

edge is dull, and its normal characteristic has been obliterated, either accidentally or negligently, it will burst the loops, does not constitute it the wedge of the patent.

The test of infringement, when alleged against the manufacturer of a machine, and based solely upon the machine itself, is whether, as made and when offered for sale, it contains the patented invention. If its structure is such that, when used in the manner contemplated by the manufacturer, it has the capacity of appropriating the invention, he can be treated as an infringer by participation with the user. But if its structure is such that it can only acquire that capacity by misuse, whether negligent or intentional, he is not responsible as an infringer.

Accordingly the decree of the circuit court should be reversed, with costs against the appellee, and the cause remanded to the circuit court, with instructions to dismiss the bill, with costs of that court.

BOYDEN POWER-BRAKE CO. et al. v. WESTINGHOUSE AIR-BRAKE CO. et al.

WESTINGHOUSE AIR-BRAKE CO. et al. v. BOYDEN POWER-BRAKE CO. et al.

(Circuit Court of Appeals, Fourth Circuit. November 11, 1895.)

Nos. 131, 134.

1 PATENTS—CONSTRUCTION OF CLAIMS—"SUBSTANTIALLY AS SET FORTH."

The phrase, "substantially as set forth," used in the claim of a patent, has a technical meaning, and is equivalent to saying, "by the means described in the text of the inventor's application for letters patent, as illustrated by the drawings, diagrams, and models which accompany the application." These words limit the general terms of the specification, which set out the function performed by the invention, and confine the inventor's rights to his own special means of performing that function.

2. SAME—INFRINGEMENT—EVIDENCE—RULINGS OF PATENT OFFICE.

Where the patent office, after full examination, grants a patent for a device which accomplishes the same result as a device previously patented to a different inventor, this is a ruling that the later device does not infringe the earlier patent; and in an infringement suit involving the two devices this ruling is to be regarded as the testimony of experts of the highest experience, skill, and knowledge.

3. SAME—DEFECTIVE CLAIM—AIR BRAKES.

In claim 2 of the Westinghouse air-brake patent, No. 360,070, the description declaring that the piston, "by a further traverse, admits air directly from the main air pipe to the brake cylinder," is fatally defective in claiming only a result, which is public property, and not identifying the specific means by which that result is achieved by the inventor.

4. SAME—MECHANICAL AND FUNCTIONAL EQUIVALENTS.

In determining whether one device employs means equivalent to those of another device, the fact that the invention relates to an agency, such as compressed air, which operates by modes not visible to the senses, does not authorize the court to determine the matter by reference to functional equivalents rather than mechanical equivalents. 66 Fed. 997, reversed. *O'Reilly v. Morse*, 15 How. 62, applied.

5. SAME—EFFECT OF PRIOR DECISIONS—RES JUDICATA.

Prima facie, a decision founded upon one patent not in suit in the present case, and another decision founded upon three patents collectively, only one of which is now in issue, declaring that an invention used by a person not a party to the present suit was an infringement, is not binding where the alleged infringing machine differs widely in structure from the one complained of in those suits.

6. SAME—MECHANICAL EQUIVALENTS—AIR BRAKES.

The brass-ring partition of the Boyden air-brake patents (Nos. 481,134, 481,135, and 481,136), with the port contained therein, inserted in and made a part of the triple valve itself, which successfully accomplishes the function of discharging train pipe air into the brake cylinder simultaneously with the triple valve's discharge of auxiliary reservoir air into that cylinder, is not the mechanical equivalent of the additional stem and valve and the by-passes leading from the additional valve to the brake cylinder, which, in the Westinghouse patent, No. 360,070, accomplish the same function, although both devices are put in action by the triple-valve piston when on its extreme traverse. 66 Fed. 997, reversed.

Appeal from the Circuit Court of the United States for the District of Maryland.

This was a bill in equity by George Westinghouse, Jr., and the Westinghouse Air-Brake Company against the Boyden Power-Brake Company, George A. Boyden, president, Charles D. Mann, secretary, and William Whitridge, treasurer, for the infringement of a patent relating to quick-action air brakes. In the circuit court a decree was rendered declaring infringement of claim 2, and noninfringement of claims 1 and 4, and awarding an injunction and accounting, with a reference to a master in the usual form. 66 Fed. 997. From this decree both parties appeal.

