J. ANDERSON.

MOLD FILLING MACHINE.

APPLICATION FILED SEPT. 25, 1909.

949,745. Patented Feb. 15, 1910.

2 SHEETS—SHEET 1.

Fig. 1

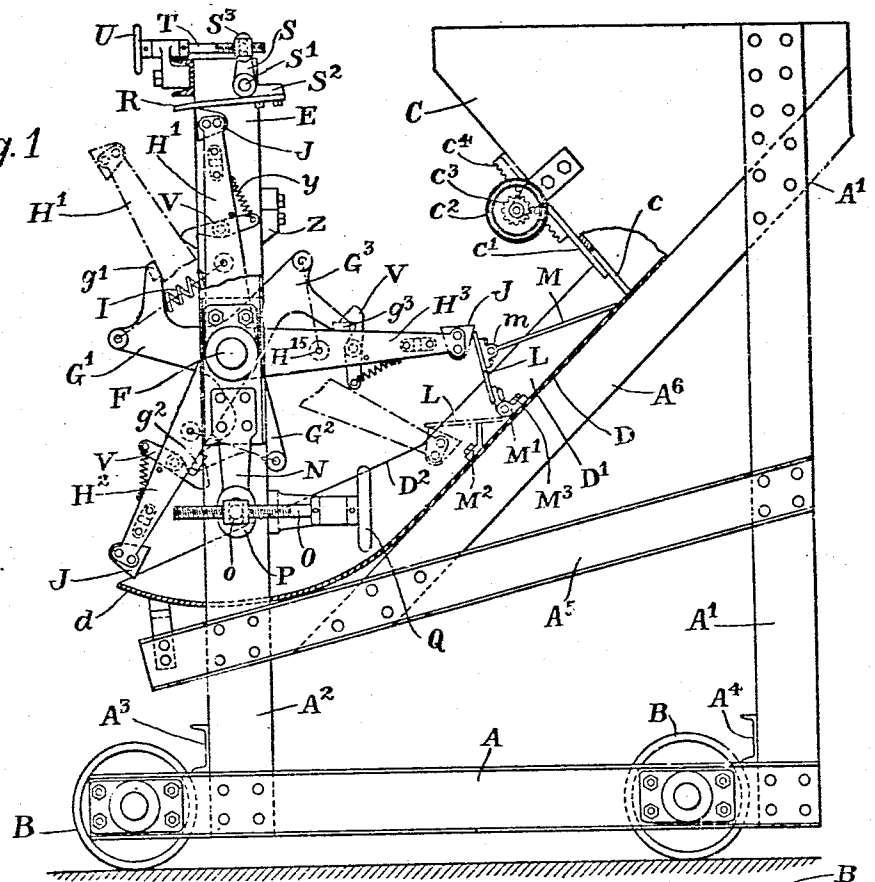
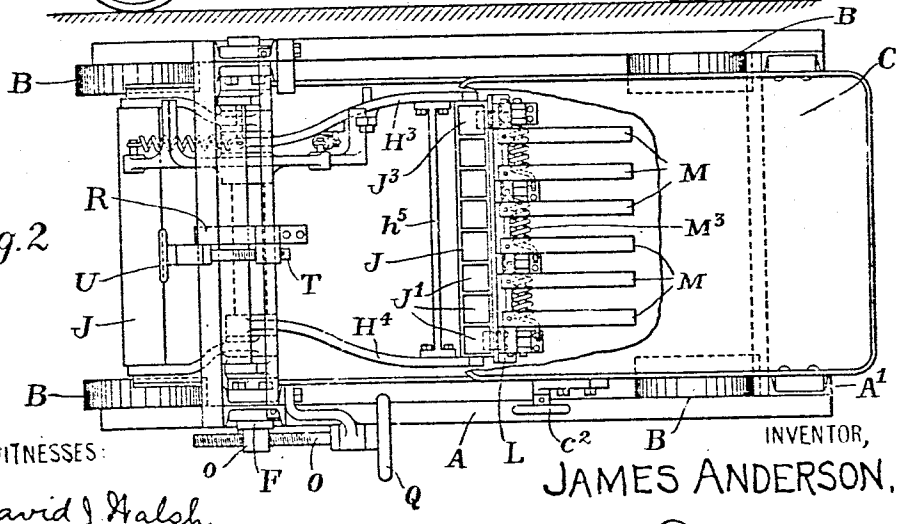


Fig. 2



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2 SHEETS—SHEET 2.

