

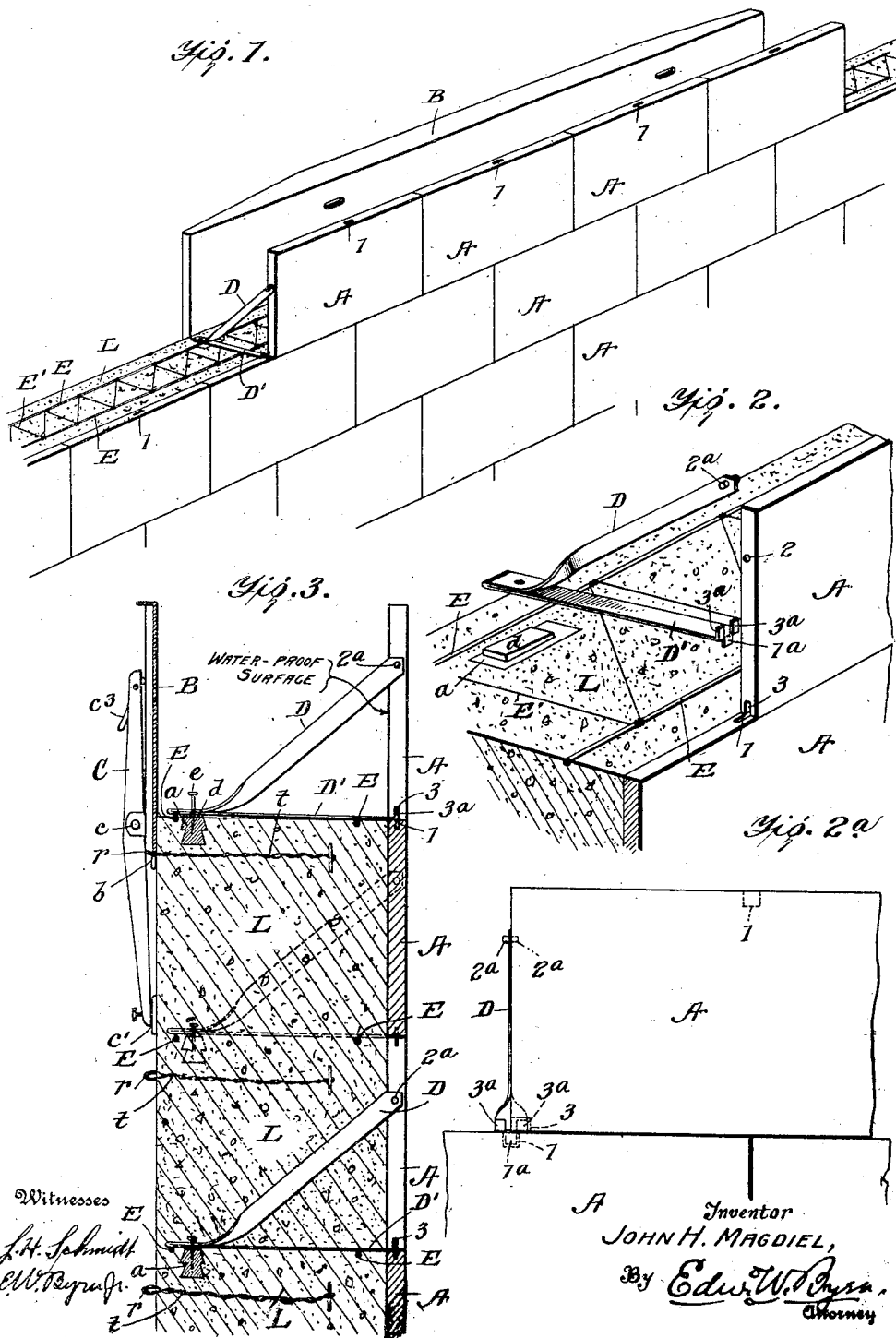
J. H. MAGDIEL.
COMPOSITE WALL AND METHOD OF CONSTRUCTING SAME.

939,726.

APPLICATION FILED MAY 22, 1909.

Patented Nov. 9, 1909.

