom, one leg is secured to each of the four
corners thereof. The body or central portion of the base
12 is generally open, while the perimeter 14 is similar

to a picture frame, with the inner edges thereof being deformed downwardly. This deformed portion is identified by numeral 16 and provides a sealing lip on the finished concrete casting. A cast concrete cover is positioned thereon. The outer edge 15 of the base frame 12 is generally flat and has a plurality of upwardly extending dowel pins 18 located thereon. Each of the dowel pins 18 is adapted to engage a plurality of aligned openings 19 in a flange 26 which extends along the lower edges of the outside of side and end members 21, 21a, 22 and 22a. The flange 26 substantially circumscribes the outer expandible form 20 and is in generally parallel relationship to the base frame 12. The elevational view in FIGURE 3 best discloses this structure.

Each section 21, 21a, 22 and 22a of the outer expandible form is of generally L-shaped configuration and when joined together, forms a rectangular, hollow box like construction. One vertical edge of each of said L-shaped outer form members is provided with a short right angle flange 23, adapted to lie in generally parallel relationship with the vertical side of the opposite form member which is adjacent thereto. Each of the flanged portions has two or more horizontal slots 24 in each face thereof, into which threaded stud members 25, secured to the body proper, are positioned to provide a means for locating and positioning each of the outer form sections.

Clamping means (not shown) are provided to maintain each of the two form members in positive fixed relationship. The upper horizontal edge of each of said L-shaped form members 21 and 22 are flanged for rigidity. Each of the L-shaped form members have a flange section 26 thereon which is spaced from the lower edge thereon. The flange section 26 has a plurality of aligned openings 19 therein which are adapted to engage a plurality of dowel pins 18 which extend upwardly from the base frame 12. Additional clamping means (not shown) are also provided for maintaining the outer expandible form in positive contact with the base frame 12.

In the modified form of the present invention shown in FIGURE 10, the two part expandible form 120 is of the same general construction previously described, however, the flanged corner sections 123 are of slightly different configuration. Each of the corner sections are of W-shaped cross section and are adapted to have mounted thereon, a pair of meshing bevel gears 131 and 132 which are journaled in bearings 134 secured to their respective flanges. The bevel gears 131 and 132 are positioned on threaded shaft members 136 and 138 respectively. A threaded nut 139 is securely affixed to each of the end and side members so that rotation of the shaft members 136 and 138 will cause the two L-shaped expandible form members to separate at a uniform rate. Since the diagonally opposite corners of the form are of the same construction, it will be apparent that each of the corners will be operated in unison to obtain maximum efficiency from this structure. It will also be apparent that the modified corner structure eliminates the necessity of having any additional clamping devices on the corners for holding same in pre-determined relationship, since the threaded structure positively eliminates any possibility of corner separation in either corner.

The plan view of the present invention illustrated in FIGURE 2 shows the outer form 20 in the operative position. The inner form 30 is also shown in the operative position, while the flat top cover 24b has been removed for purposes of illustrating the mechanism contained within said inner form. The linkage mechanism is adapted to simultaneously operate the two sides 32 and 34 which are pivoted on the base 12, as well as the two end members 36 and 38 which are also pivoted on the base frame 12. The corner members 40, 42, 44 and 46 of the inner form are disposed intermediate the side and end members and are operated in unison with an-

other linkage which is cooperable with said first mentioned linkage.

It will also be noted that two guide posts 48 and 50 are symmetrically positioned on two cross members 52 and 54 respectively, located on the base frame 12. The guide members 48 and 50 locate and position a horizontal actuating bar 60. Each end of the horizontal actuating bar 60 has pivotally secured thereto a pivotal member 68 which is pivotally connected to each of the end members 36 and 38 of the inner form. In addition thereto, a plurality of adjustable pivotal links 72 are interposed between the side members 32 and 34 and the side of the horizontal actuating bar 60. It will now be readily apparent that as the actuating bar 60 is moved up and down on the guide posts 48 and 50, the pivotal members 68 and the adjustable links 72 will operate to pivot the end members 36 and 38 as well as the sides 32 and 34.

