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McCracken

[11] **3,844,526**

[45] **Oct. 29, 1974**

[54] **VERTICAL SHAFT FORM WITH CAMMED STRIPPING UNITS**

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[73] Assignee: **Economy Forms Corporation,** Des Moines, Iowa

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[52] **U.S. Cl.** **249/152,** 249/181

[51] **Int. Cl.** **B28b 7/16**

[58] **Field of Search** ..... 249/48, 51, 63, 66, 122, 249/144, 146, 152, 178, 180, 184, 186; 425/DIG. 129, DIG. 5, 438; 264/334

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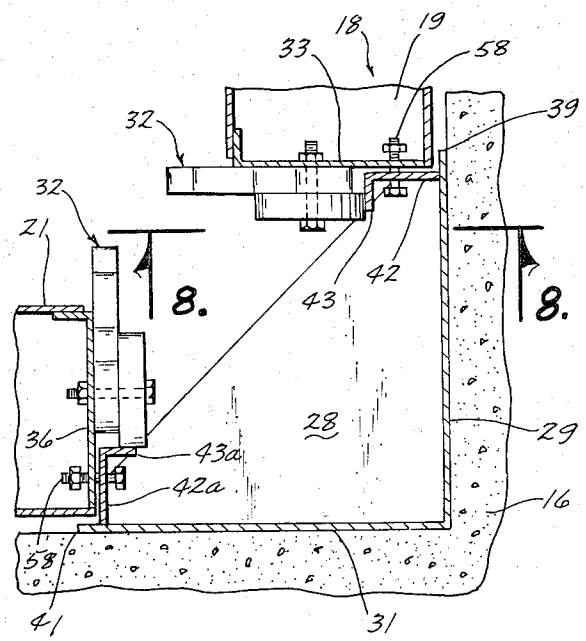
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Primary Examiner—Robert D. Baldwin
Assistant Examiner—John McQuade
Attorney, Agent, or Firm—Rudolph L. Lowell

[57] **ABSTRACT**

A concrete form assembly for constructing a section of an elevator shaft or the like including an outer form structure and an inner form structure positioned within the outer form structure. The inner or trapped form structure is comprised of vertically disposed side walls and end walls and at least a pair of diagonally opposite stripping corner sections, each of which co-acts with associated manually actuated stripping units for stripping the inner form structure from the completed shaft section. Each stripping corner section is movably interconnected with an adjacent end wall and side wall for relative limited horizontal transverse and lateral movements to a concrete pouring position, wherein the concrete engaging surfaces of a stripping corner section are located in planes common to the concrete engaging surfaces of an adjacent end wall and side wall; and to a position for removing the inner form structure wherein the end walls and side walls and corner sections are stripped from the completed shaft section so that the inner form structure can be removed as an integrated unit from the shaft section. Such movements of the stripping corner sections are accomplished by the stripper units which are rotatably mounted on the end walls and side walls for coacting operation with the corner sections.

