

of Harvey, belonging to the estate of Renick Huston, or to the estate of Thomas T. Renick,—and for the purposes of these suits it matters not to which, as the representatives of both estates are parties complainant,—as security for moneys borrowed for the use of a mercantile firm, was a plain misappropriation of the property of one of the estates. Our decree was that the notes should be returned to the representative of the estate from which it was wrongfully taken. The defendants retain their claims against the firm of B. T. Renick & Co., on its notes, and can prosecute them before the ordinary tribunals; and if any members of the firm have interests in the estate of Renick Huston, or of other deceased parties, they can seek to subject those interests to the payment of the claims without prejudice from our decree in these cases.

Petitions denied.

WATER-METER COMPANY v. DESPER.

1. While letters-patent for a combination are not infringed if a material part of it is omitted, yet if a part which is only formally omitted is supplied by a mechanical equivalent performing the same office and producing the same result, they are infringed.
2. The courts in this country cannot declare that any one of the elements entering into such a combination is immaterial. They can only decide whether a part omitted by the alleged infringer is supplied by an equivalent device.
3. Reissued letters-patent No. 5806, granted March 24, 1874, being a reissue of original letters No. 109,372 granted Nov. 22, 1870, to Phinehas Ball, and Benaiah Fitts, for an improvement in liquid meters, are not infringed by letters-patent No. 144,747, granted Nov. 18, 1873, to Henry A. Desper, for an improvement in fluid meters.

APPEAL from the Circuit Court of the United States for the District of Massachusetts.

The facts are stated in the opinion of the court.

Mr. Andrew McCallum for the appellant.

Mr. J. E. Maynadier, *contra*.

MR. JUSTICE BRADLEY delivered the opinion of the court.

This is a bill in equity filed by the Union Water-Meter Company, the appellant, to restrain the infringement of a patent and for an account of profits and damages. The letters-patent alleged to be infringed are reissued letters No. 5806, being a reissue of original letters-patent No. 109,372, granted 22d

November, 1870, to Phinehas Ball and Benaiah Fitts for certain improvements in water-meters; the reissue being made to the complainant as assignee, on the 24th of March, 1874. The defendants, by their answer, deny that the reissued patent was for the same invention described in the original; aver that the invention claimed was covered by another patent granted 20th July, 1869, to the same patentees, Ball and Fitts; deny that they were the first and original inventors of the alleged improvement, specifying various older patents in which, as they allege, it was described, and divers persons who had known and used it; deny infringement; and aver that all water-meters made by the defendants are constructed according to letters-patent No. 144,747, granted 18th November, 1873, to Henry A. Desper, one of the defendants, except in the omission of a certain adjusting screw.

The water-meter which is the subject of the patent consists of two parallel horizontal cylinders, each traversed by two pistons, connected together by a connecting-rod of such length that when one piston is at one end of the cylinder the other is at a sufficient distance from the other end, to leave the requisite space to be filled with the quantity of water to be measured at each stroke. This water being discharged, the pistons are made to traverse the cylinder and allow the opposite end to be filled with water, and discharged in like manner. By this reciprocating motion of the pistons, regulated quantities of water are constantly received and discharged into and out of the two ends of the cylinder alternately. The pressure of the water from the source of supply, admitted by means of proper valves, gives to the pistons this reciprocating motion. The valve gear between the two parallel cylinders is so arranged as to cause the pistons in one cylinder to move in an opposite direction from those in the other. A rotary valve is used for both cylinders, situated between and below them, being circular, or funnel-shaped, having holes, or ports, in its side for the induction and eduction of the water into and out of the cylinders, and being crowned with a bevel-gear to give it a circular motion. Across and over the valve, extending from one piston-rod to the other, is placed a shaft, having a crank at each end, and a bevel pinion near one of the cranks, meshing into the

bevel-gear of the valve ; the two cranks are arranged at right angles with each other, and each has a crank-pin which is inserted in a slot made in the centre of the piston-rod with which it is connected,—the side of the cylinder being removed, or open, between the end portions that receive the water. The slot which receives the crank-pin is perpendicular, and at right angles with the length of the piston-rod, and is wider than the diameter of the pin, and enlarged in the middle in order to give the pin room, and allow the crank to turn freely over after the piston has been stopped. The pistons are prevented from coming into contact with the ends of the cylinders by means of adjusting stops, slightly projecting therefrom inside. Projecting stops for arresting the movement of the pistons, and much of the mechanical arrangement between the crank-shaft and the slots in the piston-rods, used for giving the proper motion to the crank-shaft, are to be found described in a patent granted to Mr. Ericsson in 1851 for a water-meter having slide valves instead of a rotary valve, but in which a rotary motion was communicated to the indicator.

The patent in question does not cover any of the separate parts of the meter, it being conceded that these were all known and used before the application for the patent. The claim relied on by the complainant is for a combination only, being the fourth claim in the reissued patent, which is in the following words :—

“ 4. The combination in a liquid meter of the following instrumentalities, to wit, a rotary valve, *g*, provided with suitable ports or openings, through which the liquid to be measured can be supplied to the meter and discharged therefrom; two cylinders, *b* and *b'*, for the reception and measurement of the liquid; the double-acting pistons, *c* and *c'*, each carrying a rod, *d*, and each of these provided with a single cam-slot, *e*, arranged as described, and of a width greater than the diameter of the wrist *n* of the crank-shaft, so as to permit of the adjustment of the pistons, that they may discharge at each stroke, as nearly as possible, the exact quantity of water required of them, and so as to allow each of the crank-wrists *n* freely to pass its dead-centre after its own piston has ceased to act on it; adjusting stops, *o*, by means of which the adjustment of the length of the stroke of the pistons at either end is effected;

and, lastly, a crank-shaft, *i*, through which motion from the pistons is imparted to the valves, the whole operating in the manner substantially as described."

