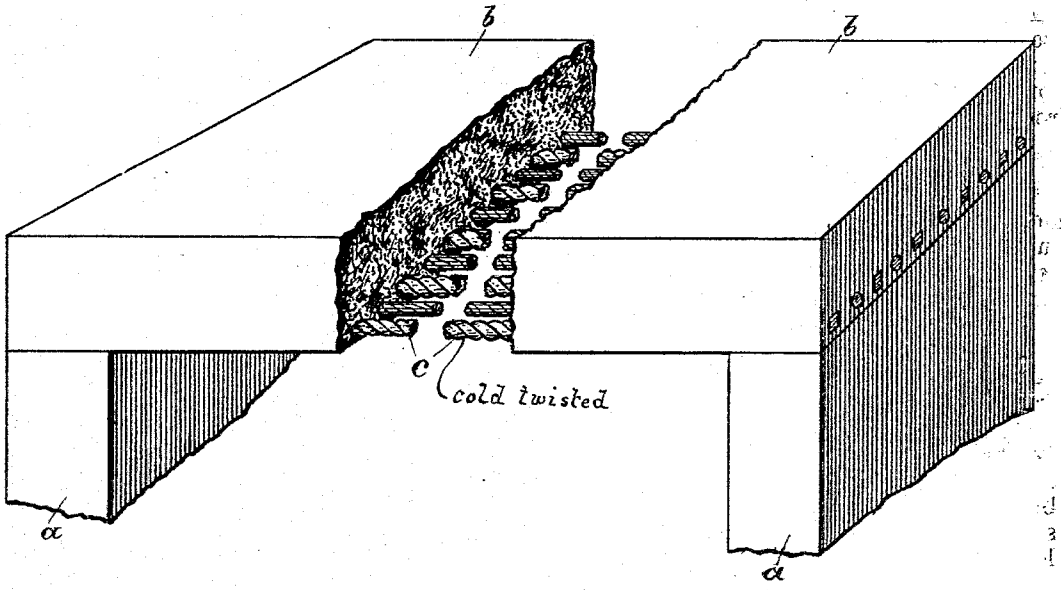
(No Model.)

E. L. RANSOME.

CONCRETE CONSTRUCTION.

No. 516,113. Patented Mar. 6, 1894.



Witnesses,
L. A. Howse
H. F. Ascheck

Inventor,
Ernest Leslie Ransome

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ERNEST LESLIE RANSOME, OF OAKLAND, CALIFORNIA.

CONCRETE CONSTRUCTION.

SPECIFICATION forming part of Letters Patent No. 516,113, dated March 6, 1894.

Application filed November 6, 1893. Serial No. 490,185. (No model.)

To all whom it may concern:

Be it known that I, ERNEST LESLIE RANSOME, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented an Improvement in Concrete Constructions; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to that class of structures of concrete, brickwork, or like material, in which the tensile strength of the construction is increased by the embedment and introduction of iron bars into the body of the material, and is an improvement upon the construction for which Letters Patent No. 305,226, of September 16, 1884, were granted me. By that invention I created a continuous bond between the iron and concrete, by using polygonal bars of iron so twisted as to form long spiral threads on the bars.

My present invention consists in using similar bars of iron in like manner, that have been twisted cold, that is to say using bars of iron which were twisted while the iron was in its normal condition, cold, instead of being heated for the operation, for I have discovered that structures in which cold-twisted bars are used are much more rigid and also stronger and capable of sustaining greater loads than when such bars are used hot-twisted, or untwisted, and this quality of cold-twisted iron applies with equal force to iron of any cross section, whether it be round or square. The amount of twist to be given to the bar may vary considerably. The more they are twisted, the stronger and more rigid is the structure in which they are used, provided the cold-twisting is not carried too near to the point of rupture.

In practice I usually give as follows: bars one-fourth inch diameter, or square, six twists to the lineal foot; bars one-half inch diameter, or square, three twists to the lineal foot; bars three-fourths inch diameter, or square, two twists to the lineal foot; bars one inch diameter, or square, three-fourths twist to the lineal foot; bars one and one-half inches diameter, or square, one-half twist to the lineal foot; bars two inches diameter, or square, one-tenth twist to the lineal foot. This twisting can be readily done in any ordinary iron lathe of sufficient strength, by rigidly fastening one end of the bar to the headstock or face plate of the lathe, and fastening the other end of the bar to the tail-stock (both stocks being held also rigidly in their relative positions), and turning the lathe and bar in the ordinary manner of lathe turning.