2 SHEETS—SHEET 1.



J. H. MAGDIEL.

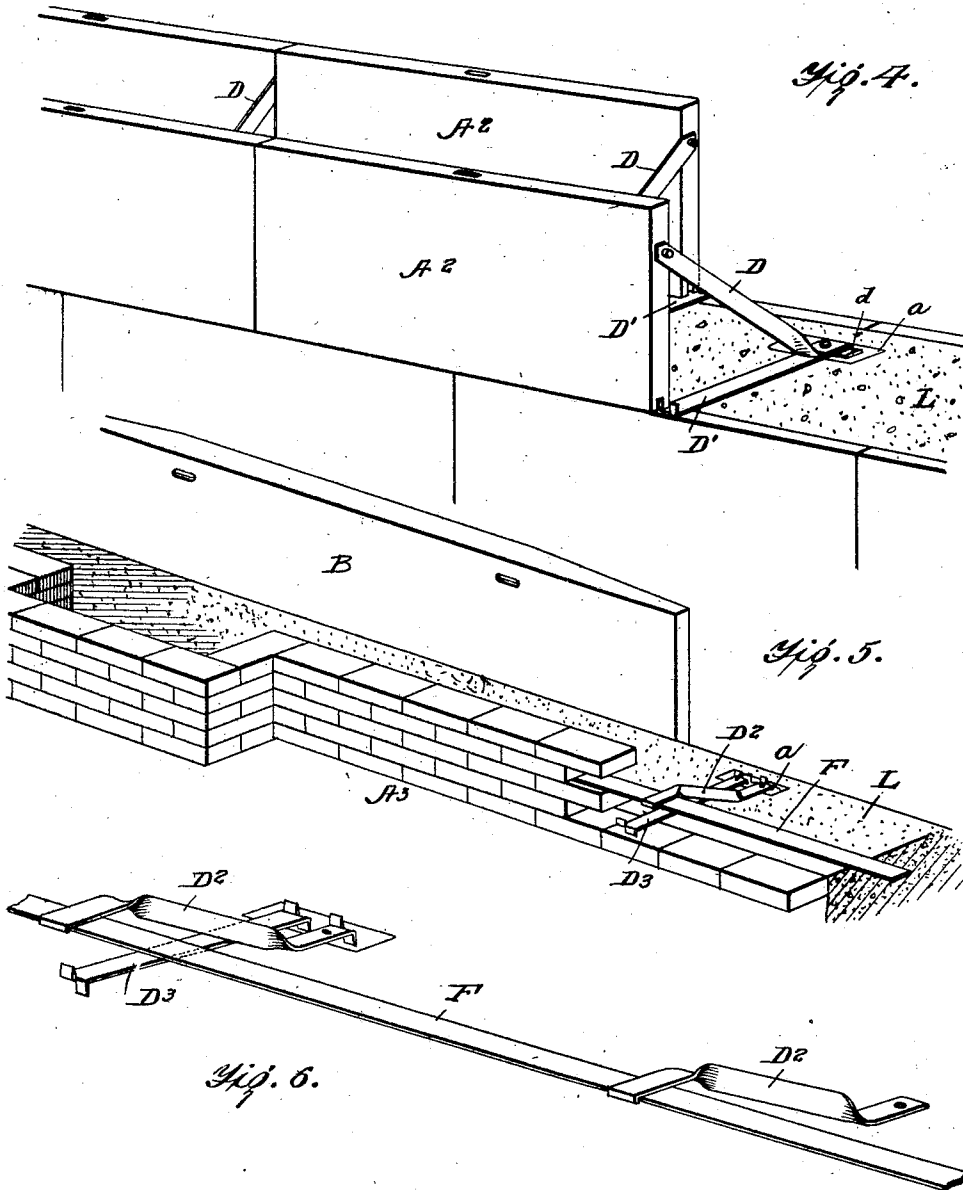
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COMPOSITE WALL AND METHOD OF CONSTRUCTING SAME.

939,726.

Specification of Letters Patent.

Patented Nov. 9, 1909.

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To all whom it may concern:

Be it known that I, JOHN H. MAGDIEL, a subject of the King of Norway, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Composite Walls and Methods of Constructing the Same, of which the following is a specification.