The combination here claimed consists of five parts or elements, viz.: 1st, the rotary valve; 2d, the two cylinders; 3d, the double-acting pistons, connected by a rod having a cam-slot at right angles with the length of the rod; 4th, the adjusting stops; 5th, the crank-shaft with its pinion, and cranks, by means of which rotary motion is imparted from the pistons to the valve. The rotary valve, and the combination of the cylinders, piston-rods, crank-shaft, and rotary valve were the subjects of a previous patent granted to Ball and Fitts on the 20th of July, 1869. The only additional elements in the present patent are the adjusting stops and the rectangular position of the slots in the piston-rods.

It is a well-known doctrine of patent law, that the claim of a combination is not infringed if any of the material parts of the combination are omitted. It is equally well known that if any one of the parts is only formally omitted, and is supplied by a mechanical equivalent, performing the same office and producing the same result, the patent is infringed.

The first question, therefore, is, whether the defendants infringe the claim referred to,—whether they do, in fact, in their water-meters, use all the parts of the combination above specified.

The meter manufactured by the defendants is different in several respects from that described in the complainant's patent. It has a rotary valve like the latter, but without any bevel-gear; it also has two cylinders, with an immaterial difference of position, being placed at right angles with each other instead of being parallel; each cylinder is likewise provided with two double-acting pistons, connected by a piston-rod, the same as in the complainant's meter; the cylinder-heads are also furnished with Eriesson's stops projecting inside for arresting the movement of the pistons, though these stops are fixed and not adjustable. But the meter of the defendant's has no crank-shaft, and no semblance of a crank-shaft, for imparting motion from the pistons to the rotary valve; on the contrary, their valve is connected directly with the piston-rods in the follow-

ing manner: The piston-rods cross each other at right angles, having transverse slots, and being halved together, one lying immediately on the other, so that the axes of the pistons are in the same plane. The valve below is connected directly with the piston-rods by a single crank which is keyed on to its upper solid stem, and has a crank-pin which works in the two slots of the respective piston-rods. Thus arranged, the successive reciprocating movements of the two double pistons impart a circular motion to the valve, which, by duly arranged induction and eduction ports, alternately fills and empties the respective cylinders.

From this it appears that, in the construction of defendants' meter, the crank-shaft, with its two cranks, pinion, and gearing connection (which is an essential feature of the complainant's meter), is altogether dispensed with. The defendants effect the desired result of communicating rotary motion to the valve without any such shaft, or any thing equivalent thereto. The entire part, with all its appurtenances, is thrown out of their machine. They use a crank, it is true; but it is attached directly to the rotary valve, and is a part of it. The use of a crank in converting reciprocating into rotary motion is an old device. It was applied to the steam-engine a century ago, and has been applied to hundreds of different machines since that time. Ball and Fitts had no claim to it, but only to the particular method and device by which they employed it, in combination with the various other parts of their meter. Instead of the crank-shaft, had they in their patented combination claimed every method, and all methods, of communicating motion from the piston-rods to the rotary valve by means of a crank, the defendants' meter would have been an infringement. But such a claim might not have been valid. At all events, it was not allowed.

The specification was evidently drawn with great care, and it is to be presumed that the patentees claimed all that the Patent Office considered them entitled to. We cannot say that the crank-shaft was an immaterial part of their combination. The patent, as it stands, occupies very narrow ground. It requires the presence of every one of the elements specified in the combination secured by it. We think that the defendants

do not use all of these elements, but that they dispense with one of them at least which is material in the complainant's meter. Our conclusion, therefore, is, that they do not infringe the complainant's patent.

It may be observed, before concluding this opinion, that the courts of this country cannot always indulge the same latitude which is exercised by English judges in determining what parts of a machine are or are not material. Our law requires the patentee to specify particularly what he claims to be new, and if he claims a combination of certain elements or parts, we cannot declare that any one of these elements is immaterial. The patentee makes them all material by the restricted form of his claim. We can only decide whether any part omitted by an alleged infringer is supplied by some other device or instrumentality which is its equivalent. We think no such equivalent is supplied in this case. The general construction of the defendants' meter, and the arrangement of its parts, are so different from that described in the complainant's patent, and claimed therein, that the defendants are enabled to dispense with the entire part referred to.

Decree affirmed.

RAILROAD COMPANY v. TENNESSEE.

The Constitution of Tennessee, in force in 1838, declares that "suits may be brought against the State in such manner and in such courts as the legislature may by law direct." The statute of 1855 providing that actions might be instituted against the State under the same rules and regulations that govern those between private citizens, but conferring no power on the courts to execute their judgments, was repealed in 1865. No other law was enacted prescribing the manner or the courts in which the State could be sued. In a suit subsequently brought by the State in 1872 against the Bank of Tennessee and certain of its creditors, A., who was admitted a defendant, filed a cross-bill, setting up that while the first statute was in force the bank became indebted to him, and, praying that under the indemnity clause of its charter a decree be rendered against the State for the amount of the debt. The cross-bill was dismissed solely upon the ground that the State could not be sued in her own courts. *Held*, that the repealing statute of 1865 did not impair the obligation of a contract, within the meaning of the contract clause of the Constitution of the United States.