

(No Model.)

S. J. ADAMS.

METHOD OF AND APPARATUS FOR FORMING CORES.

No. 569,986.

Patented Oct. 27, 1896.

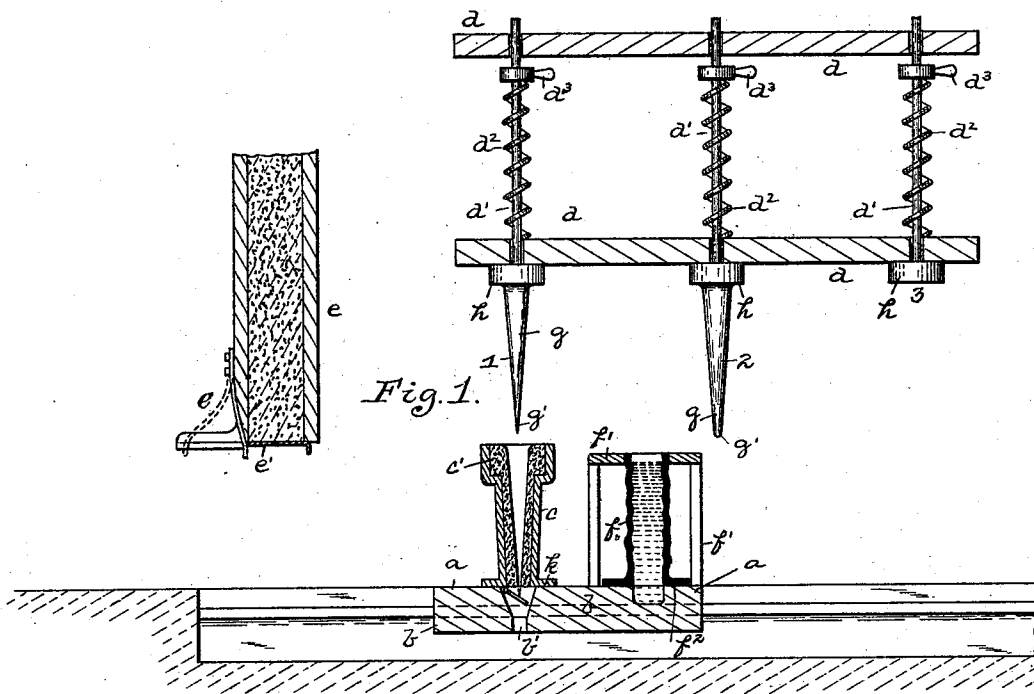


Fig. 1.

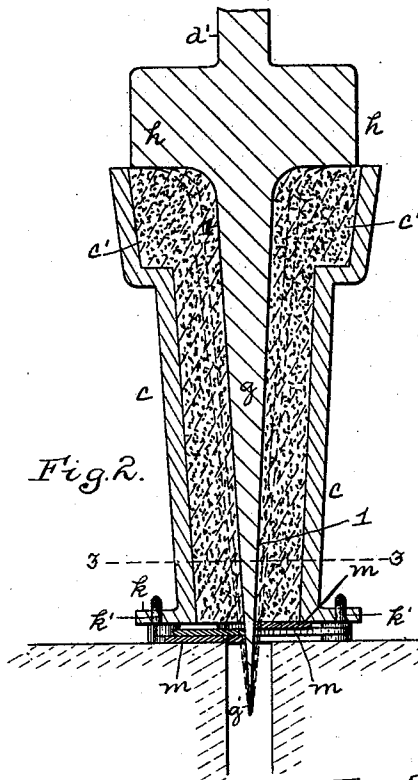


Fig. 2.

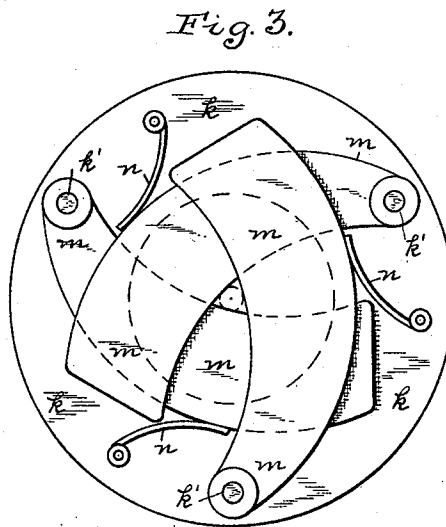


Fig. 3.