The accompanying drawing illustrates the position of these bars in a slab of concrete.

a, *a*, are supporting walls, *b*, a concrete slab, *c*, a cold twisted bar embedded in the concrete for the purpose of increasing its tensile strength.

For the purpose of this invention, I regard stone work, brick work, glass, or other structural substances of less elasticity than the bars of untwisted iron, such as cast iron, as the equivalent of concrete. And other metals that may be in like manner affected by cold-twisting as the equivalent of iron.

In many constructions this lessening of the ductility and elasticity of the iron would be of a greater disadvantage than the corresponding gain in strength due to the cold-twisting. But in concrete structures the lessening of the ductility of the iron of itself is a great and positive benefit, and meets a want long sought after, viz: that of causing the iron and the concrete in which it is embedded to work harmoniously and in unison together when subjected to strain. The nearer the elasticity of the iron approaches that of the concrete without sacrificing its strength, the better; because the more they are separated from one another in degree the more certain is the concrete structure to crack and break when under strain.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

A structure of concrete or similar material having cold-twisted metal bars embedded in said material for strengthening the same.

ERNEST LESLIE RANSOME.

Witnesses:
H. F. THOMSEN,
MINNIE PATERSON.

(No Model.)

E. L. RANSOME.

FINISHING CONCRETE AND ARTIFICIAL STONE SURFACES.

No. 405,800. Patented June 25, 1889.

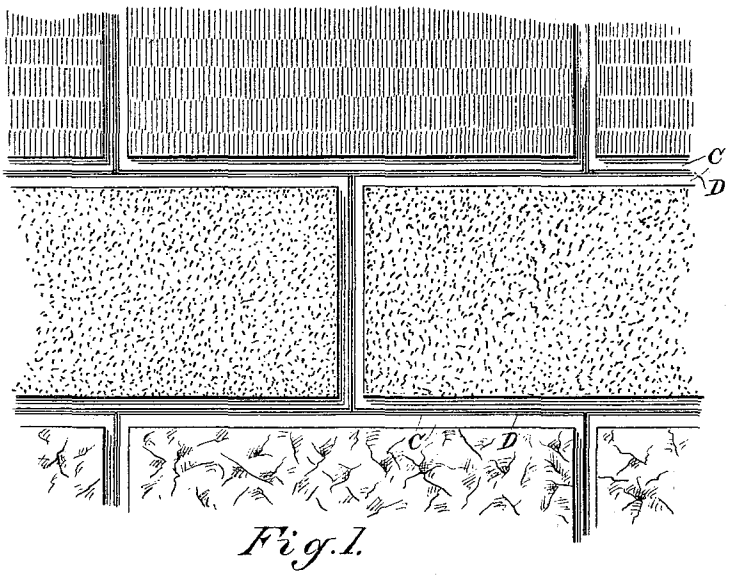


Fig. 1.

Fig. 2.

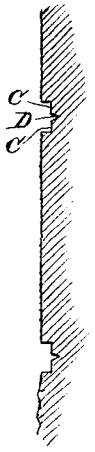
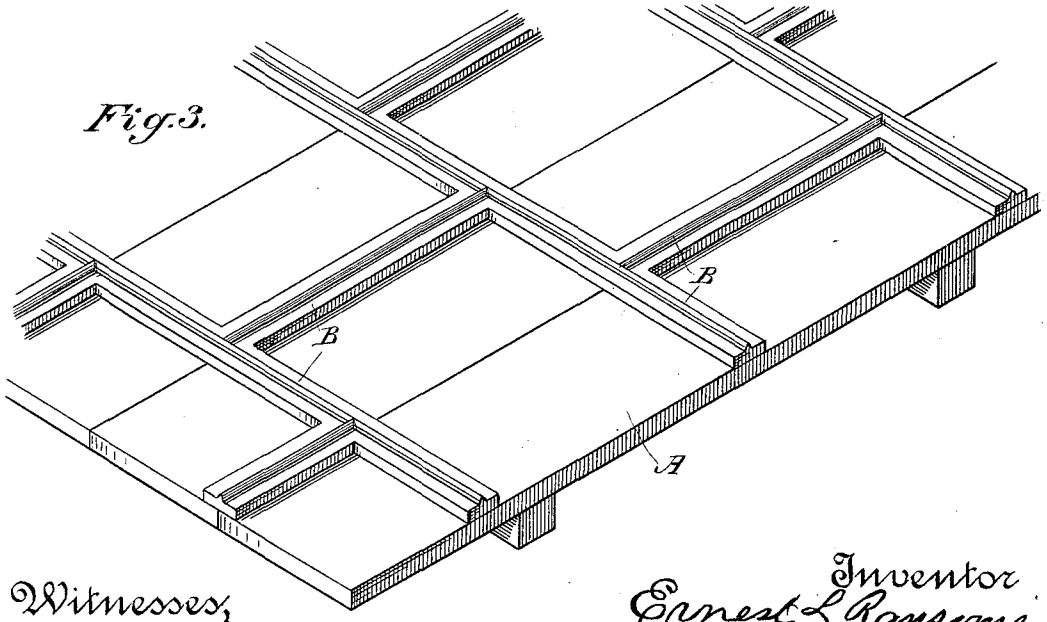