2 Claims, 11 Drawing Figures



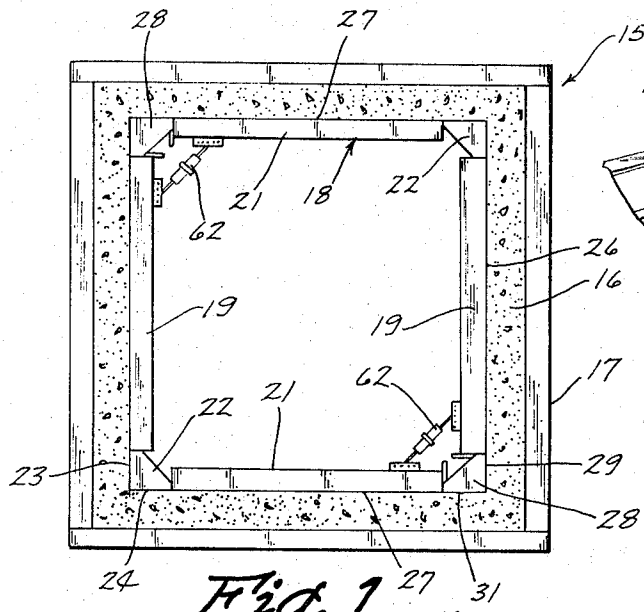


Fig. 1

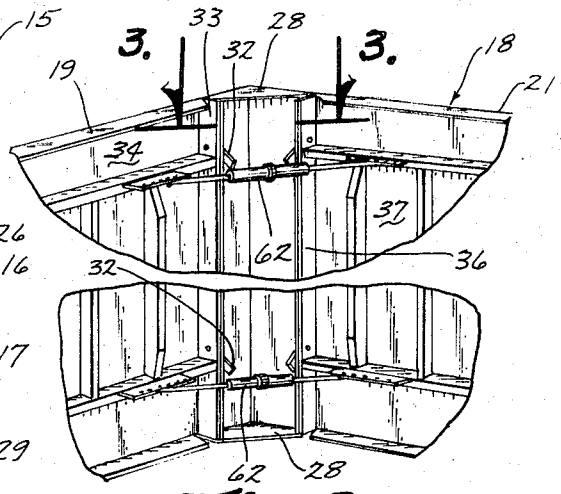


Fig. 2

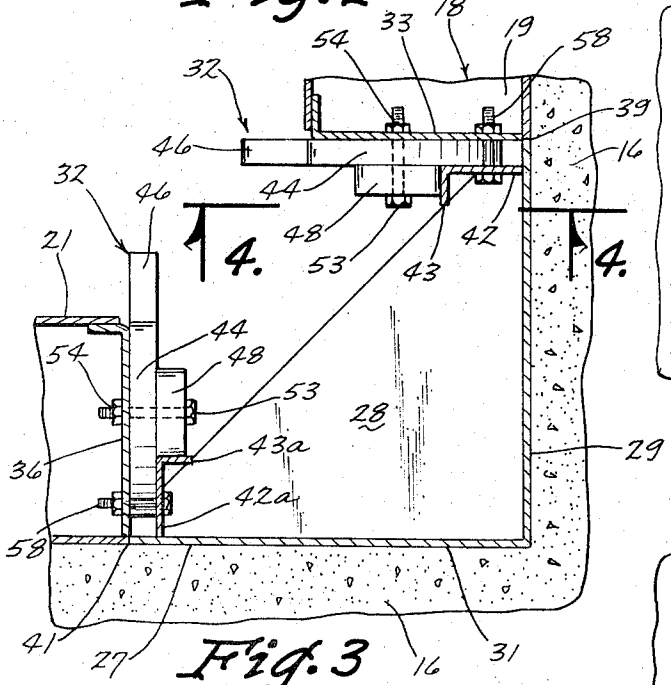


Fig. 3

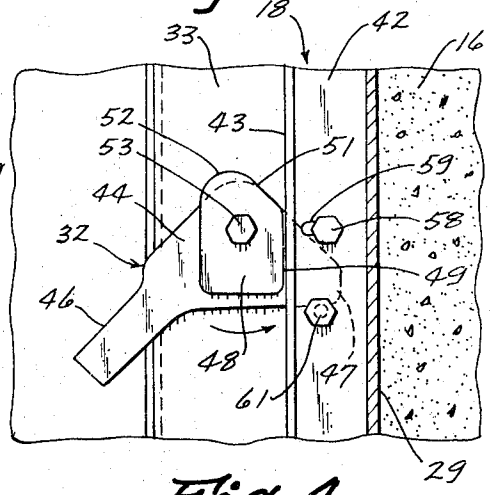


Fig. 4

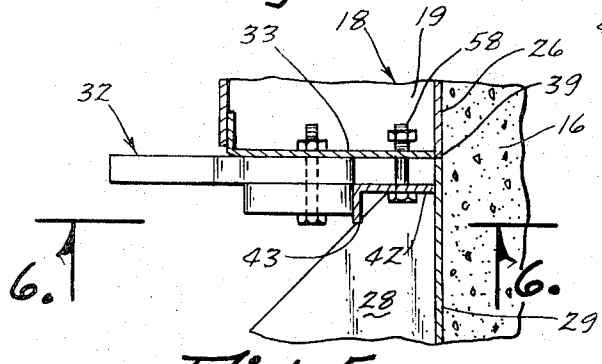


Fig. 5

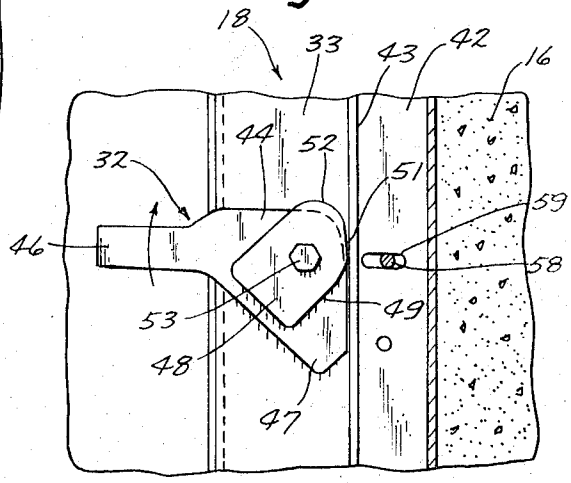


Fig. 6

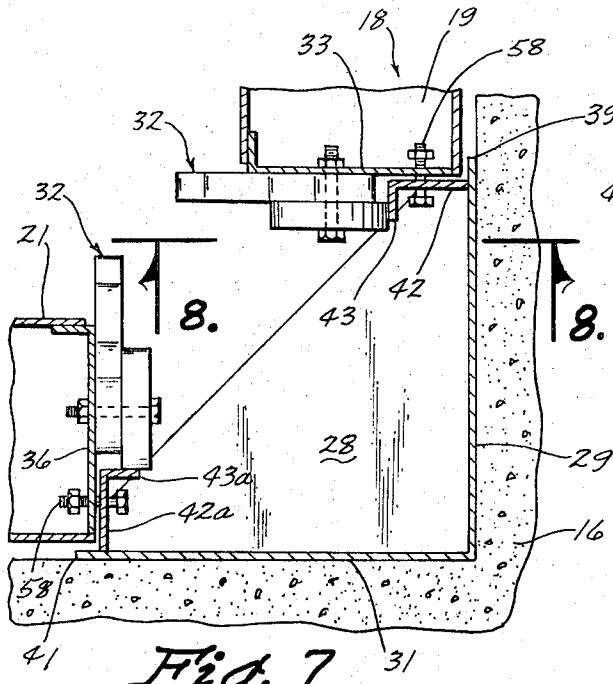


Fig. 7

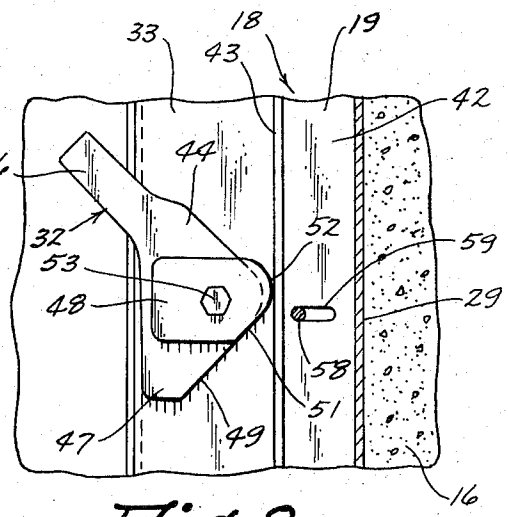


Fig. 8

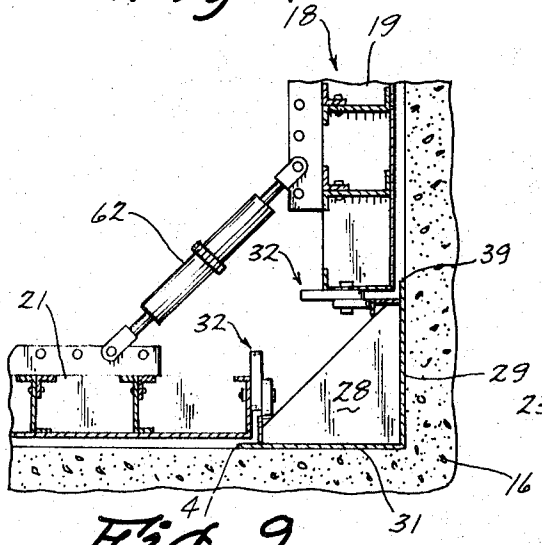


Fig. 9

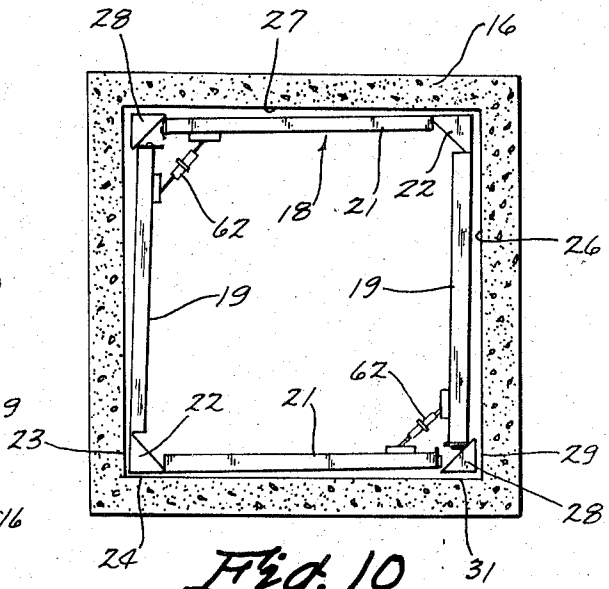


Fig. 10

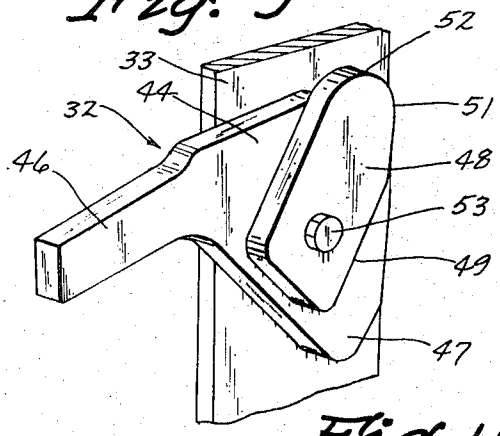


Fig. 11

VERTICAL SHAFT FORM WITH CAMMED STRIPPING UNITS

SUMMARY OF THE INVENTION

The diagonally opposite pair of stripping corner sections of the inner form structure of the form assembly are positively interconnected at all times to adjacent side walls and end walls for movement into and out of a concrete pouring position by manually actuated stripping units having coacting portions on the corner sections and corresponding walls to align the corner sections and walls. In a pouring position the concrete engaging surfaces of the stripping corner sections are continuous with the concrete engaging surfaces of the end walls and side walls. Any irregularities or blemishes in the surface of the formed concrete structure at the junctions of the corner sections with the end walls and side walls are thus completely eliminated. The end walls and the side walls are readily stripped from the concrete structure on actuation of the manually operated stripping units which are permanently mounted on the end and side walls. The inner form structure is thus adapted to be handled as an integrated unit for installation and removal purposes and is capable of being set up or stripped in a minimum of time without the necessity of special tools or accessory attachments.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a concrete form assembly for forming an elevator shaft section showing the inner and outer form structures thereof in a concrete pouring relation;

