3 Sheets—Sheet 1.

E. BROWN.

WHEEL OR PULLEY.

No. 172,910. Patented Feb. 1, 1876.

Fig. 1

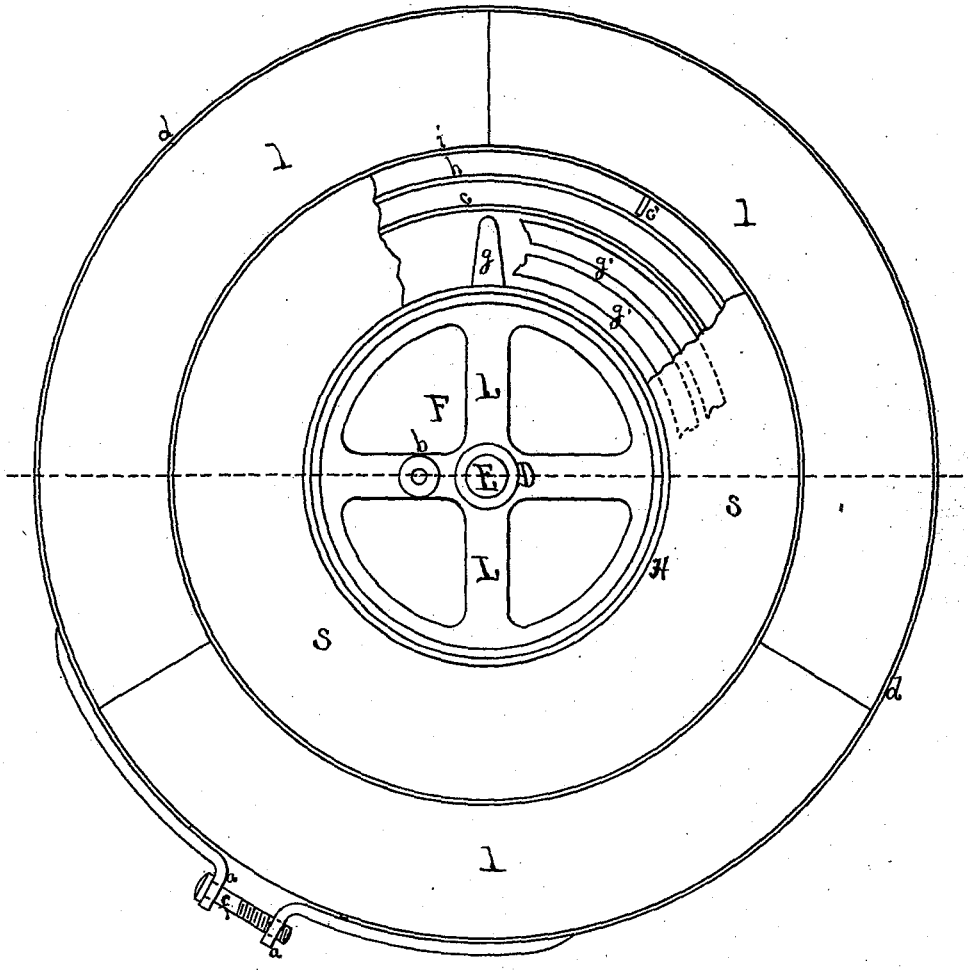

Fig. 2

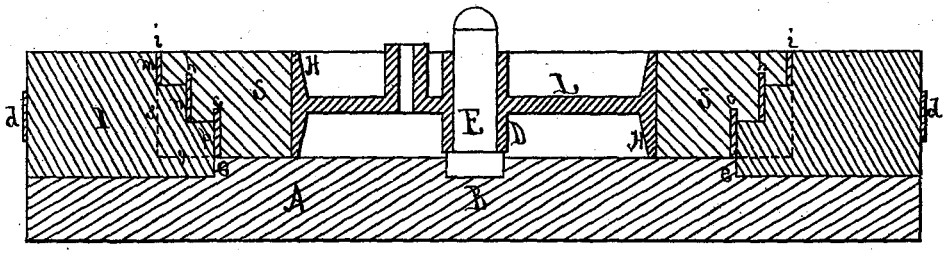

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Fig. 3

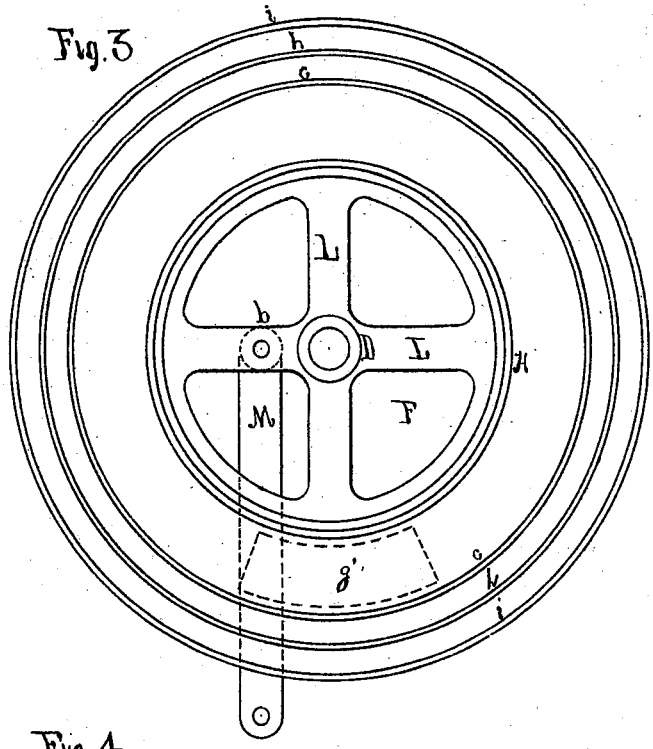