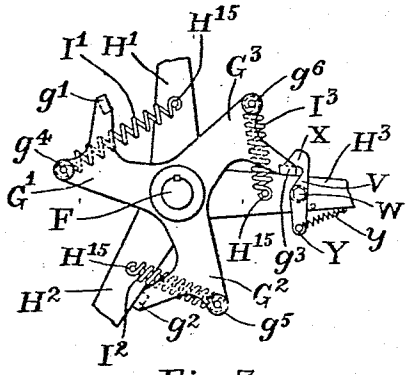

Fig. 3

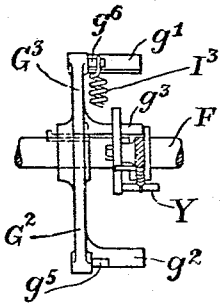

Fig. 4

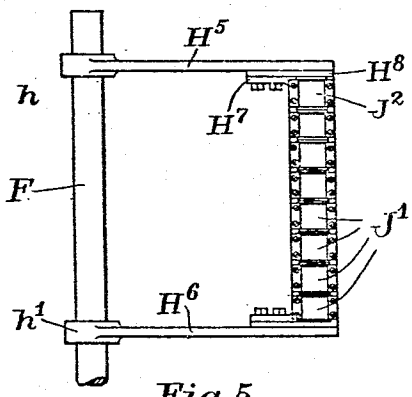

Fig. 5

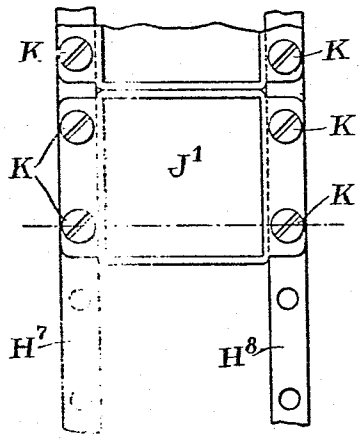

Fig. 6

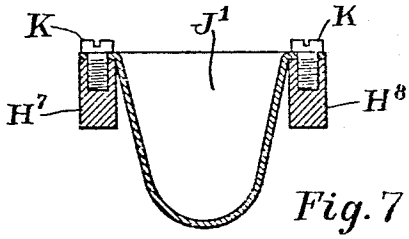

Fig. 7

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MOLD-FILLING MACHINE.

949,745. Specification of Letters Patent. Patented Feb. 15, 1910.

Application filed September 25, 1909. Serial No. 519,555.

To all whom it may concern:

Be it known that I, JAMES ANDERSON, a citizen of the United States of America, and a resident of Cold Spring, county of Putnam, State of New York, United States of America, have invented a new and useful Mold-Filling Machine; and I do hereby declare the following to be a full, clear, and exact description of the same.

The present invention relates to machines for delivering sand into flasks for the making of sand molds, to be used thereafter in the casting of metal articles, such as iron columns, column-bases, etc.

In the making of molds, it has always been desired that the sand shall be evenly "rammed", or packed, in the flask. To assure this result, it has been usual for the molder to use a hand-ram or, in later years, a pneumatic ram. Both methods are slow, in order to assure uniform packing, as far as possible, and are, consequently, expensive. For the production of certain molds—such as for the casting of gear wheels—the molder has sometimes thrown, or flung, the sand, more or less violently, into the flask, so as to attain, by the throwing force, the desired packing of the sand.

In prior machines, known as "gravity molding machines", an endless conveyer has been employed, and buckets (attached at intervals to the conveyer) have been, in succession, filled with sand, drawn to a considerable height, above a flask, and (by mere inversion of the buckets) the sand has been dropped into the flask. My machine differs therefrom in the provision of means whereby sand is thrown, or flung, into the flask.

Referring to the accompanying drawings, Figure 1 is a side view of one form of my machine, a side plate being removed to permit sight of certain parts of the apparatus; Fig. 2 is a top view of that machine; Fig. 3 is a detail of certain parts shown in Fig. 1: Fig. 4 is an edge view of the parts of Fig. 3: Fig. 5 is a top detail view, illustrating the mounting of the carrier-frames upon a shaft, and also illustrating a sand-holder of variable capacity; Fig. 6 is an enlarged fragment of Fig. 5, and Fig. 7 is a sectional view, at the dotted line of Fig. 6, of a bucket element of the sand-holder.

