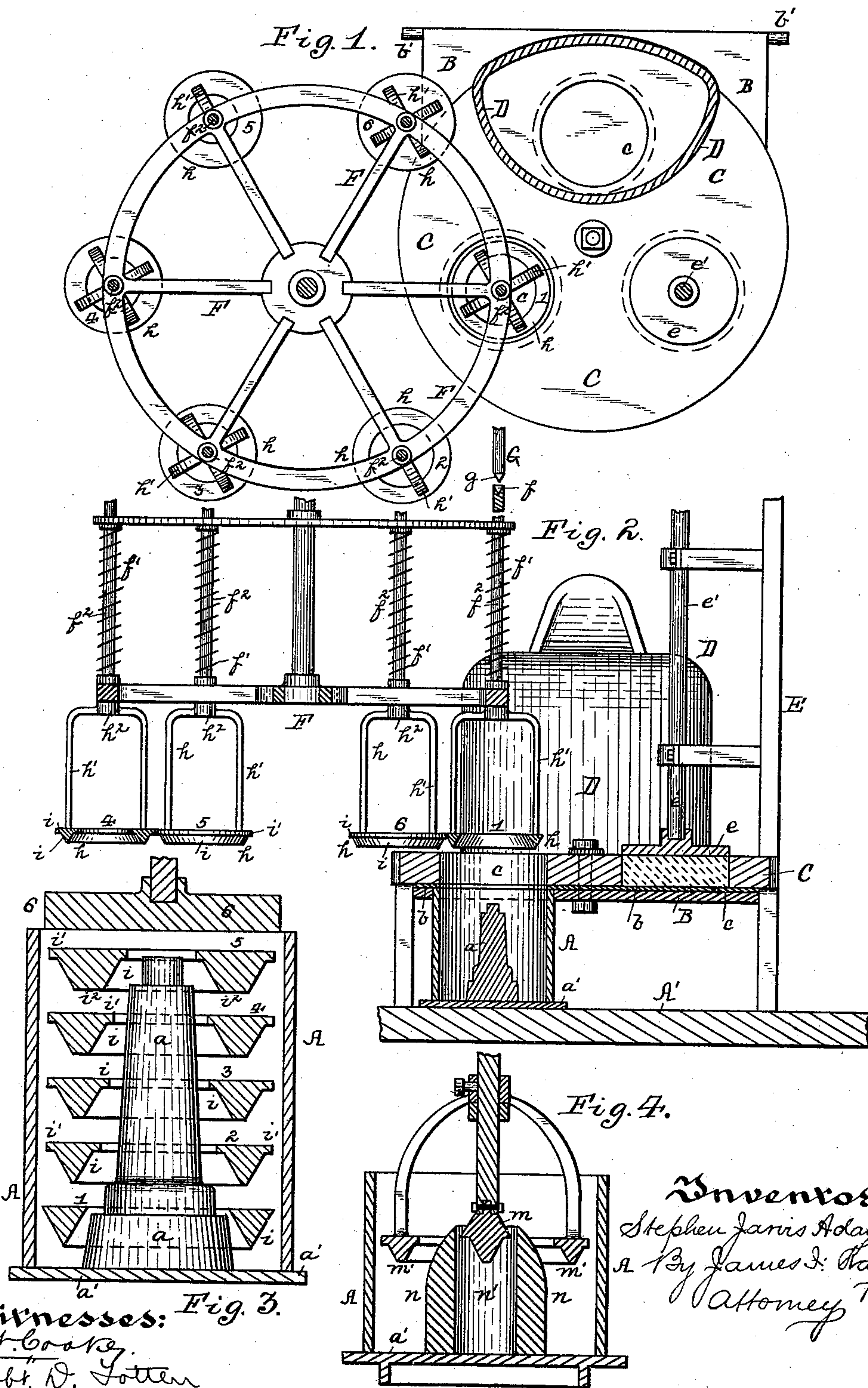


(No Model.)

S. J. ADAMS.  
APPARATUS FOR MAKING SAND MOLDS.

No. 574,650.

Patented Jan. 5, 1897.





# UNITED STATES PATENT OFFICE.

STEPHEN JARVIS ADAMS, OF PITTSBURG, PENNSYLVANIA.

## APPARATUS FOR MAKING SAND MOLDS.

SPECIFICATION forming part of Letters Patent No. 574,650, dated January 5, 1897.

