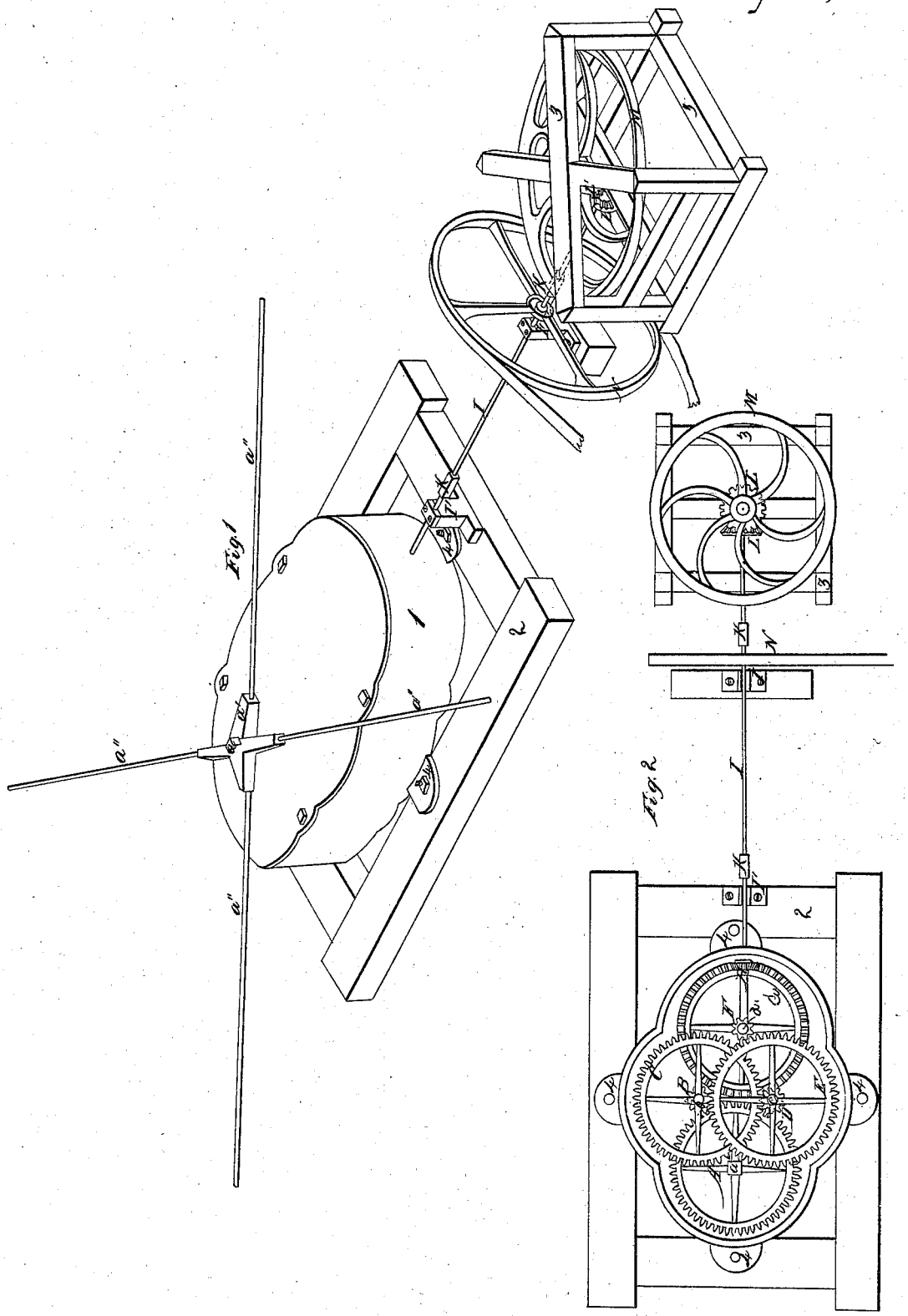
I. J. Richardson,

Horse Power,

No. 3,229, Patented Aug. 26, 1843.



UNITED STATES PATENT OFFICE.

ISRAEL J. RICHARDSON, OF NEW YORK, N. Y.

PORTABLE HORSE-POWER.

Specification of Letters Patent No. 3,229, dated August 26, 1843.

To all whom it may concern:

Be it known that I, ISRAEL J. RICHARDSON, of the city of New York, in the State of New York, have invented a new and useful Horse-Power or Machine for Giving Motion to Machinery by the Draft or Power of Horses; and I do declare that the following is a description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification.