The machine shown in the drawings comprises a frame, a driven shaft, a plurality of carrier-frames rotatable with and yieldingly connected with said shaft, sand-holders carried by said frames, means for assuring a supply of sand to said holders, and means for giving each carrier, separately, a throwing movement so as to cause the sand to be flung from the sand-holders, with some force—and in excess of that due to gravity alone—into a flask.

Referring especially to Figs. 1 and 2, the frame of the machine is shown as made up of beams or channel irons, A, A^1, A^2, A^3, A^4, A^5, A^6. Said frame may be mounted upon wheels, B, so as to be easily moved along tracks, or otherwise made portable, in order to be moved from place to place in a shop or from one shop to another.

C indicates a hopper, or lower part of a hopper, for storage of sand. It may have any usual discharge opening, *c*, and the amount of discharge of sand may be controlled by the gate c^1, which is moved as desired through the intermeshing rack c^4 and gear c^3, the latter being connected with a shaft carrying a hand-wheel at one end thereof. The hopper discharges sand into a chute having a bottom D and side flanges, or walls, D^1, the lower part D^2 of which is deepest, so as to have an enlarged chamber through which the sand-holders are first drawn, as hereinafter described. The forward end of the chute is curved upwardly, at *d*, so as to retain sand in the chute.

A regulating frame, E, is provided at the front of the machine—that is to say at the left hand side of Fig. 1—and said frame is mounted to rock upon a shaft, F. That shaft, in the machine shown, is the driven shaft of the machine, and is mounted in the upper ends of the beams A^2; it controls the filling of each sandholder as well as the throwing of sand therefrom. The means for rotating said shaft form no part of this invention, and any suitable motor or connections may be used. Figs. 1 and 3 show a three-armed casting G keyed to said driven shaft, and rotatable therewith. The arms, G^1, G^2, and G^3, are alike as to construction, and each has an offset stop, g^1, g^2, g^3, and carries a pin, g^4, g^5, g^6, at one side thereof. Each arm of the casting has three functions, it draws a carrier after it, it exerts a throwing or flinging strain on that carrier, and it arrests the throw of the carrier, so as to expel the sand, more or less violently, from the corresponding sand-holder.

The machine is provided with sand-holders, corresponding in number with and trail-

ing behind the arms of the carrier. In succession, these holders are filled with sand, and at a common point of discharge, the sand is thrown from each holder into or toward a flask. With that form of my machine shown in the drawings, the sand-holders are carried at the outer, or free, ends of carriers, or frames, mounted to have both rotation with the shaft F and to have slight rocking movements thereon. Said carriers are designated, in the drawings, by H^1, H^2, and H^3, and each may be in the form of a frame having two side arms, H^3 and H^4, each arm being adapted to rock by means of collars (h and h^1) surrounding the shaft, as shown in Fig. 5. The outer ends of each pair of arms may be connected by a brace, as h^5 in Fig. 2, or frame bars, H^7 and H^8 as in Fig. 5 may be useful for that purpose. At one side, each carrier arm may have a pin (h^{15}), and a spring will be connected at one of its ends with one of said pins and with one of the pins, g^4, g^5, or g^6, aforesaid. Inasmuch as the carrier-frames are mounted so as to rock on the shaft F, the said springs, I^1, I^2, or I^3 each tend to draw the corresponding arm H^1, H^2, H^3 to the companion arm, G^1, G^2, G^3, of the casting G, so that the normal relation of the parts is that shown at the lowermost and at the right hand arms of Fig. 3.

While, as before stated, the sand-holders may be of any suitable kind, yet I prefer to make use of long and comparatively narrow buckets, J, carried at the outer ends of the carrier frames. The buckets employed may each be divided into compartments, J^1, as in Fig. 2, or that division may be attained by having a succession of bucket elements, each separately removable for renewals or to permit the sand-holder, according as it is made up of more or less of the elements, to be variable as to capacity, varying the width of the body of sand thrown from it—a feature of importance, where it is desired that the machine shall be used to pack any of different widths of molds without using too much or too little sand.