Fig. 3.



Witnesses,
Geo. H. Strong
J. B. Hanes

Inventor
Ernest L. Ransome
by Dewey & Co
attys

UNITED STATES PATENT OFFICE.

ERNEST LESLIE RANSOME, OF SAN FRANCISCO, CALIFORNIA.

FINISHING CONCRETE AND ARTIFICIAL-STONE SURFACES.

SPECIFICATION forming part of Letters Patent No. 405,800, dated June 25, 1889.

Application filed March 19, 1889. Serial No. 303,941. (No model.)

To all whom it may concern:

Be it known that I, ERNEST LESLIE RANSOME, of the city and county of San Francisco, State of California, have invented an Improvement in Finishing Concrete and Artificial-Stone Surfaces; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to the treatment of wall and other surfaces made of concrete; and it consists in giving these surfaces a close imitation to natural stone by first placing projections upon the inner surfaces of the molds or cribs, to form corresponding recesses in the surfaces of the concrete for the imitation joining, either with or without borders, and subsequently, when the mold is removed, in finishing off said joints or borders by floating in cement or in any of the well-known ways, and finally removing the projecting surfaces of the wall between such joints and borders either roughly or regularly, so as to imitate the various finishes of natural stone.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a face view of a portion of a wall finished according to my method. Fig. 2 is a vertical section taken through the face at right angles thereto, showing the outline of the front. Fig. 3 is a view of the mold or crib in which the concrete wall is formed.

In carrying out my invention I employ molds or cribs A, which are built up in the usual way and filled with the material of which concrete or artificial stone is formed, these walls being built up of any desired thickness and height.

In order to produce the desired finish of the wall, I form fixed projections B upon the inner face of the mold or crib at such points that when the concrete is filled into the mold these projections will form recesses at the points where it is desired to imitate the joining edges of the blocks of stone. These projections B form the imitation of the border which is shown at C in Figs. 1 and 2, and also the joined lines shown at D in these figures. This leaves the intermediate portion, which represents a larger part of the face of the stone block, projecting a considerable distance beyond these borders in the mold. These projecting faces are then finished in any well-known ways for finishing natural stone, such as by breaking off the face roughly by a pick to represent the unfinished stone, or more regularly and smoothly by a chisel or similar tool, which enables me to produce any styles of finish which it is customary to give to the natural stone, while the joints and the surrounding borders between the blocks of stone are also closely imitated by means of the projections B which are placed in the molds. It will be manifest that these joints or borders can be left as they come from the molds; or, if preferred, they may be finished off by floating with cement, or by any of the well-known means for finishing which are usually employed for the entire surface.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A concrete or artificial-stone surface having a superficial joint line or border, and having the intermediate surface cut or broken, substantially as herein described.

2. The improvement in artificial-stone walls or surfaces consisting of the superficial joint or border formed by projections in the mold and the intermediate faces of the subdivisions subsequently broken or dressed by a tool, substantially as herein described.

3. A concrete or artificial-stone surface having superficial finished joint lines or borders, with the intermediate surface cut or broken, substantially as described.

In witness whereof I have hereunto set my hand.

ERNEST LESLIE RANSOME.