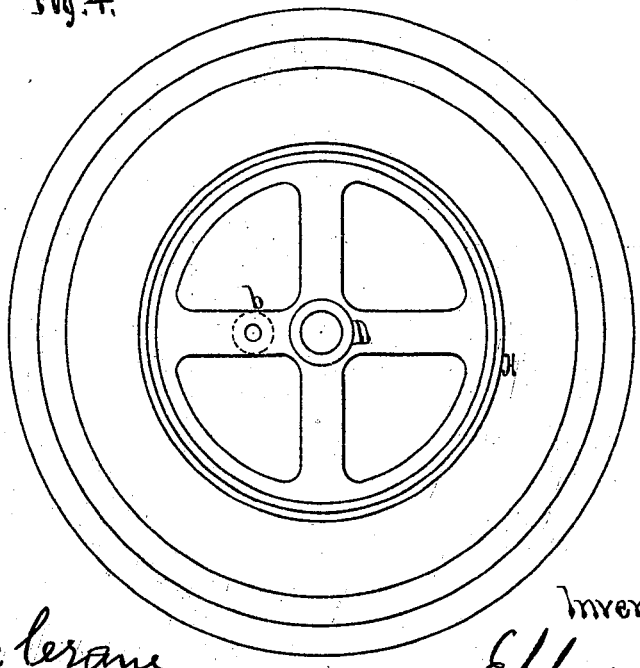


Fig. 4.



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3 Sheets—Sheet 3.

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WHEEL OR PULLEY.

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Fig. 5.

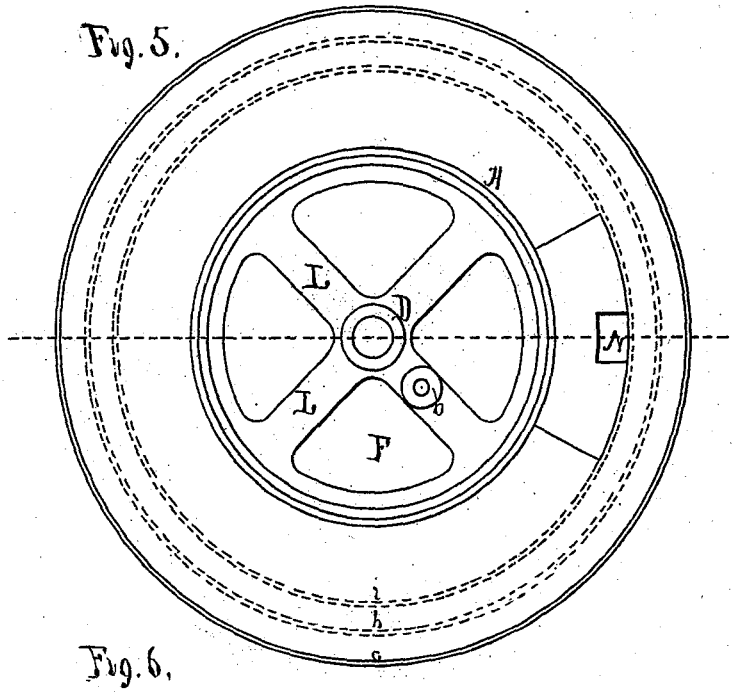


Fig. 6.