Where a sand-holder is to have a succession of bucket-elements, I may take advantage of the structure shown in Figs. 5, 6 and 7, in which each bucket-element is separately connected with and removable from frame-bars H^7 and H^8, these latter being the webs of the channel bars which constitute the outer or brace members of carrier-frames. Each bucket element may be secured to the frame-bars by means of screws K which pass through flanges of the bucket-elements. Examination of Fig. 5, for instance, will show that if one element—that designated J^2, for instance—is removed, the sand-holder will deliver a shorter line of sand—for a shorter flask—than if all elements are retained and kept in use. The like result may be attained by blocking off a part of a sand-holder—for instance, by filling a plate across the compartment J^2 Fig. 1 of a holder.

Preferably, the machine will have a packing-plate L, pivoted at M^1, and movable upwardly against a spring M^3, and restricted as to downward movement by a stop M^2. A number of fingers, or slides, M, are pivoted at m to the packing-plate L.

It has been before stated that the machine has a regulating frame, E. Said frame is composed, principally, of channel beams, e^1, e^2 and e^3. It is pivoted on and adjustable around the shaft F, and for this purpose, the lower arm of the frame carries a plate, N, having its lower end slotted at P. A piece, o, having one end fitting said slot, is also provided with a head having a threaded opening through it, whereby it engages a screw, O, which is rotatable by means of a handle Q. Rotation, in one direction or the other, advances or retracts the frame E. At its upper end, said frame, E, carries a retarding device, intended to temporarily, and successively, hold each carrier and its sand-holder against movement without interrupting continuance of rotation of the shaft F and of the casting G keyed—Fig. 4—thereto. As a consequence of these retardations, each spring, I^1, I^2, I^3, is put under a tension strain, and, when the corresponding sand-holder has passed the retarding device, the strained spring pulls the carrier, quite violently, until stopped by an offset stop, g^1, g^2, g^3; this sudden stoppage of the carrier, causes the quick and violent throw or fling of the sand from the holder. The retarding device referred to comprises a rod S^1 mounted, for rocking, in the opposite upright channels e^1, e^2, as shown in Fig. 2, and a bell-crank lever, S, fixed to said rod and having a rearwardly-extending arm, S^2, to which arm is secured the rear end of a plate, R, preferably a stiff, flat spring or strip of metal, having its forward end free. The stiffness, or strength, of strip R is sufficient to temporarily resist the pull of any one of the springs I^1, I^2, I^3. As shown in Fig. 1, the carrier H^1, or any other, brings the extreme outer edge of a sand-holder, J, against the underside of strip R, and the resistance of the latter is sufficient to temporarily retard movement of the holder even though the casting G continues to move. This retardation causes a stretching of spring, I^1, or any other, until the strain of the spring is sufficient to overcome the stiffness, or springiness, of strip R, whereupon the sand-holder slips along the under-side of the strip, the carrier-frame arm being drawn along by means of the still-strained spring, until the holder parts from the strip. Immediately the holder is released, spring I^1 violently pulls the arm

to and against an offset stop. This interruption of the high throwing speed thus imparted to the arm, causes sand to be flung from the holder and, quite violently, toward a flask. The positioning of the strip, R,—to decide the moment of interruption of the sand-holder, as well as the duration thereof—is assured by means of a screw-shaft T, revoluble in a support which is bolted, as shown in Fig. 1, to the upper bar, e^3 of the swinging frame E. The shaft T has a controlling-handle at one end, while a screw thread at its rear end fits a threaded block, S^3, for engagement with a slot in the upper arm of lever, S. Rotation of shaft T, causes forward or rearward movements of block S^3, and the swinging of the lever S, to lower or to raise the front, or intercepting end, of the strip R. Thus, the retarding device, while bodily carried by the movable frame E, is adjustable independently of that frame.

In addition to the springs, I^1, I^2, I^3, which draw and hold the carrier-frame arms against the offset stops, g^1, g^2, g^3, I show the employment of latches which automatically lock each of the arms to the corresponding offset stops and also means which effect unlocking of said parts when a sand-holder is to be retarded and a spring, I^1, I^2, I^3, is to be strained. The particular advantage of utilizing such latches is to prevent the separation of the carrier-frame arms from their stops while the sand-holders pass through the mass of sand in the chamber D^2 and against and past the packing-plate L. The weight of such mass of sand, and the resistance of springs M^3, tend to cause separation of the arms from the stops and unnecessary strains of the springs I^1, I^2, I^3.