Witnesses:

S. H. NOURSE,

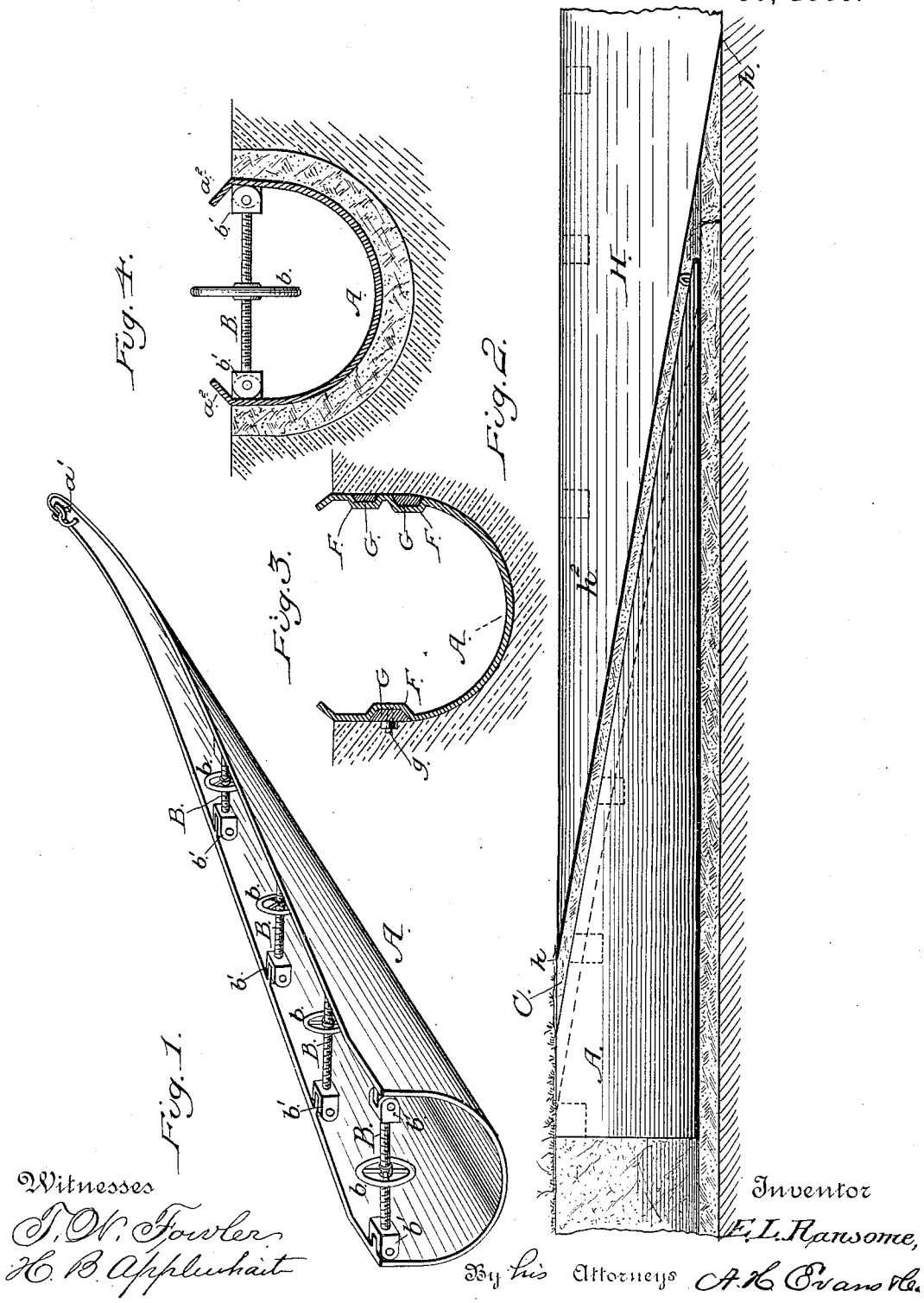
JOSEPH A. BAYLESS.

(No Model.) 2 Sheets—Sheet 1.

E. L. RANSOME.

CONCRETE MOLD FOR SUBWAYS FOR CABLE ROADS, DITCHES, &c.

No. 353,500. Patented Nov. 30, 1886.



Witnesses
T. W. Fowler
H. B. Applehait

Inventor
E. L. Ransome,
By his Attorneys A. H. Evans & Co.

(No Model.) 2 Sheets—Sheet 2.

E. L. RANSOME.

CONCRETE MOLD FOR SUBWAYS FOR CABLE ROADS, DITCHES, &c.

No. 353,500. Patented Nov. 30, 1886.

Fig. 5.

