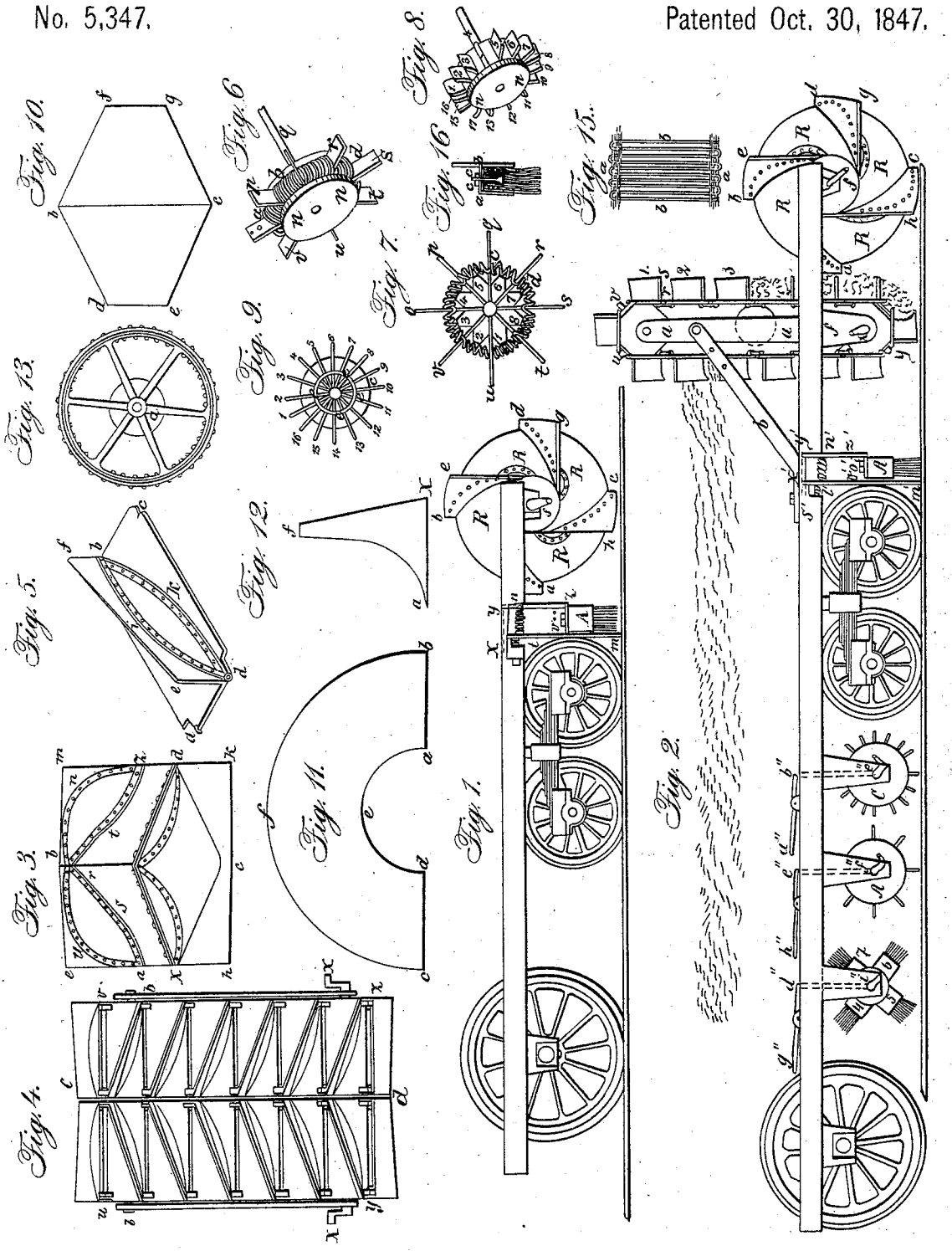
S. STREETER.

Car-Track Clearer.