10 In the building of composite walls which have a facing of one material and a backing or filling of another material, several different methods have been employed. One is to set up relatively thick blocks of stone and fill in behind this facing with bricks or other material. Another is to build the wall first and afterward face it with one inch slabs by plugging the wall and anchoring the slabs to the plugging. This is a very slow and costly method, as the work has to be performed from hanging scaffolds after the building has been put up and the slabs are more or less inadequately anchored. Still another method is to build a double facing for the wall out of slabs and fill in between the slabs with concrete progressively as the wall goes up, the slabs forming a mold to hold the concrete as the wall goes up. Although differing from it in important particulars, my invention relates more nearly to the latter method and it consists in a new method of working and also a new construction of wall, whereby great economy of working is obtained and a true, handsome and substantial composite wall is built at the lowest cost and in the most rapid manner, as will be hereinafter more fully described with reference to the drawings, in which,

40 Figure 1 is a front perspective view of a portion of a wall laid in accordance with my invention. Figs. 2 and 2^a are enlarged details showing the method of applying the bracing, Fig. 2 being in perspective view and Fig. 2^a in front elevation. Fig. 3 is a vertical transverse section through the wall, the mold side, and the slab facing at one of the vertical joints of the same, and Figs. 4, 5, and 6 are perspective views showing modifications of the invention, Fig. 4 showing an arrangement for a double faced wall, Fig. 5 showing a brick facing and Fig. 6 showing the anchorage for the brick facing.

Referring to Figs. 1 to 3, A represents the

facing slabs, which may be of marble, slate, 55 artificial stone, or any other desired material. Each slab is formed with anchorage holes in its four edges as follows; holes 1 at the middle of its upper and lower edges, holes 2 in the end edges near the top and 60 holes 3 in the end edges at the bottom. These holes are adapted to cooperate with the braces D and D¹ which are made of strap iron. The plane of the cross section of brace D is vertical and its upper end is adapted to 65 enter the vertical mortar joint between the abutting ends of two adjacent slabs and said upper end is provided with a double dowel pin 2^a, one end of which enters a hole 2 in the end edge of one slab, and the other end 70 of which dowel pin enters the corresponding hole 2 in the edge of the adjacent slab. The brace D is set inclinedly, or at an acute angle to the slab, and has its foot or lower end adapted to be anchored to an anchor 75 block *a* in the concrete filling at a point within the sides of the filling. The brace D is twisted so that its upper portion is in a vertical plane but its lower end or foot is in a horizontal plane. The vertical plane gives 80 stiffness, presents a sharp knife edge to the falling concrete and this together with its inclined position, which allows the falling concrete to strike it at an acute angle and glancing blow, prevents the concrete from 85 jarring the slab or falsifying its plane after being set. The brace D¹ is horizontal and its cross sectional plane is horizontal and one end of the same is formed with two upturned lugs 3^a, 3^b and one intermediate 90 downturned lug 1^a. One of the upturned lugs 3^a locks into the hole 3 in the lower end edge of a slab, and the other lug 3^b locks into the corresponding hole 3 of the abutting slab in the same horizontal series, while the 95 downturned lug 1^a enters the hole 1 in the middle of the upper horizontal edge of the slab. The other end of the horizontal brace D¹ extends to and connects with the same anchorage block *a* which secures the foot of 100 the inclined brace. The anchorage block *a* is a wooden block of dovetail shape, largest at the bottom, thoroughly saturated with oil so it is non absorbent and will neither expand nor contract from the absorption of 105 water. These blocks are embedded in the top of each layer of concrete as it is laid flush with the upper surface and the foot of

the brace is nailed down into it. As the wall slabs A must be absolutely plumb or vertical, the brace is adjusted to the plumb position by means of a tapering wooden wedge *d* which is interposed between the anchorage block *a* and the foot of the brace and when the plumb position of the slab is obtained a single nail *e* is driven through the foot of the brace, the wedge and the anchorage block, to fix and hold the slab and braces in true and permanent position while the next layer of concrete is being filled in.