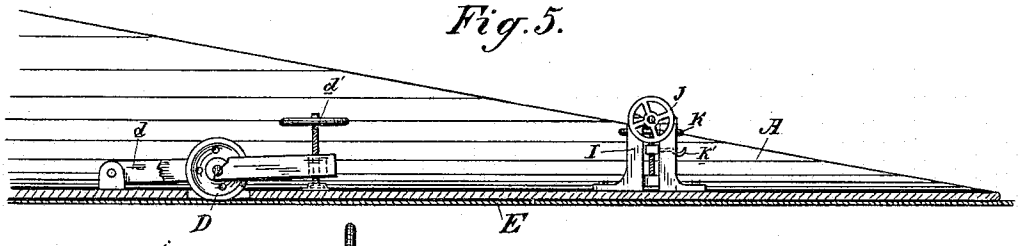


Fig. 6.

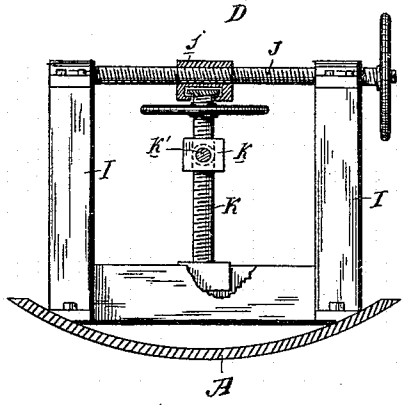


Fig. 7.

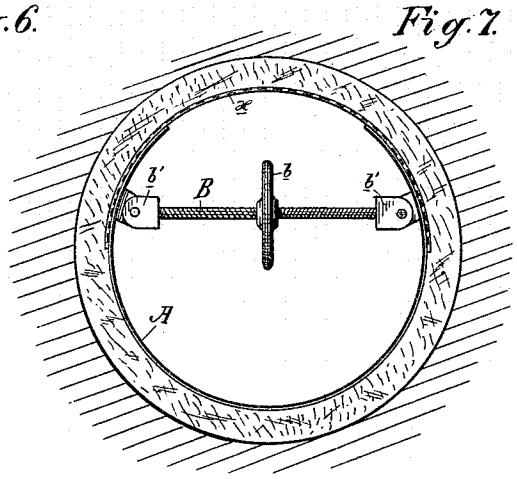
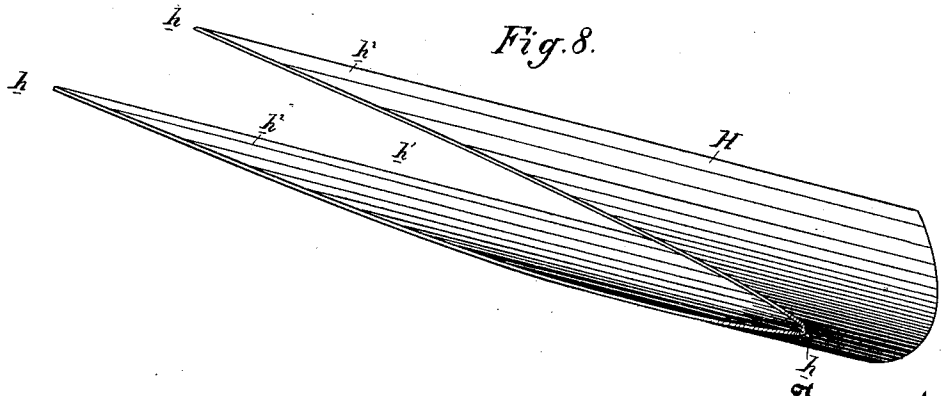


Fig. 8.



Witnesses,
Geo. H. Strong
J. D. Towle

Inventor,
E. L. Ransome
By
Dewey & Co.
Attys

UNITED STATES PATENT OFFICE.

ERNEST L. RANSOME, OF SAN FRANCISCO, CALIFORNIA.

CONCRETE MOLD FOR SUBWAYS FOR CABLE ROADS, DITCHES, &c.

SPECIFICATION forming part of Letters Patent No. 353,500, dated November 30, 1886.

Application filed February 17, 1886. Serial No. 192,313. (No model.)

To all whom it may concern:

Be it known that I, ERNEST L. RANSOME, of the city and county of San Francisco, and State of California, have invented an Improvement in Concrete Molds for Subways for Cable Roads, Ditches, Sewers, Tunnels, &c.; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the class of molds used for concrete work; and my invention consists in a mold constructed of any suitable material having a curvature or direction of outline and extent of perimeter at one end conforming to the concrete work to be made, and thence tapering or sloping on its top toward a point.