FIG. 2 is an enlarged detailed foreshortened perspective view of a corner of the inner form structure showing the assembly relation of a stripping corner section with an adjacent end wall and side wall;

FIG. 3 is an enlarged sectional view taken on the line 3—3 in FIG. 2, showing a stripping tool unit and stripping corner section in a concrete pouring position;

FIG. 4 is a sectional view taken on the line 4—4 in FIG. 3;

FIG. 5 is a detail sectional view illustrated similarly to the upper portion of FIG. 3, showing the position of a stripping tool unit when the inner form structure is to be stripped from the completed shaft section;

FIG. 6 is a sectional view taken on the line 6—6 in FIG. 5, illustrated similarly to FIG. 4, and showing the parts thereof in changed positons;

FIG. 7 is a sectional view illustrated similarly to FIG. 3, showing the position of the stripping tool unit on completion of the stripping of the end and side walls of the inner form structure from the completed shaft section;

FIG. 8 is a sectional view on the line 8—8 in FIG. 7, illustrated similarly to FIGS. 4 and 6 and showing the parts thereof in changed positons;

FIG. 9 is a reduced sectional view illustrated similarly to FIG. 7, showing an adjustable jack means for moving an end wall and a side wall relative to an adjacent stripping corner section of the inner form structure;

FIG. 10 is illustrated similarly to FIG. 1 and shows the inner form structure stripped from the completed shaft section so as to be removable therefrom as a package unit; and

FIG. 11 is a perspective view of a stripping tool unit.

DETAILED DESCRIPTION OF THE INVENTION

With reference to FIG. 1 of the drawings, there is illustrated a concrete form assembly, designated generally as **15**, for constructing a section **16** of an elevator shaft or the like of a tubular rectangular shape in transverse cross section. The assembly **15** includes an outer form structure **17** and an inner form structure **18** comprised of a pair of vertically disposed opposite end forms or walls **19** and a pair of vertically disposed opposite side forms or walls **21**. A first pair of diagonally opposite corner sections **22**, hereinafter referred to as rigid or fixed corner sections, are rigidly secured in any suitable manner to an adjacent end wall **19** and side wall **21** such that the concrete engaging surfaces **23** and **24** of a rigid corner section **22** are flush with and located in the planes of the concrete engaging surfaces **26** and **27**, respectively, of an end wall **19** and side wall **21**, also respectively.

A second pair of diagonally opposite corner sections **28**, hereinafter referred to as stripping corner sections, are movably interconnected with an adjacent end wall **19** and side wall **21** for movement of the surfaces **29** and **31** thereof into and out of the planes of the surfaces **26** and **27**, respectively, of an end wall **19** and side wall **21**, also respectively. This movement of the stripping corner sections **28** is accomplished by the provision of manually operated stripping tool or cam units **32** which are rotatably mounted on the end walls **19** and side walls **21** for a coacting operation with an associated stripping corner section **28**.

When the stripping tool units **32** and stripping corner sections **28** are in their relative positions shown in FIGS. **3** and **4**, the inner form structure **18** is in its assembly position of FIG. **1**, located within and concentrically spaced from the outer form structure **17** providing for the pouring of concrete therebetween to construct the shaft section **16**. On manipulation of the stripping tool units **32** from their positions in FIGS. **3** and **4** to their positions shown in FIGS. **7** and **8**, the end walls **19** and side walls **21** of the inner form structure **18** are stripped from the constructed shaft section **16** with the stripping corner sections **28** interconnected with the end walls **19** and side walls **21**, as illustrated in FIG. **10**. The inner or trapped form structure **18** is thus capable of being elevated or removed as an integrated unit from within the shaft section **16**.

The end and side walls **19** and **21** are of a metal construction with each thereof being of a generally pan form of a rectangular shape having a bottom wall and a laterally projected perimetric wall. Thus, as shown in FIG. **2**, the end wall **19** has a vertically disposed perimetric wall section **33** arranged normal to a bottom wall **34** which constitutes the concrete engaging surface **26**. In a like manner, a side wall **21** includes a perimetric wall section **36** arranged normal to a bottom wall **37** which constitutes the concrete engaging surface **27**.