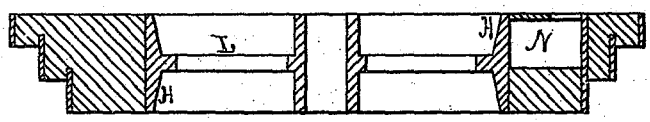
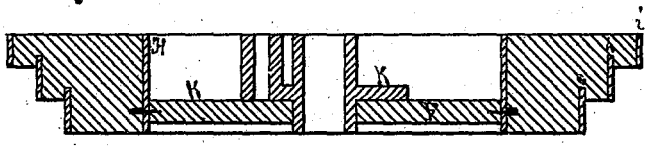


Fig. 7



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UNITED STATES PATENT OFFICE.

EPHRAIM BROWN, OF LOWELL, MASSACHUSETTS.

IMPROVEMENT IN WHEELS OR PULLEYS.

Specification forming part of Letters Patent No. **172,910**, dated February 1, 1876; application filed December 9, 1875.

To all whom it may concern:

Be it known that I, EPHRAIM BROWN, of Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Wheels or Pulleys, and in the means and process of producing such wheels, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 represents a plan of the mold with one of the wheels as constructed therein, the wheel being shown partly in section. Fig. 2 represents a central cross-section of Fig. 1. Fig. 3 represents the opposite end of the wheel seen in Fig. 1, the face or outer end being uppermost when formed in the mold. Fig. 4 represents an inner end elevation of one of my improved wheels without the metal hoops, which in all the others form the belt or band surfaces when driven by or driving other pulleys. Fig. 5 represents an end elevation of one of my improved wheels, with the counter-balance formed by a cavity in the rim, instead of a weight in the rim at the opposite side, as in Figs. 1 and 3. Fig. 6 represents a central cross-section of Fig. 5, showing the counter-balance-cavity in one side of the rim. Fig. 7 represents a central cross-section of one of my improved wheels as constructed with a central rim and shaft, connecting and supporting plate of wood or other cheap material, and with a shaft and crank connection of metal, fastened to one side of the wooden plate, the latter secured to the rim by an inner hoop, and by pins passing through the hoop into the edge of the wood, and into the substance of the wheel-rim.

This invention relates to wheels and pulleys which are used in machinery, and whose outer rims are weighted or loaded to increase their momentum when they revolve, as in the balance-wheels used to drive foot-lathes, jig-saws, or other machinery, where the momentum of the revolving driving-wheel is partially or wholly relied upon to retain the motion of the driven wheel or other mechanism, or to carry a crank over its centers, the rim of the wheel being generally more heavily loaded at one side than at any other part of its diameter, or made lighter at one side, so that when the driving-power is released or withdrawn the wheel will cease its rotary motion, and stop with the heavier side down, or the lighter side uppermost, and the crank on or nearly on its center, and in a position to start or revolve the wheel at any time without further adjustment, by upward or downward draft upon the pitman or crank-connecting rod.

This invention has for its object to greatly reduce the cost of rim-loaded wheels, by constructing their rims of cheap cement material, formed in a mold in a plastic state, and united to the central shaft-supporting hub, arms, or plate, or to this and to metal hoops, which form the belt or band surfaces at the periphery, by the described molding process, the mold, the wheel, and the process each forming part of the invention.

This invention consists, first, of the mold constructed, as described, with a bottom plate having a centering-step, by which to centrally set the shaft-supporting hub and plate, and its outer rim a segmental annular rim of the size and shape to form the plastic wheel-rim, or to receive metal hoops for one or more band-surfaces, and a clamping-hoop surrounding the rim-segments, to bind and hold them firmly together and to the bottom plate, rabbeted in its outer edge and face to receive the segmentary rim, the plastic wheel-rim being formed upon the bottom plate, between the inner periphery of the segmental mold-rim and the outer rim or flange of the center plate, the latter rim or flange forming part of the mold.

This invention also consists of a weighted or rim-loaded wheel constructed, as described, with a central shaft-supporting hub, with arms or a plate, and an outer flange, a rim composed of cement made of plastic material, hardened or dried, and with bands or hoops on the periphery of the cement rim, made of plastic material, and with an additionally-weighted side or counter-balance of lead, iron, or other substance whose specific gravity is greater than that of the substance of the cement rim, and molded into the latter while forming it, all substantially as and for the purpose herein described.