It consists, further, in an auxiliary or supplementary frame having at one end a curvature or direction of outline, and an extent of perimeter conforming to the excavation to which it is fitted, said frame having a straight top and a bottom sloping upwardly toward a point, being the reverse in construction and position to the mold.

It consists, further, in means for increasing and diminishing the diameter of the mold, and also of the auxiliary frame, when necessary; in adjustable rollers in the mold, on which it may freely ride over a plate laid under them; in recesses in the sides of the mold for receiving guides for sustaining bolts, nuts, and other forms in position in the concrete until the same becomes sufficiently set to retain said forms unaided; in a mechanism for changing vertically and horizontally the line of draft of either the mold or auxiliary frame, and in details of construction, all of which I shall hereinafter fully describe.

The object of my invention is to provide a mold for easily and rapidly laying the concrete lining of subways for cable roads, ditches, sewers, tunnels, and other extended excavations, and also to provide means for perfectly forming and holding the excavation in advance of the mold when said excavation is made in loose or sandy soil where it would have a tendency to cave.

Referring to the accompanying drawings, Figure 1 is a perspective view of my mold. Fig. 2 is a longitudinal section of a ditch, showing the mold therein in elevation, and also the "shaper" H in the ditch in advance of the mold. Fig. 3 is a cross-section of the mold, showing the recesses for the form-supporting guides. Fig. 4 is a cross-section of the mold in position, showing the top guides, a^2. Fig. 5 is a longitudinal section of the mold, showing the adjustable rollers D and the adjustable draft mechanism. Fig. 6 is a front elevation of the adjustable draft mechanism. Fig. 7 is a cross-section showing the mold in a tunnel with the top supporting-plate, x. Fig. 8 is a perspective view of the shaper H.

A is the mold, made of a frame or piece of any suitable material, though sheet metal is probably the best for the purpose. The mold is curvilinear in cross-section, or angular, or any other shape conforming to the shape in cross-section of the work to be done, and at its larger end a it has a perimeter conforming in curvature or direction and in extent to the inner surface of the concrete work to be made. This end a of the mold maintains an equal extent of perimeter for any given distance, and then the sides of the mold begin to slope on their tops gradually to the point a', though the curvature or direction remains the same throughout, its perimeter being only decreased by the sloping of the sides.

B are screws, one end being right-hand threaded and the other left-hand threaded, and having a central wheel, b, by which they are operated. The ends of the screws are threaded in suitable lugs, b', on the sides of the mold. By turning these screws so as to force the sides apart the diameter of the mold, which for this purpose should have a springy or elastic nature, or be otherwise adapted to expand, is increased, and the reverse takes place by reversing the movement of the screws.

The operation of the mold is as follows:

C is the subway, ditch, or other excavation.

Concrete can be laid on a flat surface and tamped; but it cannot be tamped efficiently on a vertical surface or a surface approaching a vertical.

In the bottom of the excavation the concrete is laid and tamped for a distance, say, a little longer than the mold. Then concrete is laid up by hand, or otherwise formed on the sides of the ditch to a shape approximating that of the mold, and to a length equal to or shorter than said mold. The work is now ready for the mold, which is placed in the ditch, say,

for the sake of clearer illustration, exactly in the concrete previously formed, which will of course make said mold concentric with the concrete. Now, the mold is drawn forward, point first, by any suitable power, to such a distance that a portion at least of its end *a* will come up with the beginning of the sloping sides of the concrete. The point *a'* thus moves beyond said sides and nearer the limit of the bottom concrete, and therefore the sloping sides of the concrete will be below the level of the sides of the mold. The screws B are now operated to expand the mold to its seat, and the workmen proceed to tamp in more concrete until it reaches the level of the mold's sides, and they carry on the bottom concrete in advance of the point of the mold. Now, the screws B are again operated, this time to contract the mold, thereby diminishing its diameter and relieving it, so that it can be drawn forward to a fresh position. It now rides easily on the concrete, and is stopped at a point as far in advance of its last move as said move was in advance of its first position. It is then tightened up again and the concrete tamped in to a level with its sides once more. The operation is thus continued throughout the length of the excavation. The mold may be made of any length—say, for example, twenty feet. This will give a very gentle slope to its sides, which is the result to be desired, for it makes the tamping to be more effective and practicable—results which could not be obtained on a steep incline.

The object in sloping the mold at all, instead of having a straight one, is to bring the concrete up within reach of the tamping-tools.