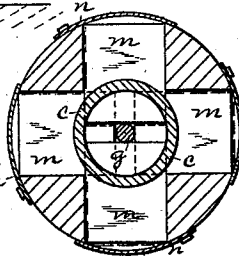


Fig. 4.

Witnesses:  
J. H. Cooney  
F. G. Kay

Inventor

Stephen Jarvis Adams  
By James S. Kay  
R. D. Follett  
Attorneys

# UNITED STATES PATENT OFFICE.

STEPHEN JARVIS ADAMS, OF PITTSBURG, PENNSYLVANIA.

## METHOD OF AND APPARATUS FOR FORMING CORES.

SPECIFICATION forming part of Letters Patent No. 569,986, dated October 27, 1896.

Application filed March 24, 1892. Serial No. 426,245. (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 Methods of and Apparatus for Forming Cores; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to a method and apparatus for forming cores, such as the cores employed in sand molds for the manufacture of wagon-boxes and similar tubular articles, though it may in some cases be used in making tubular and like molds. The cores have heretofore been formed either by ramming or by jarring, the latter process forming the most perfect core; but a means of forming the cores rapidly is desired, especially for the formation of large cores, and the object of my invention is to provide for the formation of these large cores by what might be termed a "pressing" operation.

In forming cores according to my invention I employ a long tapering packer or pattern of greater length than the core, and I fill the core-box with sand and force this long tapering pattern through the same, so as to spread the sand sidewise against the walls of the core-box, refilling the core-box and repeating this operation two or three times if it is found desirable, it being found that the long tapering packer or pattern will force all the sand in a substantially lateral direction and will act to pack the sand firmly within the core-box and form a substantially perfect core, while the operation can be performed very rapidly.

The particular points included within my invention will be hereinafter more particularly set forth and claimed.

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

Figure 1 is a face view, partly in section, showing the different parts of the apparatus in proper position for the rapid formation of cores and illustrating the method of forming the same. Fig. 2 is an enlarged sectional view showing the tapering pressing-pattern within the core-box. Fig. 3 is a view on the line 3 3, Fig. 2, the core-box being left off, showing the movable base of the core-box and operation

when opened by the pressing-tool; and Fig. 4 is a view showing another form of base.

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

In practicing my invention I generally prefer to have the parts arranged as illustrated in Fig. 1. Any suitable arrangement of the molds and pressing apparatus can of course be employed. The table *a* is illustrated as mounted on a sliding carriage *b*, which carries the mold *c*, the table sliding under the frame *d*, in which the pressing tool or tools are mounted on vertical shafts, three such pressing-tools 1 2 3 being illustrated in the drawings, and these pressing-tools being carried on shafts *d'*, mounted in the frame *d*, around which shafts are the springs *d''*, and secured to which shafts are the handles *d'''*, by means of which the pressing-tools can be drawn downwardly to give the desired stroke. The apparatus is arranged in this manner for operation by hand-power, though, if desired, the pressing-tools may be operated by any other suitable power.

At one side of the frame *d* is the sand-chute *e*, which has a sliding base *e'*, the chute terminating at about the height of the core-box, so that as the core-box is drawn under the chute it will press against the sliding base thereof and open the chute, so that the sand may pass therefrom into the core-box. The chute may be closed by any suitable spring applied to the base. Mounted on the carriage *b* is also a tubular bowl or holder *f*, which is filled with pulverized plumbago or similar lubricating material, the purpose being to employ the plumbago for imparting an antifriction or smooth surface to the pressing-pattern, so enabling it to pass through the sand without pressing the same downward, that is, enabling it to slide or slip easily through the body of sand, and so grip the sand sidewise, or laterally, instead of in a downward direction. The preferred construction of this holder *f* is shown in Fig. 1, the same being made of a rubber or other flexible or elastic tube or bag, supported at its upper end in a bracket *f'*, and either secured at its base to the table, as at *f''*, or closed as a bag. Such flexible holder will be moved or spread by the pattern entering the same and forcing aside the plumbago, and will force the plumbago back to its original position when the

pattern is withdrawn, leaving it in a soft mealy condition and preventing its packing solidly in the holder. Any suitable stop mechanism for holding the core-box and its carriage in proper relative position to the pressing pattern or patterns can, of course, be employed.