No. 5,347. Patented Oct. 30, 1847.



UNITED STATES PATENT OFFICE.

SAMUEL STREETER, OF DETROIT, MICHIGAN.

IMPROVEMENT IN MACHINERY FOR CLEARING SNOW AND ICE FROM RAILROAD-TRACKS.

Specification forming part of Letters Patent No. **5,347**, dated October 30, 1847.

To all whom it may concern:

Be it known that I, SAMUEL STREETER, of Detroit, in the county of Wayne and State of Michigan, have invented an Improvement in Machinery for Clearing Obstructions from Railway-Tracks, of which the following is a specification.

For clearing obstructions the machinery consists of seven distinct parts, each being used with or independent of all the others.

Figure 1 in the drawings represents a longitudinal section of a locomotive-frame with a double conical surface and flanges attached for removing obstructions from the track, and also a wire broom A for removing sleet from the same track. Fig. 2 represents a section of said locomotive-frame and a side view of the whole machine attached to it for clearing obstructions. Fig. 3 is a front view of the double conical surface represented in Fig. 1, together with its flanges and the braces of the flanges. Fig. 4 is a front view of the snow-excavator of Fig. 2, showing the position of the flanges in the two endless chains. Fig. 5 is a view of a single bucket of the above, and shows the flange, the brace, and the plate to which they are attached. Fig. 14 is a cross-section of the frame which supports the snow-excavator. Fig. 10 is a cross-section of the double cylindrical conical surface R, represented in Figs. 1 and 2. Fig. 11 is the form of the plate of which this surface is made by bending it so that the line *a b* shall be riveted to *d c*. Fig. 12 shows the form of a flange for the above surface and is normal to it, the point *a* of the flange being in the circle *a e d* of Fig. 11 and the point *f* of Fig. 12 being in the circle *b f c* of Fig. 11. Fig. 13 shows the iron wheel to the circumference of which the largest circles or bases of the conical surfaces (in Fig. 10) are riveted, (through *b c*, Fig. 17.) Fig. 15 shows the warp and selvage of the wire for forming the wire brooms. Fig. 16 is a section of the broom in Fig. 1, and shows the screw passing through it, the nut *c*, which fastens it, and the plate which confines it. Fig. 7 is a view of the interior of the double-spring rotary scraper. Fig. 6 is a view of the same scraper with the end covered by an iron plate, and is used to cut ice from the track. Fig. 9 is an interior view of a burr for removing ice from the track. Fig. 8 is a view of the above with a cast-iron plate covering the end.

The conical surfaces with the flanges for removing obstructions from tracks will first be constructed.

I connect two conical surfaces at their bases, as at *b c*, Figs. 10 and 3, and firmly rivet them to the circumference of an iron wheel (seen at Fig. 13) within. The small ends of these surfaces are fastened in the same manner as a boiler-head. Through these small heads and the hub of the wheel to which the bases are fastened a shaft passes, terminated at each end by a crank. The wheel, Fig. 13, to which the bases of the conical surfaces are fastened must have its rim shaped thus $\wedge$, so that the conical surfaces may fit on and be riveted to it. On each conical surface there are four flanges *b e*, *g d*, *h c*, *a*, Fig. 1, *b′ e′*, *g′ d′*, *h′ c′*, *a′*, Fig. 2, which are normal to the surface, and each flange of the one surface (*b e* and *h c*, Fig. 3) meets a flange of the other surface (*b m* and *c k*, Fig. 3) in the plane of the base of the two cones at *b* and *c*, respectively, Fig. 3. These flanges, though perpendicular to the surfaces, are not in the plane of the shaft, but make an angle with it. To determine this angle I will fix two consecutive flanges on one surface. Divide the circles of the base and vertex each into four equal parts, so that a point of the vertex and in the base, as *y*, Fig. 3, is in the same plane through the shaft. To a point in the vertex, as *x*, Fig. 3, I fix one end of the flange, and to that point, (*y*, Fig. 3,) in the base which is opposite the next point to the rear (*a*, Fig. 3) in the vertex I fasten the other end of the flange. The flange *x y*, Fig. 3, thus runs diagonally across the surface and is normal to it. In the vertex at *a*, Fig. 3, and opposite to the point *y*, Fig. 3, where this flange terminates in the base, I fix one end of another flange, the other end being carried diagonally to the next point of division in the base at *b*, and thus rivet it. Two consecutive flanges of one surface are now fixed, *x y* and *a e b*, Fig. 3, and the other are fixed in the same way, each flange on the surface of the other frustum meeting a flange of this surface at the base of the cone, as *d y* meeting *x y*, Fig. 3, and thus forming a continuous flange, bearing in mind that the points *d* and *x*, Fig. 3, on the two vertexes where