Each stripping corner section **28** comprises a body member **38** (FIGS. 2 and 3) of a right angle shape in transverse cross section, the leg portions of which form the concrete engaging surfaces **29** and **31** that terminate in vertical edges **39** and **41**, respectively. Spaced inwardly from the vertical edges **39** and **41** and projected in a direction away from the corresponding surfaces **29** and **31** are laterally projected flanges or plates **42** and **42*a***, respectively. Each plate **42** and **42*a*** is ver-

tically extended in a parallel relation with a corresponding side edge **39** and **41** and terminates in a right angle shoulder **43** and **43***a* which extend in a direction away from an adjacent side edge **39** or **41.**

The perimetric sections or lateral projections **33** and **36** of an end wall **19** and side wall **21,** respectively, are movable to positions opposite from and in a spaced parallel relation with corresponding ones of the projections **42** and **42***a* of a corner section **28.** The distance between the spaced plates or lateral projections **33, 42,** and **36, 42***a*, is equal to the distance that a projection **42** and **42***a* is spaced inwardly from an adjacent vertical edge **39** and **41,** respectively, of a stripping corner section **28.** By limiting the maximum relative lateral movement between an end wall **19** or side wall **21** with an associated stripping corner section **28,** to an amount equal to the spacing between opposed projections **33, 42,** and **36, 42***a*, the vertical side edges **39** and **41** of a stripping corner section are positionable in abutting engagement with a projection **33** and **36,** respectively. In like manner, a relative transverse movement between an end wall **19** or a side wall **21** with an associated stripping corner section **28** may be limited to provide for the location of a concrete engaging surface **29** and **31** of a corner section **28** in a coplanar relation with a corresponding concrete engaging surface **26** or **27,** respectively, of an adjacent end wall **19** or side wall **21,** also respectively. These relative transverse and lateral movements to align a stripping corner section with an adjacent end wall **19** and side wall **21,** is accomplished by means including the manually actuated cam or stripping tool units **32.** Since each stripping tool unit **32** is of a like construction and similarly assembled with an end wall **19** or side wall **21** for a like coacting operation with a stripping corner section **28,** only one of such assemblies will be described in detail with like parts being indicated by like numerals.

A stripping tool unit **32** (FIGS. **4** and **11**) includes a manually actuated flat lever that has a body section **44** of a generally triangular shape provided at one end with a handle extension **46** and having a spacer extension **47** at the other end thereof. The spacer end **47** is of a thickness equal to the maximum distance at which a projection **42** and **42***a* is spaced from an edge **39** and **41,** respectively, of a stripping corner section **28.** Intermediate its ends, the body member **44** has secured thereto, in a side by side relation as by weldments, a cam member **48** of a generally rectangular shape having a cam surface formed with a low section **49,** an intermediate section **51** and a high section **52.** Extended transversely through the body member **44** and cam member **48,** at a position generally centrally thereof, is a bolt **53** that functions as a shaft for rotatably supporting a tool stripping unit **32.**

The bolt **53** (FIG. **3**) is mounted at one end **54** on an adjacent end wall **19** or side wall **21** by the extension of such bolt end **54** through either a lateral projection **33** or **36,** respectively. In this mounting of the stripping tool **32,** the body member **44** is positioned with the side thereof remote from the cam member **48** in bearing engagement with the adjacent side of the projection **33** or **36**; and with the cam member arranged with the cam surface thereof opposite a shoulder **43** or **43***a*. Movement of the body member **44** axially of the bolt **53** is prevented by the engagement of the bolt head **56** with the cam member **48** and the engagement of a nut **57** on the bolt **54** with a projection **33** or **36.**