The slabs A are set up, one horizontal layer at a time around the whole building, and form one side of the mold which is to receive the concrete and which slabs become when the concrete sets a permanently connected wall facing. In order to hold the concrete while being filled in behind these slabs, I employ a horizontally shiftable one-side mold plate B, Figs. 1 and 3. This one-side mold is of my invention and has been covered by me in United States Patent No. 926,269, June 29, 1909. It consists of a metal plate with flanged edges. It is supported on one side of a wall as it is built up by means of downwardly projecting pins *b* Fig. 3, along its lower edge, which pins are inserted in the projecting loops or eyes *r* of wire anchors *t* which are built in each layer of concrete L, as the wall goes up, the eyes *r* projecting from the concrete just far enough to receive the pins *b* of the metal mold and hold it up. The mold plate B is clamped in vertical position and held against one side of the wall by two or more cantalivers C fulcrumed to the lower edge of the plate and having each a bearing foot *c*¹ at the lower end that bears against the previously laid layer of wall, and a cam-headed or cranked lever *c*² at the upper end, that locks the mold side and cantaliver together against the wall. This one-side wall mold is supported in the anchor loops *r* and after the concrete is filled in and tamped between it and the permanent slabs on the other side, the detachable one-side mold is loosened by turning its levers *c*³ and its pins *b* are lifted out of the supporting eyes *r* of the wire anchors *t* and the one-side mold is adjusted horizontally along the wall a distance nearly equal to its length and is there reclamped and the filling continued to further extend the horizontal layer of concrete.

In order to give greater strength to the wall to prevent settlement and cracking, I embed a metal reinforcement between each layer of concrete. This reinforcement is shown at E E and consists of two parallel wire cable strands or rods with cross wire connections E¹. This is made of a width to be fully embedded in the concrete and after a layer of concrete has been laid and before the braces for the next course of slabs have been set I lay this reinforcement

longitudinally along the top of each layer and then pack the concrete for the next layer on top of the same.

Mode of operating.—In my method of building the composite or faced concrete wall, the basic layer of slabs with a removable mold side forms a mold which is first filled with concrete all around the building and in this concrete are embedded the wire anchors *t* a short distance below the top of the layer and also the oil-soaked wooden blocks *a* which are flush with the upper surface. These blocks are spaced to correspond with the position of the vertical joints of the slabs. The reinforcing E E is then laid on. A second horizontal course of slabs is next erected on one side above the first course and are held in position by the braces D D¹ which are fastened down upon the reinforcing and are nailed to the embedded anchorage blocks. The one-side wall mold is then applied to the other side and from time to time is shifted and worked horizontally along until this course is finished around the entire building. The next course of anchors *t* and oiled blocks *a* are incorporated in this course and by the time the workmen reach this point for the following round these blocks will have become sufficiently rigid in their matrix of cement to stand the nailing and erection of the following course of braces.

It has been common to build a filled and faced wall with double facings in which the facings were reciprocally connected across one to the other. This allows both together to swing in or out and the falling of concrete on the horizontal cross pieces jars the slabs or blocks and has a tendency to draw them into a distorted position out of plumb. In my invention, it will be seen, that the slabs are held by inclined braces whose feet have an anchorage in the set and solid subjacent layer of concrete by anchorage blocks embedded in the body of the wall, which gives a rigid, positive and independent support for the slabs to hold them in place and allows the one side wall mold to be worked on the inner side. The inclination of the braces and their sharp edges in vertical direction also prevents falling concrete from having any disturbing effect upon them and thus preserving the plumb of the slabs after once being set. Each slab, it will be seen, is also anchored on all four of its edges, at two points in the middle in its horizontal edges, and two points at each end.

In setting up the facing slabs or bricks, I first apply to the inner side of the same, next to the concrete, a surface coating of adhesive waterproof material, as shown in Fig. 3. This prevents the moisture from the concrete from penetrating the slabs or bricks and producing efflorescence stains on

the outside and also prevents moisture from the weather from passing through to the inside.

With reference to the incorporation of the longitudinal reinforcing, I would state, that it is the building of the wall in layers of uniform thickness that renders possible the incorporation of longitudinal reinforcing. This reinforcing is especially valuable for preventing the wall from sagging and cracking if there should be a weak spot in the foundations, as sometimes happens on made ground.

