

UNITED STATES PATENT OFFICE.

WILLIAM RUSSELL PALMER, OF ELIZABETH CITY, NORTH CAROLINA.

HORSE-POWER.

Specification of Letters Patent No. 11,328, dated July 18, 1854.

To all whom it may concern:

Be it known that I, WILLIAM RUSSELL PALMER, of Elizabeth City, Pasquotank county, State of North Carolina, at present residing in the city and State of New York, have invented a new and useful Improvement in Machines for the Application of Horse-Power, which I designate as "Palmer's Improved Horse-Power;" and I do hereby declare that the following is a full and exact description of my said invention and machine, reference being had to the accompanying drawings, and to the letters of reference marked thereon, and which form a part of this specification.

The principal features of my invention or machine, by which it is distinguished from horse powers ordinarily in use are, that I am enabled to secure a much greater length of lever or arm, to which power a force is to be applied, than is usually secured in other horse powers; and my machine or horse power is so constructed that two or three or more bands can be attached to and worked with it at the same time, and thus motion be applied at one and the same time to different machinery, and my horse power is also so constructed, that its different parts can easily and readily be taken apart or separated and thus rendered more convenient for transportation or carriage, or for stowage, and that it can also be made much cheaper than ordinary machines for a similar purpose.

The nature of my invention consists in increasing the length of the arms or levers to which the power or force is to be applied, thus rendering the power applied much more effective by means of the leverage obtained, and in applying power or imparting motion to any machinery from the ends of the long arms by means of a band or bands, playing in points of support attached to the ends of such arms, in this manner being able to use the power at the best advantage, and superseding the necessity and use of cog wheels and shafts in transferring power to the movement of machinery.

To enable others to make and use my invention and machine I will proceed to describe its construction and operation.

The central frame work *d, d*, of my horse power, and in which the upright shaft or spindle *l* revolves, &c., I make of strong heavy timber of two or more inches in thickness and about six feet long, a foot and a

half wide and two feet high. The bottom of this frame or box projects about a foot on each side and is firmly fastened by mortise and tenon joints to heavy bed sills by which the machine is secured to any place for working purposes. In the center of this bottom piece, is placed an iron plate with a socket upon which the shaft *l*, rests and revolves, and which also passes through an iron box fitted in the upper side piece of the same. The spindle is about $2\frac{1}{2}$ inches in diameter and extends above the frame work a couple of feet, to which part is attached the arms or levers *a, a, a*, and their supporters *b, b, b*; and it is retained in its proper position in its boxes by means of a journal turned in it, into which the upper box, which is made of two parts, fits. To the spindle or shaft, about one third its distance above the frame *d*, I securely fasten a metal plate or other support *p*, to which are attached the inner ends of the levers or arms, by bolts or screws or in any other strong and safe way. These arms or levers I generally make about twenty feet in length, though their length may be varied according to circumstances; and from six to seven inches wide at their outer end and five inches at the end attached to the support *p*. They should be made of strong inch and a half stuff, (when made of wood) and have also a rib or stay, of about the same thickness, of about one third their width and running along upon their upper sides, to give greater strength and prevent sagging. At about two thirds the distance, from the spindle or shaft to the ends of the arms, braces *o, o, o*, stretch from one arm or lever to another, from the point of junction of which iron rods or supports *b, b, b, b*, extend from each arm or lever to the shaft, to which they are fastened or hooked and secured by means of a plate *p, p*. This plate *p p* is attached near the top of the shaft or spindle, so as to give as much purchase as possible to the supports *b, b*. The plate *p* may also be made of a much larger diameter, say from eight to ten feet, in which case boxes of iron or other strong material are to be attached to its periphery, into which the ends of the levers are inserted and fastened. By this arrangement arms of a shorter actual length may be used, and still the whole distance or length of lever, measured from the central shaft to the circumference, be preserved. This plate or wheel may also be made of two or three parts, so

that when necessary, or more convenient for carriage, it may be taken to pieces. In the case of the use of a wheel of such large diameter, it will also require to be supported on its under side, by arms extending from the shaft toward the circumference of the wheel or plate.

At the ends of the arms or levers are attached one or more strong iron pins or stops *c, c*. These are bent as represented in the drawings and are intended to be made square as to the part which passes into the lever, while the other part should be left round, and they should be of sufficient length to allow them to pass well into or through the arms and project two or three inches on the outside. These pins enter the arms near their ends and at the sides of the ribs or stays fastened to the arms, at an angle of about thirty degrees, so that whenever a band or cord is made to pass between any one of these pins and the arm in which it is inserted, it is made to take a short bend or turn between the rib and the pin and is thereby prevented from moving or slipping in the smallest degree, but is kept and retained as securely and firmly as if held by cogs and wheels, and power or motion is as easily and effectually transferred therefrom as from a shaft worked by means of cogs.