It is obvious that if a curvilinear mold with a straight top were placed in a ditch the lower portion of ditch could not be reached by the tamping-tools, though the concrete could be poured in, but it could not be tamped; but by having the sloping mold and operating it as described the sides of the concrete lining are always near enough to the level of the sides of the mold to enable the tamping to be done. By expanding and contracting the mold its periodical movements are rendered practicable, and can be easily and rapidly effected. By making it of considerable length I not only obtain a gentle slope for its sides, but also have room for a number of workmen to do the tamping, thus accelerating the operation.

In order to insure greater accuracy in filling in the concrete, I may make the sides of the mold as shown in Fig. 4, forming an inwardly-bent portion, a^2, which makes a flaring opening, into which the concrete may be directed with greater precision.

In order to make the mold ride easy when being moved, and to prevent it from having any tendency to disturb or mar the concrete by undue friction, I may, especially in very heavy molds, provide it with rollers D in its bottom, Fig. 5. These should be made vertically adjustable, so that when the mold is at rest they may be withdrawn out of the way, and when the mold has to be moved they may be projected through their apertures in the bottom, and thereby carry the mold. Any suitable mechanical contrivance may be employed to effect this adjustment.

I have here illustrated a pivoted lever, *d*, in which the roller is mounted, and a screw, *d'*, by which the lever is moved on its pivot to project or withdraw the roller.

E is an independent plate laid under the mold, and on which the rollers travel, thus avoiding any disturbance of the concrete bottom.

In the sides of the mold may be made grooves or recesses F, for receiving the guides G, which are for the purpose of sustaining bolts, nuts, or other forms, *g*, in position in the concrete until the same becomes sufficiently set to retain said forms unaided, Fig. 3. The mold can be so contracted, as heretofore explained, before being moved that it will leave the guides B undisturbed.

It will be observed that this mold is adapted for use in tunnels and other excavations having either a complete circumference, or one with more degrees than an ordinary ditch, in which case, of course, the end *a* will have a perimeter corresponding in extent, or nearly so, to the inner surface of the concrete work, whatever that may be; and in such work I would have a plate, *x*, Fig. 7, independent of the mold, but resting on the top of its large end and overlapping its sides. This plate is for holding up the top concrete until it has become set, the mold in the meanwhile moving forward under it, or others like it, leaving them behind for subsequent removal at the proper time.

When the excavation is being made in loose or sandy soil, or any soil which has a tendency to cave and not to preserve the perfect outline desired, I use, in connection with the mold A, the frame H, which from its peculiar function may be termed the "shaper." It consists of a frame of any suitable material, having, at one end a curvature or outline and an extent of perimeter conforming to the excavation. Its top is straight, but its bottom is sloped upwardly toward a point on a line, *h h*, thus leaving an opening, *h'*, which is flanked by the side arms, h^2, whose lower edges are the lines *h h*, Fig. 8. In using this shaper it is placed in the excavation in advance of the mold, and in a reverse position, so that the larger ends of the two lie farthest apart, while their smaller ends are adjacent that of the mold entering the opening *h'* of the shaper between its side arms, h^2. The mold being smaller in diameter than the shaper, a space is left between the two, which enables the operation of the mold to take place, as hereinbefore described. The shaper holds up the sides of the excavation and preserves its outline. It is moved in advance of the mold as the latter moves, and may be wholly independent thereof or connected with it, so that both may be moved together.

Ordinarily the shaper may be a rigid one, but when working in ground where patches of harder material—such as rock—have to be traversed it may be necessary to adapt it to be expanded and contracted. This I would accomplish in a similar manner as I have described in connection with the mold—namely, by making the frame H of some material having an elastic or springy nature, or otherwise adapted to be expanded or contracted, and providing it with the right and left hand screws B.

In moving the mold and the shaper it may be necessary at times to alter the line of draft, either vertically or laterally, or both. I have here shown as a means for accomplishing this end a frame-work, I, consisting of a slotted or grooved base and standards. In the top of these latter is mounted a horizontal screw, J, upon which a clutch-nut, *j*, travels. In the cluch-nut is seated the head of a vertical screw, K, the base of which travels in the slotted base of frame I. Upon this screw is a nut, *k*, in which is swiveled the draft hook *k'*. This device is secured within the small end of the mold A, when this latter is use by itself, or in the large end of the shaper H, when used in connection with the mold. By operating screw J the line of draft is changed laterally, and by operating screw K it is changed vertically.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A concrete mold consisting of an expansible and contractible frame or piece of the outline in cross-section of the work to be made, and having a sloping top, substantially as described.