this continuous flange terminates are in the same plane through the shaft.

The drum *a b c d*, Figs. 3 and 10, or conical surface should be made of heater or thin boiler iron, and the flanges, as *a e b* and *b m z*, Fig. 3, of stiff boiler-iron. The under side of the flanges are braced with pieces of stiff boiler-iron, as *a s r u* and *r t z n*, Fig. 3, and these braces are riveted to the flanges and to the surface of the drum.

To brace the flange *a e b*, Fig. 3, rivet a piece of boiler-iron around a line *a u b*, Fig. 3, which starts from one end of the flange, and by curving extends to the other, or to the plane of the base *b c*, Fig. 3, of the conical surfaces. This line runs near and along the outer edge of the flange, as at *a u b*, Fig. 3, then curves to near the under edge, and thence along to the base of the cones.

The drum *d e f g*, Fig. 10, is made one foot longer than the width between the rails, so that each end will project six inches beyond the rails. To a locomotive-frame two feet high make the diameter of the drum three feet and the diameter at the ends eighteen inches. At the point *h c*, Figs. 10 and 3, where the diameter is greatest, the flange *r b*, Fig. 3, is six inches in width, and at the ends of the drum *a x* and *z d*, Fig. 3, the flange, as *z m* and *a e*, is two feet, with the corners slightly rounded. The flanges are riveted to the drum, and the braces are riveted to the flanges and drum.