In the drawings, I show each carrier-frame arm provided with a latch, V, pivoted at w, and having, at its rear end, a pin, Y, which is elastically connected, by a spring y, with the corresponding carrier-frame arm. The pin Y, as shown in Figs. 2 and 4, extends, for a considerable distance beyond the outer side of the corresponding carrier-frame arm, H^1. The forward end of each latch is provided with a hook X, for engaging an offset stop, as shown in Fig. 3. In order to operate the latches, I provide a cam Z, and said cam, as shown in Fig. 2, to the channel-beam e^3 of the regulating frame E. Said cam, as shown in Fig. 1, has a beveled underside. As the shaft F rotates, and carries, with it, casting G and the carrier-frame arms, each pin Y strikes against the cam Z, and is pushed down to unlock the forward, or hooked, end, X, of its latch from the corresponding offset stop. This occurs at or about the moment the outer edge of the sand-holder touches the retarding plate R, and as said holder slides along the underside of said plate, the pin Y will be drawn entirely past cam Z, as shown in Fig. 1.

In operation, the illustrated machine acts as follows; The hopper gate c^1 is moved and the discharge port c is opened; the sand falls down the chute and into the compartment at D^2; the shaft F is rotated, and the casting G and the associated carriers are rotated with it, in the direction indicated by the arrows in Fig. 1. This draws the buckets, or sand-holders, through the sand in the chute, and the buckets are heaped full and drawn against the elastically-yielding plate L; said packing-plate is then in the position shown by dotted lines Fig. 1, and compresses the sand in each holder as the latter successively pass underneath the plate; after this compression, a sand-holder is drawn upwardly, moving the packing-plate, L, to the position shown by full lines, and just before it reaches the retarding-device, the corresponding pin Y is forced against the cam Z, and the hooked end of the latch V disengages the offset stop; before the latch is returned by spring y, the sand-holder has been brought against the retarding device, and the latter holds the carrier-frame back, even though the casting G still continues to rotate as it must do, being keyed to the shaft. The retardation of the carrier-frame, causes the corresponding spring I^1, I^2 or I^3 to be put under strain. This yielding means is further strained as the rotation of the driven shaft, F, continues, until the sand-holder has been drawn past the retarding device, whereupon I^1 becomes effective and draws the carrier-frame, with more or less violence dependent upon the strength of the spring and the position of the retarding device, against the offset stop g^1, as shown by dotted lines in Fig. 1. The stop, g^1, suddenly arrests the carrier frame, and this sudden arrest causes the contents of the bucket to be flung, or thrown, therefrom and toward the flask. Simultaneously, the latch v engages with the stop g^1, locking the carrier-frame to the casting-arm. These parts remain locked together during a greater part of a revolution around the axis of the shaft F. By this means, springs, I^1, I^2, I^3, are relieved from strain while the buckets are being drawn through the mass of heavy sand in the lower part of the chute D. Any tendency of sand to pack at or below the discharge port c will be overcome by the sliding movements of fingers M.

It will be seen that my machine picks up uniform amounts of sand, packs these uniformly, and throws the same uniformly. As a consequence, the sand is rammed uniformly into a flask, and is solidly deposited therein, due to the throwing or flinging exerted by the machine.

The supply of sand is adjustable, the re-

tardation and force of throw of the carriers are both adjustable, and the direction of the throw is, by varying the position of the frame E, adjustable.

What I claim is:

1. In a mold-filling machine, a movable sand-holder, means for assuring a supply of sand thereto, a device for temporarily retarding the movement of said holder, and means for moving said holder out of its engagement by said device and toward a point for discharge of sand from said holder.

2. In a mold-filling machine, a sand-holder, means for assuring a supply of sand thereto, yielding means for moving said holder, and a device for temporarily retarding the movement of the holder and putting the yielding means under strain.

3. In a mold-filling machine, a carrier, a sand-holder carried thereby, means for assuring a supply to said holder, yielding means for moving said carrier, and a device for temporarily retarding the movement of the carrier and putting the yielding means under strain.