This machine in its external appearance somewhat resembles the common box stove of a moderate size, and in the place of legs as seen in the stove, four ears or flanges extend out from the bottom plate far enough to admit of their being attached by bolts to an oblong wooden frame consisting of five timbers lying upon the ground. At one end of the box a shaft rises through the top plate and upon this is affixed a cap or shoe in the form of a cross which receives and sustains at four openings in its sides the arms to which the horses are attached for giving motion to the machine, and from the opposite end of the box, through a hole a little above the bottom plate, passes out a round horizontal shaft, which by being connected by means of coupling joints or a band and pulleys with other machinery communicates to it the motion desired. The machinery within the box consists of four sets of combined wheels—four driving and four driven or pinion wheels. The motion is communicated from the shaft to which the arms are attached as above described. The first or main driving wheel is attached to the lower end of this shaft and operates into a pinion upon an upright shaft and immediately above it and on the same shaft with the pinion is another driver which again turns another pinion on an upright shaft with another driver on the same lying above it which last driver operates into a third pinion on an upright shaft near the lower end of which is a driving bevel wheel turning a pinion on, and which gives motion to, the horizontal shaft above mentioned. Each driving wheel is about fifteen inches in diameter and each of the three first mentioned pinions about five and the last or bevel pinion about four inches in diameter, giving about one hundred and eight revolutions of the horizontal shaft to one of the main or first moving shaft. The machinery thus described is made to occupy a very small space by the following method or arrangement.

The main driving wheel is placed at one end of the above mentioned box or external inclosure more particularly hereafter described, its shaft being in the center of the box transversely or from side to side, and the pinion into which the main driving wheel operates is placed on one side (say the left hand) of the center and at such distance from it that the driving wheel upon its shaft shall reach and operate into the second pinion on the opposite or right hand side of the center at an equal distance from it of that of the first pinion.

The third pinion and bevel driver are placed at the opposite end of the box from the first or main driver and at such distance from the main driver and from the center of the box transversely, that the third driver may operate into the pinion and also that the bevel driver shall revolve very near but without touching the first pinion.

The true and exact position of the shafts of the respective wheels may be ascertained in the following manner. Take a point for the situation of the shaft of the main driver in the center of the box transversely, half the diameter of the wheel from the end on the inside, leaving a little space for the wheel to revolve freely, then extend a line from it through the center of the box to the opposite end. On each side of this line draw another distant from it one fourth of the diameter to the pitch line of the second driver and second pinion. Then take half the diameter of the first driver and first pinion to their pitch lines and the points to which this distance will extend upon the side lines from the point above given for the place of the shaft of the main driver will be the places for the shafts of the second and third drivers, and to ascertain the position for the shaft of the bevel driver take half the diameter of the third driver and third pinion to their pitch lines for one line and half the diameter of the bevel driver and first pinion for another line and extend these lines, the first from the place of the third driver shaft and the second from the second driver or first pinion shaft, toward the opposite end of the box from the first driver and the point at which their ends will meet or extreme point of intersection will give the point for the shaft of the bevel driver required.

The box in which the wheels operate and by which they are sustained is formed as follows: A thin plate of cast iron extends around the sides or outer edges of all the horizontal wheels conforming in shape to the figures formed by them perpendicularly when combined as above, rising a little above the highest wheels in the combination and extending a little below the main driver, and only of sufficient width and length to allow the wheels to revolve without touching. The bottom of the box is one entire plate closing it up at the bottom and has steps or boxes formed in it in which the lower journals of the upright shafts operate, and the top which is cast in connection with the surrounding sides as described, consists of a sort of checker work or cross plates, extending from side to side in such a manner as to pass over the centers of all the horizontal wheels and have holes or boxes formed in them for the upper journals of the wheel shafts. At the four points in the sides of the box described when the diameter behind or inside the first and fourth drivers is the least or in other words at the points where the circumferences of the first and fourth driving wheels intersect or cross those of the second and third drivers, the sides of the box or casting is thickened or formed into a kind of post extending from top to bottom, to give it the greater strength and permanency, and the bottom plate is fastened to the sides as described by bolts or screws passing into these enlarged or thickened parts of the side casting. A top plate fastened on in a similar manner covers and shuts up the whole of the gearing described. Instead of the box as described an iron frame may be substituted in its place formed as follows:

A set of cross bars of the form and structure of those at the top of the box above described, extend over, and under the centers of the horizontal wheels and in which the upper and lower journals of the shafts rest, the upper and lower set being cast each in one piece and at the four points corresponding with the thickened parts of the sides of the box as described, the bars are continued or a flange extends downward and upward by a short curve until they meet about half way, when they extend outward horizontally far enough for a bolt to pass through and fasten with a nut, and the lower set of flanges extend an inch or two farther out so as to rest upon and admit of the iron frame being fastened by them to the wooden frame above described. In this manner, whether the cast box or cast frame be used, the machinery with the exception of the bevel pinion wheel is sustained exclusively in iron supports, consisting in either case of but two pieces, firmly attached together, thereby giving great permanency and durability to the machine and insuring entire accuracy in its operation.