Each corresponding pair of opposite projections **33, 42** and **46, 42***a* are movably interconnected by a connecting bolt **58** for movement toward and away from each other to a predetermined maximum distance equal to the thickness of the spacer end **47** for a purpose to appear later. The bolt **58** extends through an opening (not shown) in a projection **42** or **42***a*, and an arcuate slot **59** formed in a projection **33** or **36.** With a pair of opposite projections **33, 42** and **36, 42***a* spaced apart a distance permitted by a connecting bolt **58** the handle **46** is manipulated to rotate a stripping tool unit **32** in a counterclockwise direction, as viewed in FIG. **4,** to locate the spacer extension **47** between such opposed projections to maintain the predetermined maximum spaced relation therebetween. Concurrently with this spacing function of the stripping tool **32,** the cam member **48** is rotated to a position wherein the cam low side **49** is in bearing engagement with an associated shoulder **43** or **43***a*. This position of the stripping tool unit is defined by the engagement of one side of the spacer extension **47** with the connecting bolt **58** and is maintained by a lock bolt **61** extendible through oppositely arranged openings (not shown) in a corresponding pair of the projections **33, 42** and **36, 42***a* so as to be engageable with the opposite side of the spacer extension **47.**

It is seen, therefore, that the spacer extension **47** maintains a laterally fixed relation between the projections **33, 42** and **36, 42***a* providing for the vertical edges **39** and **41** of a stripping corner section **28** being located in a flush abutting engagement with corresponding projections **33** and **36.** Concurrently with this action of the spacer end **47,** it is seen that the cam member **48,** on movement of the low side **49** thereof into bearing engagement with a corresponding shoulder **43,** moves a corner section **28** transversely relative to an adjacent end wall **19** or side wall **21** to a pretermined position wherein the vertical side edge **39** of the corner section continues to abut a projection **33** of the end wall **19** but wherein the corner section surface **29** lies in the plane of the surface **26** of the end wall **19.** It is apparent that a stripping tool unit **32** functions similarly relative to a side wall **21** to provide for movement of the corner section surface **31** into the plane of the side wall surface **27** with the vertical edge **41** in abutting engagement with the projection **36.** This assembly relation of a stripping corner section **28** with an adjacent end wall **19** and side wall **21** is positively maintained by the lock bolt **61** during the pouring of the shaft section **16.**

On completion of the shaft section **16** the inner form structure **18** is stripped from the section **16** for removal as a unit. For this purpose the locking bolt **61** is removed to provide for the rotation of the stripping tool unit **32** in a clockwise direction, as viewed in FIG. **4,** relative to the shaft **53.** During initial rotation of the stripping tool unit **32** from its position in FIG. **4** to the position thereof in FIG. **6,** the spacer extension **47** is retracted from between the projections **33** and **42,** during which time the shoulder **43** is engaged by the intermediate cam side **51** to maintain the coplaner relation between the surfaces **26** and **29,** shown in FIG. **5.**

On a continued rotation of the stripping tool unit **32** in a clockwise direction from its position in FIG. **6** to the position therefor in FIGS. **7** and **8,** the cam high side **52** is moved into engagement with the shoulder **43.** With the surfaces **29** and **31** of the stripping corner section **28** in full bearing engagement with the shaft sec-

tion **16** the engagement of the cam high side **52** with the shoulder **43** results in the stripping of the end walls **19** and side walls **21** away from the shaft section **16.** This stripping movement takes place relative to a stripping corner section **28** to an extent limited by the length of the arcuate slot **59** which receives the connecting bolt **58.** As best appears in FIG. **7** an end wall **19** and side wall **21** are movable transversely toward the projections **42** and **42***a* on lateral movement of such walls out of engagement with corresponding side edges **39** and **41** of a corner section **28.**

To complete the stripping of the inner form structure **18** from the shaft section **16** adjustable jacks **62,** corresponding to the stripping corner sections **28,** are interconnected with an adjacent end wall **19** and side wall **21** in any suitable manner (FIGS. **1** and **2**). On retraction of the jack assemblies **62** the corner sections **28** are stripped from the shaft section **16** so as to completely free the inner form structure or entrapped form **18** from the shaft section. Since the end walls **19** and **21** are rigidly connected to the rigid corner sections **22** and movably connected by the connecting bolts **58** and jack assemblies **62** to the stripping corner sections **28** the entire form **18** is removable as an integrated unit from within the shaft section **16.**