I prefer to employ a long tapering pressing-pattern, that is, a pattern of greater length than the core-box, as is clearly shown in Fig. 2, as by such pattern I can obtain the necessary pressure at the base of the core-box. I also prefer to form the body *g* of the pressing-pattern with a very long taper, as shown, so that it will pass easily through the sand and impart the packing pressure to the sand in a direction which, while slightly downward, is to a great extent outward or lateral, so packing the sand against the walls of the core-box. The pressing-tool may also have the head *h*, which will enter within the enlarged upper part *c'* of the core-box, which serves for forming the cope print or head of the core, so that when the pressing-pattern is drawn down it will not only spread the sand, as above described, but the head *h* will act to pack the sand within the enlargement *c'* of the core-box, as well as in the large upper end of the core, which might be more or less spongy. It is evident, however, that unless the lower part of the core-box is closed the sand could escape through the base thereof, and there would therefore be practically no compacting of the sand at the base of the core-box, and to confine the sand within the base of the core-box I provide what I term a "movable" base or bottom therefor, a preferred form of this movable base being shown more clearly in Fig. 3.

Pivoted on the annular flanges *k*, formed on the core-box or separate therefrom, but forming a seat for the base thereof, are the plates *m*, which extend inwardly across the lower end of the box, these plates being substantially of similar shape, that is, concave or reëntrant on one edge and convex on the other, and the plates extending over each other, as shown in the drawings, so that they substantially close the base of the core-box, leaving only a small opening therein into which the point end of the pressing-pattern can enter. The plates *m* are pressed inwardly by any suitable springs *n*, and as they lap over each other it is evident that as the pressing-tool enters between them all the plates can be forced outwardly, so permitting the tool to descend, while at the same time they confine the sand at the base of the core-box and provide for the proper packing thereof. As soon as the tool rises the plates are pressed in by their springs, and so act to again close the base of the mold and, when the opening formed by the pattern is filled, prevent the escape of the sand through said base.

If desired, the core-box may be made open at the base and this movable or closing base

be formed on the carriage *b*, the core-box being placed over the same and guided by pins or other means to its seat and after the formation of the core the core-box being lifted from said base. If desired, also, the plates *m* may be formed of different shape from that described, and instead of being pivoted at *k'* they may be mounted in sliding grooves and slide therein when opened out by the pointed end *g'* of the pressing-tool. Such a construction is shown in Fig. 4. The base-plate may also be hinged at the base of the pattern and forced to place by a spring, as shown in Fig. 1.

In forming cores in accordance with my invention, the apparatus being ready to form the core, the core-box *c* is placed upon the carriage *b* over the open end *b'* thereof, the core-box either carrying the movable base or the movable base being secured to the carriage and the core-box resting upon the same, as may be desired. The carriage is then drawn over to the sand-chute and the base *e'* thereof pressed back, so permitting the sand to fill the core-box. The operator then draws the core-box under the pattern 1 and by means of the handle operating the same forces down the pattern, the pattern passing through the core-box and entering the space *b'* in the carriage below the same, and its action being to force the sand out against the walls of the mold and compact the same, the pattern passing through the base of the core of the mold, and so acting to pack the base of the core also.