Application filed August 4, 1890. Renewed November 4, 1891. Serial No. 410,889. (No model.)

*To all whom it may concern:*

Be it known that I, STEPHEN JARVIS ADAMS, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Making Sand Molds; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to apparatus for forming molds, and has special reference to apparatus to be employed in connection with the forming of molds in accordance with the invention described in an application made by me of even date herewith, Serial No. 360,891, for method of and apparatus for forming cores and molds, in which the sand is alternately fed to the flask or to the core-box in regulated quantities and the sand is compacted by downward pressure at a point or points about central to the body of sand within or surrounding the core-box, flask, or pattern. In said application the apparatus particularly illustrated is such as is employed in forming cores; and my present invention relates to apparatus which is more particularly applicable to the forming of molds.

My invention is specially adapted for forming deep molds, such as for wagon-boxes, pipe-balls, and like articles, and in packing said molds by pressing apparatus it is found that as the pressure will not act evenly through the entire body of sand if of considerable depth, but that part of the mold will be spongy, while part will be more rigidly compacted than desirable, and in casting the weight of the metal against the spongy portions will press out the sand and cause swells or enlargements in the casting and the metal will not lie against the rigidly-compacted part of the mold, so making the casting uneven. These castings, and especially the pipe-balls, are required to be extremely accurate, even to one-hundredth of an inch, and therefore the reason why pressing has not been successfully employed in making such molds is apparent.

In the apparatus embodying the present invention I employ feeding mechanism for feeding the sand to the flask and packers adapted to enter the flask, which correspond substantially to the spaces between the pattern or pat-

terns and the flask, so as to compact the sand therein and force it against the pattern or patterns and the flask-walls, the invention comprising certain improvements which will be more fully hereinafter described and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a top or plan view of the apparatus. Fig. 2 is a side view, partly in section. Fig. 3 is a section of mold, illustrating the different strokes of the packers and the positions of the different packers in forming the mold; and Fig. 4 is a section of a mold, illustrating the packing of sand within a mold in which the core is formed integral with the body of the mold.

Like letters and figures of reference indicate like parts in each.

The pattern-plate  $a'$ , carrying the patterns  $a$ , and the flask  $A$ , in which the mold is to be formed, are supported in the usual way upon the bed  $A'$  of the machine, the flask  $A$  extending up to a table  $B$ , on which the measuring apparatus is supported, and the patterns  $a$  extending up within the flask in the usual way, the table  $B$  being preferably hinged at or near its rear end, as at  $b'$ , so that it will nearly balance, and that its forward end may be lifted in order to introduce the flask in place and withdraw it from the machine. On said table is preferably employed a thin steel plate  $b$ , which forms the base on which the measuring-box moves, and the end of which preferably extends over or around the flask, which fits into a seat in the table  $B$ . On this plate  $b$  is the measuring-box  $C$ , which in the form shown is mounted on a vertical axis on the table  $B$  and has a series of measuring-pockets  $c$  therein, the measuring-box shown having three of such pockets, the one pocket being under the sand-reservoir  $D$  to receive sand therefrom when the other two pockets are exposed, as hereinafter described.

The sand-reservoir  $D$  is suitably supported upon the table  $B$ , and the sand is fed in at the upper end thereof, so that a constant supply is maintained therein for feeding to the measuring-pockets. These parts are substantially such as described in the former application.



As, however, the measuring-pockets *c* are generally of larger diameter than those employed in the making of cores and the sand would naturally be spongy when confined within said  
 5 pockets and therefore liable to drop into the flask as soon as the measuring-pocket is drawn over the same, in which case the sand would not be evenly spread within the flask and around the pattern, I arrange above one of the  
 10 pockets, say the pocket which has just received the sand from the reservoir and which is drawn out from the reservoir, but has not yet been drawn over the flask, the presser *e*, (more particularly shown in Fig. 2,) which  
 15 presser corresponds substantially in shape to and is adapted to enter the pocket *c* and press upon the sand with sufficient pressure to compact it enough to prevent its dropping out of the pocket, the sand being so compacted that  
 20 it will remain in the pocket until expelled therefrom by any suitable device. This reciprocating packer *e* is mounted in a frame *E*, its shaft *e'* extending through bearings therein, and it can be operated from the main  
 25 packing apparatus or by a separate reciprocating mechanism, as desired.