To arrange the inner form structure **18** in its concrete pouring position shown in FIG. **1** the jack assemblies **62** are initially extended to provide for the relative adjustment of the stripping corner sections **28** with the end walls **19** and side walls **21** by the stripping tool units **32** to the positions thereof shown in FIGS. **3** and **4.** It is contemplated that a plurality of stripping tool units **32** will be utilized in connecting each stripping corner section **28** with an adjacent end wall or side wall. Also, it is to be understood that at least a pair of the jack assemblies **62** (FIG. **2**) corresponding to each stripping corner section **28,** will be interconnected between the upper and lower ends of an adjacent end wall and side wall.

Although the invention has been described with respect to a preferred embodiment thereof, it is to be understood that it is not to be so limited since changes and modifications can be made therein which are within the full intended scope of this invention as defined by the appended claims.

I claim:

1. A metal form assembly for constructing a concrete shaft section comprising:

a. an outer form structure,

b. an inner form structure located in a spaced relation within said outer form structure to provide for the pouring of a concrete material therebetween to form said shaft section;

c. said inner form structure including vertically disposed side walls and end walls and a pair of diagonally opposite stripping corner sections, each of which is arranged between the adjacent ends of one of said end walls and one of said side walls, and each of which stripping corner sections has a body member of an angular shape in transverse cross section with vertically disposed side edges,

d. first lateral projections corresponding to and extended inwardly from said one end wall and said one side wall at the ends thereof adjacent a stripping corner section,

e. second lateral projections corresponding to said first lateral projections extended inwardly from the body member of a stripping corner section adjacent a vertically disposed side edge thereof at positions spaced from and opposite said first lateral projections,

f. means movably interconnecting opposite ones of said first and second lateral projections to limit the maximum relation therebetween, and

g. a manually actuated stripping tool unit rotatably mounted on each of said first lateral projections including a spacer member and a cam member, said stripping tool unit rotatable to a concrete pouring position for said inner form structure wherein said spacer member is located between opposite ones of said first and second lateral projections to space said projections apart the maximum distance defined by said interconnecting means, and wherein said cam member is engageable with a corresponding second lateral projection on said body member to move a vertical edge thereof into abutting flush engagement with the adjacent end of a corresponding end wall or side wall,

h. said stripping tool unit, on setting of the formed concrete shaft section, rotatable to an initial stripping position wherein said spacer member is retracted from between opposite ones of said first and second lateral projections, and said cam member is in bearing engagement with a corresponding second lateral projection to concurrently hold a stripping corner section in bearing engagement with the formed shaft section and to force said end walls and side walls out of engagement with the formed shaft section whereby to provide for the movement of the adjacent ends of corresponding end walls and side walls inwardly of the body member of a stripping corner section.

2. A metal form assembly for constructing a concrete shaft section comprising:

a. an outer form structure,

b. an inner form structure positioned in a spaced relation within said outer form structure including vertically disposed side walls and end walls and at least a pair of diagonally opposite stripping corner sections, each corner section having a body member with vertically disposed side edges,

c. means movably interconnecting each corner section with an adjacent side wall and end wall for limited relative lateral and transverse movements,

d. a plurality of coacting means on a corner section and on the side wall and end wall adjacent thereto operable to move a corner section into and out of a position wherein said vertically disposed side edges are in abutting engagement with a corresponding adjacent side wall and end wall, and

e. means for releasably locking a corner section in said position against movement relative to an adjacent side wall and end wall,

f. each of said coacting means including a pair of rotatable operating members rotatable together about a common axis, one of said operating members providing relative transverse movement between a corner section and adjacent end wall and side wall into said position, and the other of said operating members constituting a spacer member for holding a corner section in said position against lateral movement toward an adjacent side wall and end wall.

* * * * *