I generally prefer to employ the two pressing-patterns 1 and 2, the pattern 2 being somewhat larger than the pattern 1, so that after the first packing stroke by the pattern 1 the core-box is carried under the pattern 2, and a like stroke from that pattern acts to further compact the sand within the core-box. The operator then quickly slides the carriage *b* back under the sand-chute and fills up the space formed within the core-box by the pressing pattern of patterns, and again draws the core-box under the pressing-pattern, when he repeats the stroke, this time, in most cases, finishing the lower part of the core, and he may repeat the operation until the core is packed within the core-box. To finish the upper part thereof, he may carry the core-box under the pattern 3, by which a packing stroke can be made in the upper part of the core-box to compact the head of the core. In some cases but a single stroke of the long tapering pattern is required to form the core, this, of course, depending upon the size and taper of the core-box, the size of the pattern, and the solidity with which the core is to be packed. Where but a single stroke is required, the head *h* is generally employed to pack the upper part of the core by downward pressure. In order to make the patterns enter the sand easily, and slip through the same without great frictional action, at intervals during their use I

pass them into the plumbago, soapstone, or other suitable substance contained in the holder *f*, and the plumbago adhering to the surface of the pattern acts to impart a smooth or slippery surface thereto, so that the pattern will be more efficient in forcing the sand outwardly or laterally when it passes into the core-box. Different kinds of cores can be made in this way, and for some purposes the cores can be packed so that there is practically only a shell-core, that is, the core is packed against the walls of the box, so as to form it sufficiently strong to be placed within the mold, and no core-rod or other such support is required, while at the same time the large opening within the core acts to assist in the venting of the mold when the metal is poured therein. In the same manner certain kinds of tubular tapering molds may also be formed.

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

1. The herein-described method of forming cores and molds, consisting in filling the core-box or flask with loose sand, forcing a long continuously-tapering packer downwardly into the sand contained within the core-box so as to spread and pack the sand laterally against the core-box, filling the space formed by such packer with loose sand and repeating the operation, substantially as set forth.

2. The herein-described method of forming cores and molds, consisting in first coating a tapering pattern with plumbago or other anti-friction substance, and then forcing such pattern downwardly into the body of sand contained within a core-box or flask, substantially as and for the purposes set forth.

3. The combination with a core-box or flask, of a long continuously-tapering packer of greater length than the core-box or flask, and mounted in guideways constructed so as to permit the packer to enter the sand and have a longer stroke than the length of the core-box, and thereby spread and pack the sand laterally against the core-box, substantially as set forth.

4. The combination with a core-box or flask, of a packer having a long continuously-tapering body portion and a head enlargement above the same corresponding substantially in diameter to the diameter of the upper end of the core-box or flask, substantially as and for the purposes set forth.

5. The combination with a core-box or flask, having a movable base portion, of a tapering pattern of greater length than the core-box or flask, and constructed to pass through the same and force aside or open said base, substantially as and for the purposes set forth.

6. A core-box or flask having an outwardly-

yielding base extending over the end thereof in combination with a pattern entering the core-box and contacting with such base substantially as set forth.

7. A core-box or flask having a spring-operated movable base portion, in combination with a pattern entering the core-box and contacting with such base substantially as and for the purposes set forth.

8. A core-box or flask having two or more movable plates entering from the sides across the end thereof so as to close the same, in combination with a pattern entering the core-box and contacting with such plates and means for holding the plates normally inward substantially as and for the purposes set forth.

9. A core-box or flask having two or more plates entering from the sides across the end thereof and fitting one over the other, in combination with a pattern entering the core-box and contacting with such plates and means for holding the plates normally inward substantially as and for the purposes set forth.

10. A core-box or flask having two or more plates pivoted at their outer ends and having their free ends entering across the end thereof and extending over each other, in combination with a pattern entering the core-box and contacting with such plates and means for holding the plates normally inward substantially as and for the purposes set forth.

11. A core-box or flask having movable plates entering from the sides thereof across the end thereof and fitting over each other, and springs pressing against said plates to force them across the end of the core-box or flask, and a pattern entering the flask and adapted to contact with such movable plates substantially as and for the purposes set forth.

12. In an apparatus for forming cores or molds, the combination of a core-box or flask, a packer constructed to enter the same, and a holder for plumbago or antifriction material in position for the packer to enter the holder before entering the core-box or flask, substantially as and for the purposes set forth.

13. In an apparatus for forming cores or molds, the combination of a core-box or flask, a packer constructed to enter the same, and a holder for plumbago or antifriction material in position for the packer to enter the holder before entering the core-box or flask, said holder having flexible or elastic side walls, 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:

JAMES I. KAY,  
J. N. COOKE.