I am aware that pins have been used in machinery for the purpose of furnishing a support for revolving belts or bands, but in such cases the pins have either been inserted at right angles to the surface of the part in which they were fixed, in which case there was nothing to prevent the slipping of the bands, or else, in cases where the pins have been fixed at an acute angle, there has been no arrangement or contrivance similar to the rib or stay, above described, so that in such case the band played in a V shaped groove, which also offered but little resistance to the slipping of the band. But from the shape which I give my lever with its rib and the position in which the pin *c*, is placed, the band is wholly prevented from slipping, and thus one great objection to the use of bands and belts obviated. Instead however of attaching the pins *c, c*, to the arm or lever, in the manner before described I sometimes attach to the under side of the lever a piece of metal split and forked as represented by the extra arm, illustrated by the drawing at A, and B. By the use of this device the band receives the same bend or turn as in the contrivance before described, and where a single band only is required, I generally prefer this arrangement. Where three bands are desired this arrangement becomes peculiarly desirable, as that part of the metal which is fastened to the under side of the arm or lever, fills the place of and performs the part of a

rib between which and a pin which should be inserted in the under side in the same manner as before described the band passes. The bend or curve which is given to the wires, at their projecting ends acts as a guide to the belt or band to keep it in, and make it take, its proper place, and at the same time allows such belt or band to pass freely and without hindrance out of the points of support.

The band *r* runs from the arms of the horse power over a pulley *v*, which moves a large wheel *w*, from which motion is communicated to any required machinery. The pulley *v*, is conical in shape usually made up of three or more whose diameters are about as 1 to 2 so that by changing the band *r, r*, from one of these pulleys to the other, a different speed may be given to *w*, and through it to the desired machinery. The wheel *w*, is also constructed, so that while it serves to communicate motion to the machinery, it also at the same time acts as a fly wheel, equalizing the motion and accumulating power. The peculiar construction of the wheel is shown: On one side of the shaft or hub is attached the conical pulley *v* and to the other side similar pulleys may be attached if desired, or it may be left free, to furnish a support for braces, should any be necessary, to steady the wheel, or prevent a tendency to swerve from a steady motion because of its rapid revolution. The periphery of the wheel is made very heavy, as in ordinary fly wheels, for the purpose of the equilization and accumulation of power. The spokes are attached to the sides of the periphery instead of to the center, so as to be easily detached when the wheel is taken to pieces for transportation; they are also made broad to give greater strength, and have their broad surfaces parallel to the plane of the wheel's revolution, so as to offer as little resistance as possible to the air. To decrease friction, and make most available the power accumulated in the fly wheel, motion is transmitted by means of a round band, playing in a groove upon the periphery of the wheel. This groove I prefer having on the same side of the wheel as that to which the spokes are attached. The various parts of the wheel *w*, and of the frame work supporting it are to be so constructed, that they can be separated, and put into a small compass for transportation or storage.

The band *r*, after it leaves the levers passes around a cylinder *n*, made with various grooves to receive the band, and thence over the pulley *v*. This cylinder *n* is made adjustable, as represented in the model, so that the band can be tightened or loosened, according to circumstances. Near the cylinder *n*, and between it and the pulley *v*, I also place two brass or wooden cylinders, grooved

for the passage of the band *r*, one above the other, the lower one of which is permanent, while the upper one may be passed nearer the lower, as occasion may require. Their use is to confine or tighten the band when it becomes slack from use, and this end is accomplished either by helical springs above the ends of the upper roller, or by having the shaft of the upper roller project beyond the frame work, which supports it, to which projecting ends may be attached weights according to the necessity of the case.

The frame which contains the cylinder *n*, and the small cylinder *m*, the pulley *v*, and the wheel *w* is so placed in position, in respect to the horse power that the band *r*, is made to pass around the cylinder *n*, and the pulley *v*, at nearly right angles with the line of direction it has when it leaves the arms or levers *a, a*, while it passes from the pulley *v*, into the points of support on the ends of the arms or levers, in a straight line. In this manner the band *r*, is made to act with the greatest power when passing onto the pulley *v*, while it passes from off this pulley to the arms easily and without friction.

The grooves in the pulleys *v*, and indeed all the grooves in any part of my machine, in which bands are intended to play, I construct in a new and peculiar manner, so that any decrease in the size of the band from wear or stretch makes no difference in the hug of the band to the groove in which it plays. It is well known that round bands playing in grooved pulleys, after they have been used, become smaller by wear or stretch,

and then are very liable to slip, because they do not sufficiently hug the groove. To remove this liability and prevent this result, I make the width of the groove on the surface or circumference of the pulley more than double the width at the bottom and the side surfaces of the groove are also cut down in a straight line and do not meet together at the bottom. The groove is thus made nearly of the following shape **U**, the plan I have above described being illustrated by the first and third ones of the series. With a pulley grooved after this fashion, a band or cord may be used at first, of a diameter nearly equal to the surface width of the groove, and as this band becomes reduced in size, either by wear or stretch, it still continues to hug as tightly the sides of the groove, (though having sunk deeper into the groove,) and liability of slipping is avoided.

Having thus fully described my improvements, what I claim as my invention and desire to secure by Letters Patent is—

The combination of the rib, or projection, upon the arms *a*, with the bent pin or iron *c*, or their equivalent **A, B** constructed, and arranged substantially as described, for the purpose of giving a short bend to the rope or band and thereby preventing the slipping thereof as herein set forth.

W. RUSSELL PALMER.

Witnesses:

S. D. LAW,
HALL COLBY.