

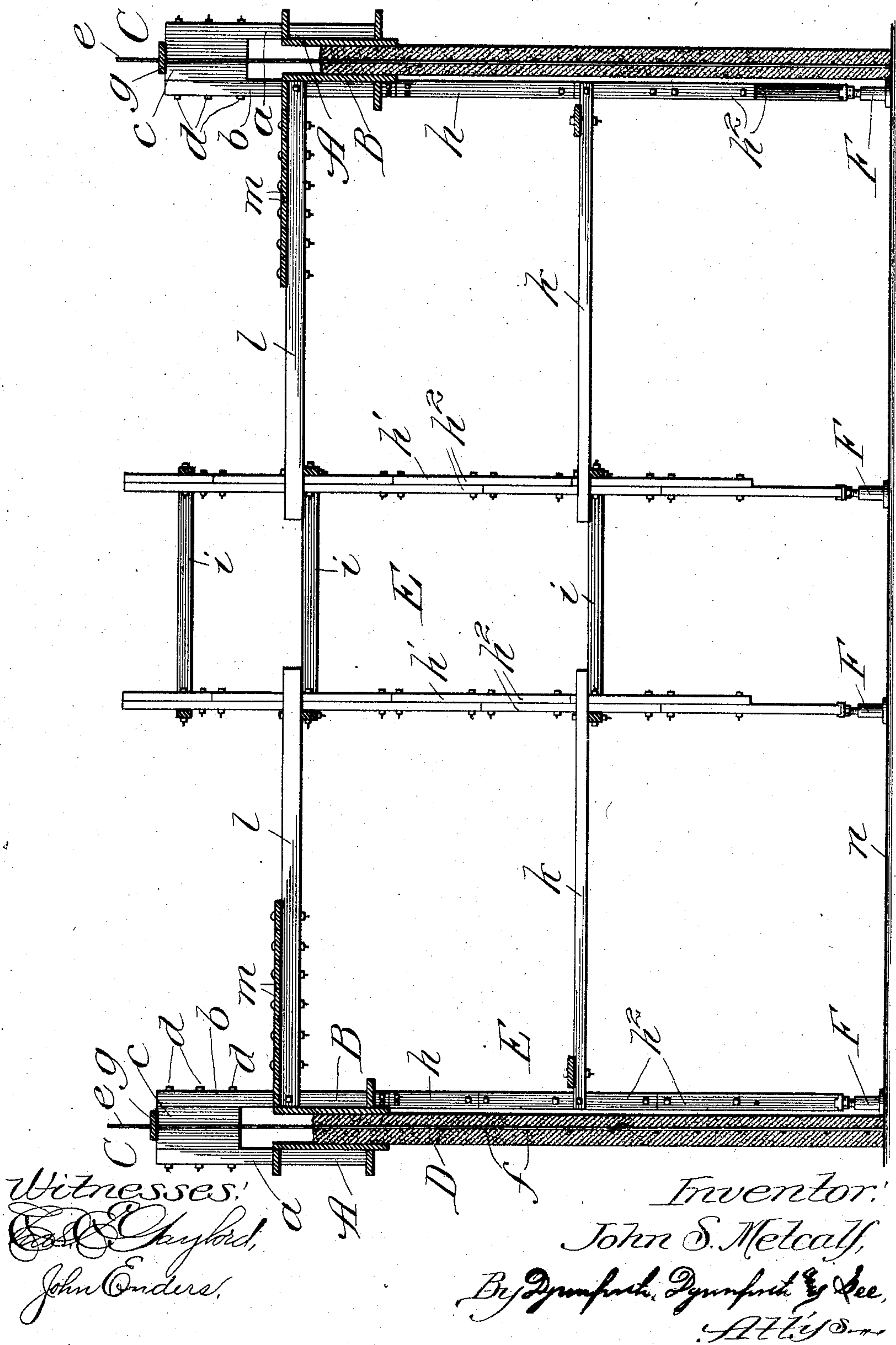
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J. S. METCALF.

METHOD OF ERECTING METAL CONCRETE STRUCTURES.