This invention also consists of a weighted or rim-loaded wheel constructed as described,

the rim of plastic material, hardened or dried, and with its counter balance formed by a cavity in the rim at one side, instead of an additional weight at the opposite side, substantially as and for the purpose described.

This invention also consists of a weighted or rim-loaded wheel constructed, as described, with a central shaft-supporting hub and a plate with a flanged periphery, a rim composed of cement made of plastic material, hardened or dried, and with an additionally-weighted side or counter-balance, whose specific gravity is greater than that of the substance of the cement rim, and molded into the latter while forming it, all substantially as and for the purpose described.

This invention also consists of a weighted or rim-loaded wheel constructed, as described, with a central shaft-supporting hub, and a connected plate with a flanged periphery, and a rim composed of cement made of plastic material, hardened or dried, all substantially as and for the purpose described.

This invention also consists of a weighted or rim-loaded wheel constructed, as described, with a central shaft-supporting hub, and a connected plate with a flanged periphery, and a rim composed of cement made of plastic material, hardened or dried, and with hoops or bands on the periphery of the cement rim, all substantially as and for the purpose described.

This invention also consists of the process of constructing a rim-loaded wheel, such as herein described, by molding said rim of cement in a plastic state in a mold, upon a bed-plate, and between the inner periphery of the annular mold, or hoops therein, and the outer periphery of the flange, on a central supporting-plate, and uniting or connecting the plastic rim with the flange of the plate, or with this and the hoops, all substantially as herein described.

In carrying out my said invention, I first construct the mold, as shown in Figs. 1 and 2, with a bed or bottom plate, A, having a center step, B, by which to centrally set the shaft-supporting hub D and the center plate F, with its flange H, by a center core or guide, E, passing through or entering the hole in the hub and the step.

The outer edge and face of the bed A is rabbeted, as shown, and around this rabbeted surface, and against its annular shoulder *e*, the annular mold-rim segments I are fitted, and they are secured in position by an outer clamping-hoop, *d*, having ears *d*, and a clamping-screw, *f*, by which to draw the hoop tightly around the segments and hold them together and to the shoulder on the bottom plate.

The inner periphery of this segmentary mold-rim, in the present instance, is constructed with three offsets or band-forming surfaces, *m u p*, each of a different diameter, to correspond with the three cone or band surfaces on the lathe or other pulley to be driven by them, or to receive the three metal bands *c h i*, the two first named being wider than the offsets, and entering the substance of the cement wheel-rim S, which is molded upon them when the rim is formed in a plastic state. The hoops or bands *c h i*, when thus applied, form the band-surfaces of the wheel, which, instead of having three cones or band-surfaces, may be made with a single band-surface, extending entirely across the face or periphery of the wheel, by simply constructing the inner periphery of the segmentary portion of the mold with a single band-forming surface, as on the lines 3 and 4 in Fig. 2. The flange H of the center plate F also forms a part of the mold; and in order to form a rim-loaded wheel, such as herein described, after preparing the mold, as described, and the center plate with a web, K, as in Fig. 7, or with arms L, as in Figs. 1 to 5, inclusive, a shaft-supporting hub, D, and generally a crank-connecting hub, *b*, and an outer flange, H, I place the core or guide E in the hole in the hub, and then insert the lower end of the guide in the center step, which brings the lower edge of the flange H fair against the face of the bed-plate. Lugs *g* project outward from the outer periphery of the flange, and pins *c'* project inward from the hoops *c h i*, to become embedded in the plastic cement material, and thus to unite or connect the hoops and the flange to the cement wheel-rim when forming it, and when the wheel is to be made with a counter-balance, or one side heavier than the other, I then place in the mold one or more pieces, *g'*, of iron or lead, whose specific gravity is greater than the cement substance, and will cause the wheel to stop with the additionally-weighted side downward, and ready to be started instantly by the crank-connecting rod M, the crank-pin or hub *b* and the counter-balance *g'* being arranged relatively with each other about as shown in Figs. 1 and 3.

Instead of the additional weight *g'*, and as an equivalent for the latter, I sometimes form the cement wheel-rim with a cavity, N, in one side, and about opposite to where the iron or lead is molded in, substantially as shown in Figs. 5 and 6.