To complete the excavation of the snow from a deep cut, I place a vertical frame (shown in Fig. 14) upon the front of the locomotive-frame and immediately behind the conical surfaces. This frame, Fig. 14, is composed of two uprights *a b* and *c d*, Fig. 14, and *a*, Fig. 2, made of iron, which are supported on each side by an arm, one of which is seen at *b*, Fig. 2, projecting diagonally upward and forward from the locomotive-frame, through the ends of which a pin (seen at *e e*, Figs. 14 and 2) in the frame on each side passes. There is also an arm, one of which is seen, *f*, Fig. 2, projecting vertically downward on each side of the locomotive-frame, and in each of these arms is a hole, through which a shaft terminated at each end by a crank passes. The upper end of this vertical frame supports a shaft A, Fig. 14. On each shaft are four octagonal wheels *g h i k* and *l m n o*, Fig. 14. Each wheel has four cogs, two on each, (seen at *u v y z*, Fig. 2,) equidistant from each other. There is a wheel on each end of the shafts, as *g k l o*, Fig. 14, and two others *h i* and *m n* in the middle of the shaft. Midway between these two shafts is another shaft C, Fig. 14, supported by the vertical frame and having two friction-rollers 1 and 2, Fig. 14, on it, each at a distance from the end of the shaft equal to one-fourth the length of the shaft. Two horizontal braces or bars D and E, Fig. 14, extend between the sides *a b* and *c d*, Fig. 14, of the vertical frame at equal distances above and below the shaft C, Fig. 14, which has the friction-rollers, and half-way between said rollers and the shafts A and B, Fig. 14, at the top and bottom of the frame. Now make the buckets, which connected together form an endless chain. Upon the vertical frame, Fig. 14, there are two of these endless chains, as seen at Fig. 4, and which in revolving remove the snow by lifting it from the track and throw it off on each side. They are made of boiler-iron. To construct one bucket cut a piece of boiler-iron *a b c d*, Fig. 5, so that it is rectangular. Each angle or corner of this iron is cut out, as at *a b c d*, Fig. 5, and a piece of iron is riveted across the short sides of this rectilineal figure, as at *a d* and *b c*. The ends of the bars so riveted are turned over or rolled, so as to make an eye in each of the four angles (re-entrant) of the boiler-iron *a b c d*, Fig. 5. A piece of boiler-iron of same figure, but narrower, as *d e b f*, Fig. 5, is riveted to the piece of boiler-iron *a b c d*, Fig. 5, just described. The second piece of boiler-iron *d e b f*, Fig. 5, is perpendicular to the first piece and crosses it in its longest diagonal. The flanges are braced on the under side with boiler-iron. The brace *d i b k*, Fig. 5, is so cut and riveted that the widest part of it at *i k*, Fig. 5, will cover to about the middle of the flange, and is curved gradually to a point where the bucket and flange intersect at the ends at *b* and *d*, Fig. 5. The curve of the other edge of the brace *d k b*, Fig. 5, is the same, and is riveted to the bucket *a b c d*, Fig. 5. Buckets made in this way are fastened together by a square link passing through the eye in each corner and the same link passing through an eye in the adjoining corners of the next bucket. An endless chain is thus formed, and, the link being large enough to fit on the cog or pin of the end and middle wheel on the upper A, Fig. 14, and lower B, Fig. 14, shafts, it is seen that when power is applied to the cranks of the lower shaft (one of which is seen at *x*, Fig. 2, and *x*, Fig. 4) the buckets will receive their proper motion. Upon the same frame, Fig. 14, a second endless chain is placed, which is constructed in the same manner; but the flanges of the second chain of buckets intersect the flanges of the first chain at the top of each bucket and in the center of the frame, as seen in Fig. 4, so that the outer edges of the flanges of both chains are at the lowest point of the buckets and the inner edges at the highest point, and the lowest points are in the same horizontal plane. The second chain of buckets is arranged by links same as the first, and the cogs in the wheels on the upper and lower shaft of their frame mesh into these links and give the whole motion. Each chain covers one-half the width of the frame, and, the flanges sloping downward and outward toward each side of the track, the snow is thus taken up from the track and is thrown or slides off at the sides. The flange at the central part of the frame (in the line *c d*, Fig. 4) is slightly curved upward, and

this curve gradually diminishes toward the outer edge, where it disappears, (seen in Fig. 2,) and the object of this is to give it a hold upon the snow to raise it up.

To remove sleet from the tracks, an elastic wire broom A, Figs. 1 and 2, is used, and it is fastened on the forward end of the locomotive-frame and directly in front of the forward wheels and behind the endless chain. This broom is seen in its position at A, Figs. 1 and 2, and Fig. 16 is a section through its length. The warp, Fig. 15, of this broom is made of annealed iron wire of No. 14, and the filling is made of elastic wire of equal proportions from No. 7 to No. 16. The center of the web is made without warp, as Fig. 15, ten threads on each side forming a selvage. The web being two feet wide, as from *a* to *a*, Fig. 15, it is cut in two lengthwise the web from *b* to *b*, Fig. 15, so that the filling would form a fringe if made of yarn. The elastic wire must be thoroughly annealed when the selvage is formed, care being taken not to anneal that part which forms the center of the web. The selvage is wound around an iron screw on which is a conical head tapering toward the screw and the screw end projecting through and beyond the selvage, the whole seen at Fig. 16. An iron band confines the upper or woven part of the broom, as A, Fig. 1. This band in the inside is of less diameter at the top than the bottom and it is forced over the selvage end of the broom by passing the end of the screw on which the broom is wound through it and through a hole in an iron plate, as *a b*, Fig. 16, covering it, and putting a nut *c*, Fig. 16, upon the end of the screw and turning the nut. There is a piece of stiff spring-steel *x y z*, Fig. 1, and *x' y' z'*, Fig. 2, fastened to the front of the locomotive-frame and which projects about one foot horizontally, *x y*, Fig. 1, and *x' y'*, Fig. 2, beyond it, where it curves and projects downward, *y z*, Fig. 1, and *y' z'*, Fig. 2, and then curves and projects inward, *z v*, Fig. 1, and *z' v'*, Fig. 2, toward the wheel. The length of the downward part *y z*, Fig. 1, and *y' z'*, Fig. 2, is determined by the height of the locomotive-frame, and as the broom is fastened to the part *z v*, Fig. 1, or *z' v'*, Fig. 2, which projects inward toward the wheel, by a nut *o o*, Fig. 1, *o' o'*, Fig. 2, on the screw which passes through it, the length of the two together must be such that the broom will touch the track and brush off the sleet. When the front of the broom becomes worn, it may be unscrewed and the front part turned to the rear.