Cross members 52 and 54 also have positioned thereon, a rectangular supporting frame which locates and positions four pivotal L-shaped links 76, 78, 82 and 84. The upper ends 96, 98, 102 and 104 are secured to four linkages 86, 88, 92 and 94, which in turn are connected to the four right angle corner members 40, 42, 44 and 46 which are pivotal. The sides 32 and 34 are pivoted on the base frame 12 with a plurality of hinges 106, while the end members are pivoted to the base frame 12 with a plurality of hinges 108. The right angle corner members 40, 42, 44 and 46 are pivotal about the two vertical edges of each of the side members 32 and 34 on hinges 109.

The operating means 110 for expanding or retracting the inner form 30 extends transversely across the bottom of the base frame 12 and is operable to cause the various linkages attached thereto to operate the sides, ends and corners to expand or retract said inner form. An arm 114 is secured to the actuating means 110, to which are secured pivotal links 116, 118, 120 and 122. The respective links are secured to the free ends of the L-shaped links 76, 78, 82 and 84. Links 116 and 118 are secured to the ends of links 76 and 78, while links 120 and 122 are secured to links 82 and 84. Link 124 is pivotally secured to bracket 126 at one end and to the end of arm 114 at the other.

The cover member 240 is of generally rectangular configuration and has a pair of downwardly depending hollow sleeves 49 and 51 secured to the central portion thereof. The hollow sleeve members 49 and 51 are positioned to cooperate and engage the end portion of the guide posts 48 and 50, thereby aligning and positioning the top cover 240 in proper relationship to the sides, ends and corner members.

The cylindrical extensions 150 on the ends of the expandible outer form 20 are used for transporting the outer form 20 independently or with a casting contained there-within, from place to place. The extensions 150 are positioned in the central portion of each of the ends 21 and 22.

Operation

After the concrete casting has been poured and had time to partially cure, the single operating handle member 112 is moved to actuate the various linkages contained within the inner form, thereby retracting said inner form. An overhead crane or chain fall is then employed to remove the outer form 20 and concrete casting, which is frictionally held therein. The form 20 and casting are then rotated on the cylindrical extensions 150 to place the casting in an upright position. In one instance the clamping means on each corner is released, thereby allowing the outer form 20 to be expanded to release the casting, while in the other instance the bevel gears on each of two corners are rotated, thereby causing the outer form to expand at a uniform rate and release the casting. Thereafter the outer form is removed from the casting and repositioned on the base frame 12 for a successive pour.

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Having thus described our invention, we claim:

In a concrete form for the manufacture of draft free hollow products using a rectangular outer form, the combination of,
 an expansible outer form mounted on a generally flat 5
 frame;
 said expansible form of two symmetrical parts of generally L-shaped configurations;
 an outwardly extending flange on the upper and lower edges of each of said two symmetrical form sections; 10
 a plurality of locator pins extending upwardly from said flat frame;
 a plurality of openings in said lower flange, said openings in alignment with said locator pins;
 a right angle corner member interposed between the 15
 two adjacent open portions of the L-shaped form sections; a plurality of horizontal slots in each of said right angle members cooperable with a plurality of stud members extending from each of said form sections to permit accurate alignment of said form 20
 sections;
 expansion of said outer form permits the release of a finished concrete casting;
 at each of the two diagonally opposite corners of the 25
 outer form are fitted with a pair of interengaged bevel gears carried on a threaded shaft, a fixed nut on

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each of the respective L-shaped members; each bevel gear when rotated acting to expand said corners by means of said threaded shaft operating against said fixed nut on each of the respective L-shaped members, said expansion taking place at a uniform rate, stoppage of said rotation forming an effective clamp to limit and prevent the accidental displacement of either of the form sections.

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