For lathes or other machines intended for light work, I sometimes construct my improved cement-rimmed wheel as shown in Fig. 4, where both the counter-balance *g'* and the hoops or bands *c h i* are dispensed with. This further reduces the cost of the wheel, and such a wheel will perform good service, as the cement rim will be of sufficient strength to endure all the strain and wear brought upon it.

I sometimes construct my improved cement-rimmed wheel with a center plate, F, of wood or other cheap material, but with a flange, H, and a shaft-hub, D, of metal, and fasten the flange to the edge of the plate by pins or nails *q* passing through the flange into the wood, and projecting beyond the outer surface of the flange.

Fig. 7 is intended to represent such a wheel as last described, with its center hub and crank-hub fastened to the face of the wooden plate.

In this, as in all the other described modifications of my improved wheel, the flange H forms a part of the mold when molding the cement rim.

The mold and other described parts being properly prepared and all placed in their described positions, I then mix and prepare the cement in a plastic state, say about the consistency of common mortar or cement for laying brick, and place the cement in the mold around the lugs, pins, and hoops, if these are used, and, if to be counterbalanced, either bed in the iron *g'* or form the cavity N, and press and crowd in the cement with considerable force until it is compact and solid. The mold and its contents may then be placed in a warm situation, where heat will dry the cement rim, which may then be removed from the rim and bed of the mold by first removing the hoop *d* and the segments I, and further hardened, dried, or baked to a great degree of hardness and strength.

The composition used for forming the cement wheel-rim may be varied to suit circumstances and conditions. Common Portland cement mixed with sand, gravel, pounded coal-cinders, or other convenient material, is a good composition for the cement wheel-rim, and calcined plaster, lime, clay, or other similar adhesive material may be substituted for the cement. Crude sulphur and iron filings or chips, or any of the other described substances, make a good, durable, and cheap wheel-rim, in the way described, first melting the sulphur and mixing in the iron filings or sand, and molding the rim while the cement is in a heated state and plastic; but, if weighted on one side, lead may be used for the counter-balance, or some other substance more weighty than iron and sulphur combined. A solid block of iron may answer the purpose, or a cavity, N, in one side of the cement rim.

Thus it will be seen that a wheel or pulley constructed with a shaft-supporting center plate and a loaded rim of cement, as described, will be much cheaper than most wheels of this kind or character, besides being sufficiently strong and durable.

I claim as my invention—

1. The rim-forming mold constructed, as described, with a bottom plate, A, having a centering-step, B, a segmental rim, I, a clamping-hoop, *d*, having ears *a*, and a clamping-screw, *f*, and the flange H of the center plate F, all arranged as described, for molding the wheel-rim S of plastic cement material.

2. A weighted or rim-loaded wheel constructed, as described, with a central shaft-supporting hub, D, with arms L, or a plate or web, K, an outer flange, H, a rim, S, of cement made of plastic material, hardened or dried, with bands or hoops *c h i* connected to the peripheries of the cement rims, and an additionally-weighted side or counter-balance, *g'*, molded into the cement rim, all substantially as described.

3. A weighted or rim-loaded wheel constructed as described, the rim of plastic material, hardened or dried, and with its counterbalance formed by a cavity, N, in the rim, substantially as described.

4. A weighted or rim-loaded wheel constructed, as described, with a central shaft-supporting hub, D, a plate with a flange periphery, H, a rim, S, composed of cement made of plastic material, hardened or dried, and with an additionally-weighted side or counter-balance molded into the cement rim, all substantially as described.

5. A weighted or rim-loaded wheel constructed, as described, with a central shaft-supporting hub, D, a connected plate, K, or arms L, with a flange, H, and a rim, S, composed of cement made of plastic material, hardened or dried, all substantially as and for the purpose described.

6. A weighted or rim-loaded wheel constructed, as described, with a central shaft-supporting hub, D, and a connected plate, K, with a flanged periphery, H, and a rim, S, composed of cement made of plastic material, hardened or dried, and with hoops *c h i* on the peripheries of the cement rim, all substantially as and for the purpose described.

7. The process herein specified of constructing a rim-loaded wheel, such as herein described, by molding said rim S of cement, in a plastic state, in a mold upon a bed-plate, and between the inner periphery of the annular mold, or hoops therein, and the outer periphery of a flange on a central supporting-plate, and uniting or connecting the plastic rim with the flange of the plate, or with this and hoops at the periphery of the cement rim, all substantially as and for the purpose described.

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Witnesses:
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WILLIAM R. CRANE.