A bar *x m*, Fig. 1, and *x' m'*, Fig. 2, of spring-steel, forms the scraper, is placed directly in front of the locomotive-wheels, and is immediately in rear of the broom. It is fastened at one end *x*, Fig. 1, and *x'*, Fig. 2, to the locomotive-frame, and projects vertically downward. There is a small iron plate *s*, Fig. 1, *s'*, Fig. 2, on the front end of the locomotive-frame, over which this steel plate passes, and which projects it forward of the frame, so as to allow it to act upon a spiral spring between *s* and *t*, Fig. 1, and *s' t'*, Fig. 2, in rear of it, and one end of which spring is partially countersunk into the end of the frame, so that when there is a great pressure upon the front of the scraper the scraper is pressed against this spring. There is also a spiral spring between the broom-holder and the front of the locomotive-frame, as between *t* and *n*, Fig. 1, and *t' n'*, Fig. 2, and against the broom-holder presses when meeting with resistance in front. The broom just described has only a forward motion with the locomotive. A broom of same materials, but having a rotary motion and rapid revolutions, so as easily to cut ice from a track, is made by placing four of them on each end of a shaft and over each rail and in front of the driving-wheel. Such a one is seen at 4 5 6 7 of Fig. 2 in front of the driving-wheel. They (4) are placed in the same circle on the shaft and at equal distances from each. The screw on which these wires are wound has a countersink on its head, so as to be screwed into the shaft by means of a screw-driver, and the upper edge of the iron band which confines each broom is made to fit the hub or shaft on which the broom is fastened. To a crank (one of which is seen at 8, Fig. 2) on each end of the shaft the power is applied, and in this case, as in that for removing obstructions, as well as for the snow-excavator, the motion must be the reverse of that of the locomotive-wheels.

Any ice under the snow or between banks of the same is removed from a track by a double-spring rotary scraper, as seen in Figs. 6 and 7 and A B, Fig. 2, which is made of a cylindrical cast-iron hub with eight pieces cut out of its circumference, as between 1 2 3 4 5 6 7 8, Fig. 7, equally distant from each, and in the shape of a **V**, the **V** extending down toward the axle-tree one-half the radius of the hub. Eight scrapers *o p q r s t u v*, Figs. 6 and 7, made of spring-steel, are inserted into this hub, one into each **V**, and extending below the **V** and toward the axle-tree three-eighths of the distance from the axle-tree to the **V**. A spiral cylindrical spring, as *a b c d*, Figs. 6 and 7, passes around this hub and between the scrapers, and the wire passes each scraper by a notch (see Fig. 7) in the edge of the scraper. The wire is made of steel and spring-tempered after it has been formed into a spiral and bent around the cylindrical hub. The hub has a flange *a b c d*, Fig. 6, projecting over one-half the cylindrical spiral spring on one side. A circular iron plate *n*, Fig. 6, is screwed onto the outer side of the hub and of a diameter sufficient to cover the same portion of the spiral spring as is covered by the flange of the hub. A scraper of this kind is fitted onto each end of a shaft and the motion given it must be in a direction contrary to that of the driving-wheel. Thick ice may also be removed by burr, Figs. 8