2. A concrete mold consisting of a laterally expanding and contracting frame or piece having one end conforming in curvature or direction of outline and extent of perimeter to the inner surface of the concrete work to be formed, and having its top sloping thence toward a point, substantially as described.

3. A concrete mold consisting of a laterally expanding and contracting frame or piece, A, having an end, *a*, conforming for any given distance in extent of perimeter to the inner surface of the concrete work to be made, and having its top sloping thence toward a point, substantially as described.

4. A concrete mold consisting of the laterally expanding and contracting frame or piece A, having an end, *a*, with a straight top, and thence having its top sloping toward a point, *a'*, substantially as described.

5. A concrete mold consisting of a frame formed in one piece, having a sloping top, and of a nature adapting its diameter to be increased or diminished, substantially as and for the purpose described.

6. A concrete mold consisting of the frame A, formed of a single piece of metal, having a top sloping toward a point, and a mechanism for expanding or contracting its sides, whereby its diameter may be increased or diminished, substantially as and for the purpose described.

7. The frame or piece A, having a sloping top, in combination with the right and left hand screws B, fitted between its sides, whereby its diameter may be increased or diminished, substantially as and for the purpose herein described.

8. The frame or piece A, having an end, *a*, with a straight top for any given distance, and its top thence extending on a slope toward a point, in combination with the right and left hand screws B, fitted between its sides, substantially as described.

9. The adjustable and movable concrete mold A, formed of a single piece, having a sloping top, as described, and inwardly bent at a^2, substantially as described.

10. The laterally expanding and contracting mold A, in combination with the vertically-adjustable rollers D, mounted in the bottom of said mold, substantially as and for the purpose herein described.

11. The movable concrete mold A, having the adjustable rollers D in its bottom, in combination with the independent plate E, on which they travel, substantially as described.

12. A movable and adjustable concrete mold, as described, having the grooves or recesses F in its sides, and the form-supporting guides G in said grooves, substantially as described.

13. In combination with the movable or traveling concrete mold A, having a sloping top, as described, an auxiliary or supplementary movable or traveling frame, H, to be placed in the excavation in advance of the mold, said frame having at its farther end a curvature or direction of outline and an extent of perimeter conforming to the excavation, a straight top, and an upwardly-sloping bottom, substantially as described.

14. In combination with the movable or traveling concrete mold A, having a sloping top, as described, an auxiliary or supplementary movable or traveling frame, H, to be placed in the excavation in advance of the mold, said frame having at its farther end a curvature or direction of outline and an extent of perimeter conforming to the excavation, a straight top, and an upwardly-sloping bottom, forming an opening, *h'*, and side arms, h^2, between which the point of the mold lies, substantially as described.

15. In combination with the movable or traveling adjustable concrete mold A, having a sloping top, as described, the auxiliary or supplementary movable or traveling frame, adapted to have its diameter increased or diminished, said frame having at its farther end a curvature or direction of outline and an extent of perimeter conforming to the excavation, a straight top, and an upwardly-sloping bottom forming an opening, *h'*, and side arms, h^2, all arranged and adapted to operate substantially as described.

16. The traveling pieces or frames, as herein described and used, in combination with screws J and K, for adjusting vertically and laterally their line of draft, substantially as described.

17. The traveling pieces or frames, as herein described and used, in combination with the means for adjusting their line of draft, consisting of the horizontal screw J, with its clutch-nut, the laterally-moving screw K, with its nut *k*, and the draft-hook *k'* in said latter nut, substantially as described.

18. The traveling mold A, having a large end, *a*, with straight top, said mold thence having a top sloping downwardly, as described, in combination with an independent plate or plates, *x*, laid on top of the end *a*, for the purpose of sustaining the top concrete until it has become set, substantially as described.

19. A concrete mold consisting of a frame or piece of the outline in cross-section of the work to be made, and having a bottom straight throughout its length, and a top sloping down to a point, substantially as described.

20. The mode or method of lining subways for cable roads, ditches, sewers, tunnels, &c., with concrete, which consists in tamping the concrete into the space between the exterior of the mold and the inclosing subway along the diagonally-sloping sides of the mold until such space is filled, then longitudinally advancing the mold until additional sloping-space is formed between the mold and inclosing subway adapted to be filled and tamped as before, and so on, substantially as herein described.

In witness whereof I have hereunto set my hand.

ERNEST L. RANSOME.

Witnesses:
S. H. NOURSE,
H. C. LEE.