In order that the value of this construction of wall may be still better understood, I would call attention to the fact that the supporting body of the wall is composed exclusively of cement concrete in a series of superposed layers, which layers are quite rapidly laid one upon the other, progressively upward. When such built up wall has attained a certain height, its increasing and cumulative weight is liable to cause the lower layers, which are not fully set, to bulge out or mash down under the superincumbent weight, so that ordinarily a wall laid in layers would have to wait at regular intervals for the lower layers to set and harden before loading them with other superposed layers. This involves a great loss of time in building which my wall construction and method of laying is designed to avoid. That is to say, when the layers of relatively soft concrete are alternated with layers of longitudinal metal reinforcing laid between the layers and embedded therein, such metal reinforcing with its ladder-like cross connections, acts as a tension member which holds the entire mass stable and *in situ* without mashing down, bulging out, or getting out of plumb, so that construction may rapidly progress without long intervals of cessation from work for the concrete to set, and thus much valuable time be saved, while at the same time the wall, when set and unified in a monolithic structure, becomes a very strongly braced and stable wall.

As a modification of my invention, I may make a double faced wall as seen in Fig. 4 where A^1 A^2 are similar slabs anchored by the same method of inclined bracing to anchorage blocks embedded in the top surface of a subjacent layer of concrete. In this case the use of the shiftable one-side wall mold is dispensed with.

Instead of using upright thin slabs for the facing, I may, as a further modification, use a facing of bricks, as seen at A^3 in Fig. 5, it being understood that when I use the term slab as facing material I mean also to include laminated slabs like bricks. In such case I build longitudinally in the horizontal joints between the brick courses at suitable intervals a metal tie-bar F , see Figs. 5 and 6,

and form the inclined braces D^2 with hooked ends that embrace the tie bar in the laminated wall. A horizontal brace D^3 is used on the top of each layer of concrete and the anchorage ends of these braces may be secured either by the wedge and nail heretofore described, or by fins turned on the ends of the braces and hammered into the wood anchorage blocks. In this case the one-side wall mold B may be used.

In my method of wall construction, the concrete is brought to the wall as it rises by an overhead conveyer, such as shown and described in Patent No. 917,331, April 6, 1909, and the workman in ramming the concrete stands on a hanging platform or shelf which is supported by pins or hooks in the eyes r of the anchors t and which platform is shifted horizontally along with the one-side wall mold.

The great advantage of my method is to be found in the reduction of expense for forms and scaffolding, the convenience in operating and the substantial and economic construction of the wall. The bracing of the facing slabs obliquely downward into an anchorage in the previously laid and set concrete of the subjacent layer is an important feature of the method, since it gives an individual, solid and invariable anchorage for the slabs. The braces are not liable to be disturbed by the falling concrete from the conveyer buckets and as the braces and their anchorage blocks are entirely embedded in the middle portion of the wall, the inner face of the wall is free and unobstructed for the working of the one-side wall mold along the same.

I claim.

1. The method of building a faced concrete wall, which consists in laying a layer of concrete filling, building a permanent facing above the layer of concrete filling at one side of the same said permanent facing to become a part of the completed wall, independently anchoring said facing by braces extending downwardly into the subjacent layer of filling and then filling with concrete behind said facing and embedding the anchors.

2. The method of building a faced concrete wall, which consists in laying alternately a layer of concrete and a facing of upright slabs, the facing of slabs being built in advance and above each subjacent layer of concrete and being independently braced obliquely down into an embedded anchorage in the middle of said subjacent layer of concrete and then sealing said holding means by a succeeding layer of concrete enveloping the anchorage.

3. The method of building a faced concrete wall, which consists in laying a layer of concrete filling, erecting above this layer at one side a permanent upright facing of

surface slabs to form a mold side and permanent wall facing, bracing these slabs independently down into the middle of the subjacent layer of filling, embedding in the wall on the opposite side protruding mold-supporting anchors and supporting and working thereon a horizontally shiftable mold side.