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METHOD OF ERECTING METAL-CONCRETE STRUCTURES.

SPECIFICATION forming part of Letters Patent No. 789,988, dated May 16, 1905.

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To all whom it may concern:

Be it known that I, JOHN S. METCALF, a citizen of the United States, residing at Evanston, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Methods of Erecting Metal-Concrete Structures, of which the following is a specification.

My invention relates to an improved method of erecting the class of buildings the walls of which are composed of concrete molded in sections about vertical and horizontal metal bars to embed them for their reinforcing effect. The common practice observed in erecting structures of the kind referred to is to lay the foundation and form upon it the walls in sections, employing for the purpose suitable outside and inside mold-sections, between which the concrete is molded about the preparatorily-placed metal reinforcing-bars; and when a section thus formed has been allowed to set for a sufficiently long period the mold is removed and the same or another mold is adjusted on the previously-finished section to receive another filling of concrete, requiring to be hardened by setting before the mold is removed to be readjusted for filling in another section. Thus forming the wall of the structure section after section incurs waste of time in waiting for each previous section to set and in the removal or readjustment, or both, of the mold, with the result of delay in the erection and attendant expense for labor.

The primary object of my improvement is to avoid this waste of time, with the advantage of expediting the work and greatly reducing the expense of erection by enabling the work to be performed continuously. This I accomplish by raising the mold from underneath as the work proceeds either continuously or intermittently without removing or readjusting it, and therefore without requirement for its repeated disintegration and reintegration, and for practicing my improvement suitable mechanism is illustrated in the accompanying drawing in position upon a metal-concrete wall undergoing erection, the

showing being by a view in vertical sectional elevation.

A is the outer section of a circular mold, and B is the inner section thereof, for a cylindrical structure, though, as will be understood, their shape may be varied to accord with that of walls to be erected of cross-sectional shape other than cylindrical. The nature of the view selected for illustration is not such as to enable the cylindrical form of the structure to be represented, but that form may be readily understood to facilitate the explanation of my invention. At suitable intervals about the mold, which may involve any suitable construction, frames C rise vertically from it, these frames comprising beams *a* on the outer mold-section and coincident therewith similar beams on the inner mold-section, with spacing-beams *c* rising from between the beams *a* and *b*, these several beams being fastened together by bolts *d* passing transversely through them. The beams *c* serve to space apart the mold-sections and are of a thickness according to the thickness of the wall D to be formed in the mold by filling concrete into it and embedding therein vertical metal bars *e*, placed at suitable intervals apart, and circuitous metal bars *f*, intersecting the bars *e* at desired intervals. The beams *c* about the mold may be connected together from one to the other at their upper ends by strips *g*, through which the bars *e* pass for guidance in setting them and for retaining them in their proper relative positions. E denotes scaffolding within the plane of the inner mold-section and on which the mold is supported to be carried by raising the scaffolding, as and for the purpose hereinafter described. As shown, the scaffolding comprises an outer section formed of legs *h*, preferably corresponding in number with that of the frames C, and an inner central section formed of similar legs *h'* in desired number connected together at intervals along their height by cross-bars *i*, this central section being connected at intervals along its legs by cross-bars *k* with the legs *h* of the outer section of

the scaffolding, and floor-beams l extend from the frames C to the central section of the scaffolding and support flooring m for the working floor. Thus the mold and scaffolding are

5 rigidly tied together.

In erecting a metal-concrete structure with the use of the mold carried by the inside, outer, and central scaffolding E the mold is raised as the molding work progresses by

10 raising the scaffolding with power applied underneath it, preferably through the medium of jack-screws F , of usual or suitable construction, the operation being performed as follows: To start the erection of a wall D

15 upon a preparatorily-formed foundation the line of which is indicated at n , the mold with the initially-constructed portion of the scaffolding E , being that portion of the scaffolding illustrated which is within the confines of

20 the mold, with the framework C extending above the latter, is placed in position upon the foundation. Jack-screws are placed to rest at their bases upon the foundation, one underneath each beam l near its junction with

25 the inner mold-section. If the height of the mold is greater than the length of jack employed, as it ordinarily is, each jack may be blocked from underneath in a well-known manner to cause it to bear at its upper end