Arranged above the flask *A* is the packer for compacting the sand therein, this packer being either mounted in stationary bearings,  
 30 so that but one packer is employed for the operation, or the packer being mounted on a circular frame carried on a vertical axis above the operating-table and having any desired number of packers, so that one or the other  
 35 can be drawn over the flask and be forced down into the same, according to the stroke desired. I have illustrated in Figs. 1 and 2 the apparatus in the latter form, the packers  
 40 1 2 3 4 5 6 being mounted on the frame *F*, which is so arranged that the packers can be brought over the flask and over the pocket in the measuring-box extending over such flask. The several packers can be forced down into the flask by any suitable device, that illustrated being a vertically-movable shaft ar-  
 45 ranged centrally above the flask, as at *G*, which is operated by any suitable power, such as through a piston or by a cam or lever, and is adapted to engage with a seat at the upper  
 50 end of the packer and force the same down into the flask. I have illustrated the packer as having a cup-shaped seat *f*, into which the conical seat *g* on the end of the rod *G* enters so as to force down the packer. The packers  
 55 are carried on rods *f*<sup>2</sup>, mounted in bearings in the frame *F* and are retracted or drawn out by the springs *f'*. Suitable stop mechanism may of course be employed to bring the parts into proper line.

60 The packers themselves have substantially the same construction, the lower part *h* thereof being formed corresponding in shape to the space between the pattern and the flask at which they are to operate, but rather smaller  
 65 than such space, and in Figs. 1, 2, and 3 the lower portions of these packers are illustrated

in the form of rings having tapering inner and outer walls, which are adapted to spread out the sand in the same manner as described in the said application, Serial No. 360,891. 70

The ring-packers are employed with flasks having single patterns therein, but it is evident that where the flasks have several patterns the base portion *h* of the packer can be formed corresponding in shape to the space  
 75 between the patterns, so as to compact the sand against the pattern and the walls of the flask, the lower faces of the packer being tapering, as at *i*. This base portion or base-ring of the packer is supported on vertical  
 80 bars *h'*, which extend therefrom to the collar *h*<sup>2</sup>, secured to the shaft *f*<sup>2</sup> above referred to.

I have illustrated in the drawings six different packers, these six being employed to form such a mold as that illustrated in Fig. 3, in  
 85 which I have illustrated the positions of the six packers in forming the mold. The lower packer 1 is of rather greater diameter than the others, as it fits around the largest part at the base of the pattern, and as the pur-  
 90 pose is to arrange the packer about centrally of the space between the flask and pattern it will be seen that by the stroke of this packer the sand is forced down and out against the  
 95 head or lower end of the pattern and against the side walls of the flask, the sand being compacted thereby against what is known as the "head-print" of the pattern. The next packer 2 is intended to pack in the next space,  
 100 such as for the head or enlargement of the wagon-box, and it will be seen that it occupies a position substantially central between this part of the pattern and flask. The other  
 105 patterns 3, 4, and 5 are arranged in the same manner, the patterns having more or less taper according to the point at which they are to work, and some of the patterns having an-  
 110 nular wings or flanges *i'* thereon to force the sand downwardly to some extent, as may be found necessary or desirable, while the upper  
 115 pattern 5 has the base thereof formed blunt, as at *i*<sup>2</sup>, the sides thereof being tapering, as at *i*, and having the wings or flanges *i'* thereon, this packer illustrating all the forms which it is expected to embody in the packer.

The packer 6 is simply a flat packer adapted to extend over the entire body of the flask and to compact and give a finished and level surface to the upper end thereof after the  
 120 other packers have compacted the sand around the pattern and within the flask.

In the use of the apparatus above described the operator, after he has secured the flask and pattern upon the bed *A'*, its upper edge being guided to place on the table *B*, draws  
 125 around the measuring-box *C*, and on the first movement thereof he draws the pocket *c*, which has been under the reservoir *D* under the presser *e* and through the same compacts the sand within the pocket *c* and against  
 130 the pattern-plate *b*, and he then draws that pocket over the flask. He then draws the