The horizontal shaft above mentioned has a bearing at its inner end when the box described is used, formed in or attached to the box immediately behind the bevel pinion, and when the iron frame is used its bearing at the same end is a box bolted to a cross beam of the wooden frame and the outer end of the shaft in either case rests in a box or bearing on another cross beam of the frame at its end about two feet from the inner bearing.

To the outer end of this shaft outside of the bearing is attached by means of a flexible or coupling joint another horizontal shaft about eight feet in length, the outer end of which has a bearing attached to a short block resting upon the ground, and on the outside of this block and upon the end of the shaft is attached a band wheel of about two feet in diameter. From this wheel passes a band to a pulley connected with the machinery to be driven.

Connected with the machine as described is a fly wheel of about three feet in diameter and of two hundred pounds weight, lying in a horizontal position. It is placed outside of the band wheel and consequently outside of the circuit of the horses and is supported in a square frame of about twelve inches in height and of sufficient width to allow it to revolve inside of the four corner posts. The upper and lower journals of its shaft rest in boxes or bearings in cross timbers of the frame.

To the lower end of the shaft between the journal and fly wheel is attached a bevel pinion of three inches in diameter into which operates a bevel driver nine inches in diameter. From this driving wheel extends a horizontal shaft about three feet in length which connects with the shaft of the band wheel by a flexible joint, by which means the fly wheel can readily be attached to or detached from the machine as occasion may require.

The advantages which the horsepower above described possesses over those now in use or known are: First. In having one more acceleration of speed or velocity, by the addition, in one combination of the fourth set of wheels, by which means the first, as also each succeeding driving wheel may be of less than one-half the common size, and by which also the machine is rendered lighter and consequently more portable. Second. In the peculiar position of the wheels, being clustered together in such a manner as to reduce the machine to the smallest possible compass, thereby rendering it susceptible of being inclosed in a case of either iron or wood without detriment to its portability or inconvenience in its use. Third. In having the first or main driving

wheel lie at the bottom of the machine, which throws the principal strain upon the lower end of the shaft, causing a much less injurious effect than if at the top or nearly so as is usually the case, and also by placing so large a portion of the weight at the bottoms renders the machine less liable to be upset in operation. Fourth. In the whole of the machinery being sustained and supported exclusively in the iron frame or box, thereby realizing perhaps as nearly as possible in a machine for the purposes for which this is designed, the objects so much needed and desired, permanency and durability. Fifth. In the use of the fly wheel which concentrates the force applied and as it were absorbs and retains it to be beneficially expended when great or sudden resistance is to be overcome, thereby preventing a loss or useless expenditure of power and giving increased energy and a greater degree of steadiness and uniformity to the operation of the machine. Sixth. In having the fly wheel so arranged as to be attached and used at a point intermediate between the first moving power and the point where that power produces its final result, by which means it can be made to receive the requisite and at the same time not too great acceleration of speed, and also without encumbering or incommoding the action or use of any other part of the machinery, and by which it may likewise be readily detached leaving the residue of the machinery in readiness and free to act without it should it be desired.

In the drawing Figure 1 is an isometrical view. Fig. 2, is a top plan, with the top plate and upper frame of fly wheel removed; in these figures (a) is the driving shaft to which the "cap" or "shoe" (a') is affixed at the upper end; this cap serves to sustain the arms or sweeps (a''). (1) is the outside casing a frame (2) is the frame on which it is supported and (4) the ears by which (1 and 2) are connected (b, c, and d) are the second, third and fourth shafts. A, C, E, and G are the first, second, third and fourth driving wheels and B, D, F, H, are pinions connecting them with each other and the horizontal shaft I. This last named shaft has two coupling or flexible joints K, in it and is sustained on bearings I′ on its outer end. There is a bevel pinion L working into another of the same diameter L′ on the shaft of which there is a fly wheel M the whole being supported in a frame (3). On the shaft I is the band wheel N for connecting with the machinery.

I am aware that fly wheels have long since been applied to horsepowers and therefore I wish it to be understood that I do not claim the application of a fly wheel to a portable or other horsepower; but

What I do claim is—

Placing the flywheel of a portable horsepower in a frame separate from the horsepower, or machinery to be driven or propelled, and connected with the line shaft beyond the band wheel, as herein described.

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Witnesses:

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B. K. MORSELL.