and 9, and C, Fig. 2, or it may be used to start an engine over an icy track. It is made of cast-iron *a b c d*, Fig. 9, with countersinks in it to receive sixteen cold-chisels. These countersinks are equally distant from each other and are seven-eighths the thickness of the hub deep. At the distance from the center of the hub equal to one-half its radius is a countersunk circle *e e e e*, Fig. 9, and the cold-chisels are notched to correspond with it. An iron ring is countersunk into this circle and serves to prevent the chisels from flying out. A cast-iron plate *n n*, Fig. 8, is screwed upon the end of this hub, and its diameter is the same as that of the hub. A wheel or burr of this kind is placed on each end of a shaft and is raised or depressed by a lever, as seen at *a'' b'' c''*, Fig. 2, at the will of the engineer. To cut away ordinary or thin ice, it is merely depressed, so that it will by contact with the track revolve freely; but to start a locomotive upon an icy track it must be pressed downward and the engine applied to it. The inner part of the edge of the cold-chisel is slightly longer than the outer edge and tapers gradually toward it.

I have first described the construction of a machine *a b e d g c h*, Fig. 1, and *h e m k*, Fig. 3, for clearing obstructions from rail-road tracks, and would further say that the ends of the drum are circular cast-iron plates (*a b*, Fig. 17, is a section through the shaft) with a flange on the outside of the rim, as *c d*, Fig. 17, of each, wide enough to rivet, as 1 2, Fig. 17, the drum to them. The ends are fitted and riveted on the outside to the drum, as 1 2, Fig. 17. The shaft is fastened to the wheel, Fig. 13, which supports the center of the drum, and to each end of the drum by leaving a groove in the hub of the wheel and also in the shaft, as at *a*, Fig. 13, so as to admit a square key and placing the key into this groove, and the same where the shaft passes the ends of the drum. At the latter place there is a flange equal in width to the flange on the rim of the circular plate to give this point more strength.

On a frame in advance of the driving-wheel, and supported by burden-wheels, is, first, the double conical surface with flanges R, Figs. 1 and 2, to remove heavy obstructions. The endless-chain arrangement, Fig. 14 and *u v y z*, Fig. 2, immediately follows and removes the lighter substances which have escaped the double conical surface, and immediately in rear of this and in front of the burden-wheels is a wire spring-broom, as seen at A, Figs. 1 and 2, which passes over the track, clearing it for the burden-wheels. Immediately in rear of the burden-wheels are burr-wheels C, Fig. 2, to cut thick ice, which is often formed where the track passes through a gorge or deep cut. These wheels are raised or depressed by a lever, which may be acted on by steam and at the will of the engineer. This lever is seen by the dotted lines *a'' b'' c''*. Immediately following this is a double-spring rotary scraper A^3, Fig. 2, also acted on by a lever, as seen in the dotted lines *d'' e'' f''*, Fig. 2. Any ice formed under the snow or between banks of the same can be removed by this, and the steam, if necessary, be made to act on the lever. Immediately in rear of this and directly in front of the driving-wheels is placed a rotary wire broom, as at 4 5 6 7, Fig. 2, also acted on by a lever *g'' h'' i''*, Fig. 2, in a similar manner, and it is used to clear the track of ice or sleet and to brush off the ice that may have been cut, thrown, or left on by the preceding cutters.

That which I claim as my invention, and desire to secure by Letters Patent of the United States, is—

For the mode herein described of constructing and combining a series of machinery for clearing obstructions from railroad-tracks, the whole being constructed, combined, and operating substantially as is herein fully set forth.

SAMUEL STREETER.

Witnesses:

GEO. C. THOMAS,
T. C. DONN.