4. In a mold-filling machine, a carrier, a sand-holder carried thereby, means for packing sand in said holder, means, for moving said carrier, a device for retarding the movement of the carrier, and a spring strained by the retarding device and independently operating the carrier.

5. In a mold-filling machine, an operating-shaft, a sand-holder yieldingly connected with said shaft, and a device for retarding the holder relatively to the shaft and temporarily putting the yielding means under strain, and for releasing said holder while the releasing means is still strained.

6. In a mold-filling machine, a rotatable shaft, a plurality of radially disposed carriers, each separately and pivotally connected with said shaft, springs also yieldingly connecting each carrier with the shaft, sand-holders mounted upon said carriers, means for feeding sand to said holders, a sand-packing device in the path of movement of the holders, and means for successively retarding the carriers and putting the corresponding spring under strain, and for releasing said carrier while strained.

7. In a mold-filling machine, a sand-holder, means for assuring a supply of sand to said holder, means for giving a quick and limited throw to the holder, to fling the sand therefrom, and means for adjusting the angle of the throw.

8. In a mold-filling machine, a plurality of sand-holders, means for assuring a supply of sand to the same, means, including yielding connections, one for each holder, for bringing the latter, in succession, to a common point of discharge, and means for temporarily retarding the movement of each holder separately and putting the corresponding yielding means under strain.

9. In a mold-filling machine, a movable shaft, a casting connected with said shaft, a carrier pivoted on the shaft, a spring connecting said carrier and said casting, a latch for securing said parts together, and means for operating the latch.

10. In a mold-filling machine, a rotatable shaft, a plurality of carrier-frames, each separately and pivotally mounted on said shaft, springs yieldingly connecting said carrier-frames to the shaft, so as to be rotatable with the latter, buckets carried by said carrier-frames, a hopper for supplying sand for the buckets as moved, a yielding sand-packing means, against which the buckets are moved, for compressing sand in the latter, and means for retarding each carrier-frame in succession, to put the spring thereof under strain, and then to release said frame, to give a quick and limited throw thereto.

11. In a mold-filling machine, a movable carrier, a movable stop therefor, a spring for throwing said carrier toward said stop, and a latch for temporarily holding the carrier against the stop and rendering the spring ineffective.

12. In a mold-filling machine, a rotatable shaft, a device rotatable therewith and provided with a plurality of stops, a plurality of carriers carried by and mounted to rock upon said shaft, springs connecting said carriers with said first-named device, and tending to draw said carriers against said stops, latches for holding the carriers in the last-named position, means for operating the latches separately and in succession for releasing each carrier from its stop, means for retarding the operation of a released carrier, and sand-holders mounted upon the carriers.

13. In a mold-filling machine, a movable carrier, a sand-holder carried thereby, a stop for the carrier, a spring for throwing said carrier toward the stop, a device for temporarily retarding the carrier, and means for adjusting said retarding device.

14. In a mold-filling machine, a movable carrier and a sand-holder, of variable capacity, consisting of a bucket-frame at one end of the carrier and a plurality of buckets constituting said sand-holder and each removably secured to said bucket-frame.

15. In a mold-filling machine, a movable carrier and a succession of buckets each removably secured to said carrier and constituting a sand-holder of variable capacity.

16. In a mold-filling machine, a movable carrier, a sand-holder carried thereby and comprising a succession of buckets arranged end to end, the end member of said succession being removably secured in place.

17. In a mold-filling machine, a carrier,

a sand-holder carried thereby and having means for varying its capacity, and means for operating said carrier.

18. In a mold-filling machine, a carrier, a long and comparatively narrow sand-holder carried thereby and variable as to its length, and means for operating the carrier.

19. In a mold-filling machine, means for holding a mass of sand, a spring-mounted carrier, a sand-holder carrier thereby, means for causing the carrier to draw the sand-holder though the mass of sand, and means for locking the spring from strain while the carrier is being drawn through said mass.

20. In a mold-filling machine, a movable sand-holder, means for assuring a supply of sand thereto, an elastic device for temporarily retarding the movement of said holder, and means for moving said holder out of its engagement by said device and toward a point of discharge of sand from said holder.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES ANDERSON.

Witnesses:
WM. H. TRUESDELL,
G. R. THOMAS.