4. The method of building a faced concrete wall, which consists in laying a layer of concrete filling, erecting above this layer at one side a permanent upright facing of surface slabs to form a mold side and permanent wall facing, bracing these slabs independently down into the middle of the subjacent layer of filling in a direction inclined to the vertical to receive the falling concrete thereon at an acute angle.

5. A faced concrete wall, composed of a succession of layers, each layer consisting of an external series of slabs, a filling of concrete behind it and a series of inclined braces extending from the upper part of each layer of wall slabs downwardly through said filling of concrete and anchored in the body of concrete of the layer below the layer containing said braces.

6. A faced concrete wall, composed of a succession of layers, each layer consisting of an external series of slabs, a filling of concrete behind it and a series of inclined braces extending from the upper part of each layer of wall slabs downwardly through said filling of concrete and anchored in the body of concrete of the layer below the layer containing said braces and a second set of horizontal braces extending from the joint at the bottom of the layer of slabs to the foot of the inclined braces and connected to and having the same anchorage.

7. A faced concrete wall, composed of a succession of layers, each layer consisting of an external series of slabs, a filling of concrete behind it and a series of inclined braces extending from the upper part of each layer of wall slabs downwardly through said filling of concrete and anchored in the body of concrete of the layer below the layer containing said braces and a second set of horizontal braces extending from the joint at the bottom of the layer of slabs to the foot of the inclined braces and connected to and having the same anchorage, said anchorage being a block embedded in the top surface of the subjacent layer of concrete.

8. A faced concrete wall, composed of a succession of layers, each layer consisting of an external series of slabs, a filling of concrete behind it and a series of inclined braces extending from the upper part of each layer of wall slabs downwardly through said filling of concrete and anchored in the body of concrete of the layer below the layer containing said braces and a second set of hori-

zontal braces extending from the joint at the bottom of the layer of slabs to the foot of the inclined braces and connected to and having the same anchorage, said anchorage being a block embedded in the top surface of the subjacent layer of concrete and a wedge interposed between said block and the foot of the inclined braces and a single nail extending through and securing the foot of the brace, the wedge, and its anchorage block.

9. A composite wall, comprising an outer facing of finishing material and an inner filling of concrete, said wall being arranged in layers, each layer having its outer facing provided with braces extending obliquely downward and anchored in the concrete filling of the subjacent layer.

10. A composite wall, comprising an outer facing of finishing material and an inner filling of concrete, said wall being arranged in layers, each layer having its outer facing provided with braces extending obliquely downward and anchored in the concrete filling of the subjacent layer and having also a horizontal bracing anchored in the concrete filling of the subjacent layer.

11. A composite wall, comprising an outer facing of finishing material and an inner filling of concrete, said wall being arranged in layers, each layer, having its outer facing provided with braces extending obliquely downward and anchored in the concrete filling of the subjacent layer and a longitudinal metal reinforcing arranged between the layers.

12. A composite wall, comprising an outer facing of finishing material and an inner filling of concrete, said wall being arranged in layers, each layer having its outer facing provided with braces extending obliquely downward and anchored in the concrete filling of the subjacent layer and having also a horizontal bracing anchored in the concrete filling of the subjacent layer and a longitudinal metal reinforcing arranged between the layers and immediately beneath the horizontal bracing of the outer facing.

13. A facing slab for concrete walls having a single anchor recess in the middle of its upper edge and an anchor recess in each end edge at the extreme lower corner adapted to register with the middle recess of the subjacent slab to permit both of them to be locked by a single anchor in combination with a horizontal anchor having both upturned and downturned ends, the downturned ends entering the middle recess of the lower slab and the upturned ends entering the two adjacent recesses of the two superposed slabs.

14. A facing slab for concrete walls having a single anchor recess in the middle of its upper edge, an anchor recess in each end edge at the extreme lower corner and an

anchor recess in each end edge near the top; in combination with a horizontal anchor having both upturned and downturned ends adapted to enter both the middle recess of a lower slab and the lower end recesses of the two upper slabs and an inclined brace anchor having its cross section in a vertical plane and adapted to enter the vertical joint between two slabs of the same layer and

having a double dowel pin adapted to enter the end recesses of two adjacent slabs near the upper ends of the same.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN H. MAGDIEL.

Witnesses:

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