packer 1 into line with the flask and into line with the piston-rod G, which, as it descends, forces the sand held within the measuring-pocket down into the flask, the first action of the packer being to strike the sand which has been slightly compacted within the pocket c, and as the sand has been sufficiently compacted in the pocket to draw it entirely over the flask and the packer strikes the sand in the pocket in a circular line near the outer edge of the pocket it is evident that the sand so forced into the flask will be evenly distributed therein. The first measure of sand will drop to the base of the pocket, where it will be forced into place by the packer, which descends onto the same and packs the same against the pattern and the flask-wall, as above described. The packer is then drawn out and the operator draws over the flask another measure of sand, which has been previously compacted in another pocket in the manner above described, and draws the proper packer over the flask and into line with the piston-rod G, when the operation is repeated with this packer, the sand being first forced out of the measuring-pocket and then compacted within the flask. This is continued with all the different packers, the tapering lower faces *i* of the patterns acting to spread the sand against the pattern of the flask, while in the wider spaces these faces spread the sand, and at the same time the blunt edge *i*<sup>2</sup> of the packer and the annular flange *i*<sup>1</sup>, extending out at the upper edges thereof, force the sand down, so that an even packing of the sand is obtained. Upon the last stroke the sand is fed to the flask and the solid packer 6 is drawn down, so as to compact the upper part of the flask, packing the sand over its entire face and thus completing the mold. The flask containing the mold can then be removed from the apparatus and the pattern removed therefrom in any suitable way and the operation repeated.

The special advantage of this way of packing the sand is, as will readily appear, that while an even pressure is applied, yet the sand is sufficiently compacted in the deep parts of the mold, these molds for wagon-boxes, skeins, pipe-balls, and like articles being very difficult to pack with any pressing apparatus.

In Fig. 4 I have illustrated like apparatus for the packing of molds in which the core is formed with the body of the mold, so that upon the withdrawal of the pattern all that is necessary to complete the mold is a flat bed of sand. This figure clearly illustrates my invention not only as applied to the formation of molds, but to the formation of cores, as described in said other application, and the use of skeleton supporting-frames for the packers, the two being operated together and the core-packer *m* operating within the central passage *n*' of the pattern *n*, while the outer packer *m*' operates around the pattern *n* to compact the sand between the pattern

and the flask-walls. It is evident that such apparatus is included within my invention and that any suitable arrangement of the packers bring them in line with the flask or the reservoir and measuring-box for feeding the sand to the flask may be employed.

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

1. In sand-molding apparatus the combination of a flask, a sand-reservoir, a measuring-box adapted to pass under said reservoir and having a pocket therein, a table extending under and supporting the measuring-box and having an opening therein to discharge sand and a packer adapted to compress the sand within the measuring-pocket and before it passes over the flask, substantially as and for the purposes set forth.

2. In sand-molding apparatus, the combination of a flask, a reservoir for sand, a measuring-box having measuring-pockets therein, a table extending under and supporting the measuring-box and having an opening therein to discharge sand, a packer adapted to compress the sand within the measuring-pocket and before it passes over the flask, and a packer in line with the flask adapted to force the sand out of the measuring-pocket and into the flask, substantially as and for the purposes set forth.

3. In sand-molding apparatus, the combination of a flask having a pattern therein, and a frame carrying a series of packers arranged to be successively brought above and forced down into said flask, said packers corresponding substantially in shape to the space between the pattern and flask at the points at which they act to pack the sand, substantially as and for the purposes set forth.

4. In sand-molding apparatus, the combination with the flask having a pattern therein, of a frame carrying a series of packers adapted to be successively brought over and forced into the flask, said packers corresponding substantially to the space between the pattern and the flask at the points at which they pack, and a solid packer corresponding in shape to the interior of the flask, so as to compact the sand at the upper end thereof, substantially as and for the purposes set forth.

5. In sand-molding apparatus, the combination of the flask, the frame F mounted on a vertical axis and carrying a series of packers adapted to be successively brought over the flask, and the vertically-moving rod G in line with the flask, and adapted to press the packers supported on said frame into the flask substantially as and for the purposes set forth.

6. In sand-molding apparatus, the combination of the flask and the pattern extending into the same, of a vertically-movable packer having tapering side walls and a flange or flanges extending out of the upper edge thereof, substantially as and for the purposes set forth.

7. In sand-molding apparatus, the combi-

nation of a flask and frame extending above  
the flask, said frame having different arms ex-  
tending down therefrom and provided with  
different packers corresponding to the spaces  
5 to be packed within the flask, said packers  
and arms being adapted to enter the flask,  
substantially as and for the purposes set forth.

In testimony whereof I, the said STEPHEN  
JARVIS ADAMS, have hereunto set my hand.

STEPHEN JARVIS ADAMS.

Witnesses:

ROBT. D. TOTTEN,  
F. G. KAY.