30 against the respective beam. With the vertical metal bars e placed at proper intervals between the mold-sections and supported in position by passing through the strips g concrete is filled into the mold to begin the wall

35 D and at proper intervals (of, say, three feet) the horizontal intersecting metal bars f are placed and embedded in the concrete filling. As the wall grows in height within the mold laborers turn the jack-screws to raise the scaffolding, and with it the mold, along the wall-

40 surfaces, thereby incidentally smoothening them. When by continuously filling concrete into the mold-space and meantime raising the mold by turning the jack-screws the height

45 to which the mold is raised enables strips h^2 in predetermined length—say of seven feet, more or less—to form sections of the scaffolding-legs h h' to be bolted thereto to extend at their lower ends short of the foundation-

50 surface sufficiently to admit the jack-screws underneath them, the first of these extension-sections of the scaffolding-legs are thus applied. The jack-screws are reset from time to time as required (removing for the re-

55 setting purpose only a few at a time, so as to leave the others in place for stably supporting the mold and scaffolding structure) underneath the legs of the scaffolding, and as the work of concrete filling into the mold about

60 the metal reinforcing-bars progresses the jack-screws are turned to further raise the mold. When a jack-screw becomes extended to its full capacity under a scaffolding-leg—say to the height of eighteen inches—

it may be blocked underneath from time to 65 time or otherwise raised to cause it to continue to perform its raising function until its base becomes elevated above the surface of the foundation sufficiently to admit the jack-

70 screw underneath another length of leg-section h^2 , when such a strip is added and the jack-screw is adjusted underneath it. The work of thus raising the scaffolding, and with it the mold, by turning the jack-screws may be performed in the erection of a large-sized struc-

75 ture by, say, two laborers during the day while the filling with concrete is in progress and by one laborer during the night while the filling work is suspended, these laborers attending to the adjustment of the jack-screws as re-

80 quired. The mold-raising operation continues until the desired height of wall is attained, when it is dismantled of the mold and scaffolding. The mold-raising operation may be performed intermittently or continuously

85 while the mold is being filled, and though jack-screws placed underneath the scaffolding and worked by hand-labor have proved perfectly satisfactory means for practicing my invention it is feasible to employ other power

90 for turning the jack-screws and means other than jack-screws applied from underneath the scaffolding and operated by power other than hand-labor, continuously or intermittently, for raising the mold. It will readily be seen that

95 by thus raising the mold as the erection of the structure progresses interruption for dismantling and readjusting molds, with incidental delays due to waiting for the concrete to set, are avoided and the progress of erection rendered continuous, with the advantage of great

100 saving in time and expense and that of smoothening the wall-surfaces by the rise in contact with them of the mold, thereby avoiding the usual requirement in connection with molded

105 concrete walls of going over them for smoothening and finishing after the work of erection is completed.

What I claim as new, and desire to secure by Letters Patent, is—

1. In erecting the wall of a structure of the character described by filling concrete into a mold, the method of rendering continuous the progress of erection, which consists in raising the mold from underneath the same along the

110 surfaces of its filling of concrete while the filling work is proceeding.

2. In erecting the wall of a structure of the character described by filling concrete into a mold supported on scaffolding inside the struc-

120 ture, the method of rendering continuous the progress of erection which consists in raising the scaffolding from underneath the same, and with it the mold along the surfaces of its filling of concrete while the filling work is pro-

125 ceeding.

3. In erecting the wall of a structure of the character described by filling concrete into a

5 mold, the method of rendering continuous the progress of erection, which consists in jacking the mold from underneath the same to raise it along the surfaces of its filling of concrete while the filling work is proceeding.

4. In erecting the wall of a structure of the character described by filling concrete into a mold supported on scaffolding inside the structure, the method of rendering continuous the

progress of erection, which consists in jacking ¹⁰ the scaffolding from underneath the same to raise it and with it the mold along the surfaces of its filling of concrete while the filling work is proceeding.

JOHN S. METCALF.

In presence of—

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WALTER N. WINBERG.