George Westinghouse, Jr., one of the complainants in this suit, is the inventor of automatic air brakes for the slowing and stopping of railroad trains. He has taken out patents for devices in this connection to the number of some 10 or 12. Of these the patent now in suit is that numbered 360,070, issued March 29, 1887. This device does not seem to have proved effectual for the special purposes for which it was designed, and he improved it by a later one, patented to him on July 24, 1888, numbered 376,837, which is not in suit. These two devices, while preserving the mechanism for the ordinary stopping of trains embraced in earlier patents, contained additional mechanism for their prompt and complete stoppage in sudden emergencies. The apparatus as thus devised and improved are technically called "quick-action brakes," and are embraced in the patents 360,070 and 376,837.

Of the air brakes patented by Westinghouse previously to the issuing of the two patents just named, the latest improvements were embraced in the patent numbered 220,556, issued October 14, 1879. In speaking of this latter patent we shall, except when special mention of previous ones will be necessary, include generically all the improvements embodied severally in its predecessors. This air brake, 220,556, though intended for both ordinary work and emergency work, proved to be really effective only for the ordinary slowing and stopping of trains, and not to answer for the sudden stoppage of very long trains of cars. But it contained the auxiliary reservoirs and other apparatus which gave the brakes an automatic action. These three patents, Nos. 220,556, 360,070, and 376,837, are those which enter most directly into the consideration of the case before us.

It is true that the patent of Westinghouse, No. 168,359, is mentioned in complainant's bill of complaint, and not 220,556; but in the briefs and in most of the testimony No. 220,556 is made the prominent subject of discussion, and not 168,359. There was an intermediate patent, No. 217,838, which enters more or less into the polemics of this controversy; inasmuch as that patent,

as well as 220,556, already mentioned, were the immediate bases on which the quick-action brake No. 360,070 was founded.

In the earlier stages of the development of the Westinghouse air brake, it consisted of the following parts: First, a compressing air pump on the engine, by which air was compressed to the density of 90 pounds to the square inch; second, a large reservoir for storing the compressed air, fixed on the engine; third, a train pipe or main pipe leading from the engine to and along all the cars of the train, connected at each interval between the cars by a flexible hose, with couplings, rendering the train pipe continuous, and constituting it a conduit for transmitting compressed air from the engine to every car; and, fourth, a brake cylinder on each car, connected by a branch pipe to the train pipe, and chargeable with compressed air through the train pipe from the storage reservoir on the engine,—this brake cylinder operating by means of suitable levers upon the brake shoes which clapsed the wheels of each car. Useful as this system of braking proved to be, it was found not to meet all the requirements of the service. In the transmission of compressed air from the engine an appreciable loss of time was found to occur. This loss proved to be about 1 second per car; so that on a passenger train of 10 cars the time necessary for the pressure to reach the rear car would be 10 seconds; and on a freight train of 50 cars would be nearly a minute. Thus, while the forward movement of the foremost cars would be checked at once, that of the rearmost cars would not be as promptly checked, and these would come against the cars in front of them with more or less shock, producing more or less discomfort or positive damage. This defect will be appreciated when it is remembered that a train moving at the rate of 45 miles an hour moves 66 feet per second; so that a freight train of 50 cars would run more than half a mile before the brakes could begin to be effective along the entire train. This defective system contained but one reservoir for holding the compressed air, which, as before stated, was attached to the engine, and from which all the brake cylinders of the several cars had to be charged back through the train pipe and its branches and couplings. It was incumbent upon the inventor, therefore, to devise a remedy for this defect in the earlier forms of his air brakes. He supplied it by providing an auxiliary reservoir for compressed air on each car; and also by devising a mechanism for discharging compressed air from this auxiliary reservoir into the brake cylinder of its own car; so that, as soon as the engineer put in action his mechanism for checking or stopping the train, there was a simultaneous action of the brake cylinders along the whole train upon the series of brakes provided for each car. The mechanism devised for this purpose was what is known in the art as the "triple valve," one of which was provided for each car, and acted upon each brake cylinder with compressed air drawn from each auxiliary reservoir. It was called a triple valve because one of its valves connected with the train pipe leading from the engine, another with the auxiliary reservoir belonging to each car, and a third with the brake cylinder of each car. It was located at the junction of the three pipes which lead from and to each of these devices. The triple valve has three ports leading, respectively, to the three devices named, and also a fourth one leading to the open air.

A very important feature of the Westinghouse triple-valve mechanism consisted in its being automatic in operation. It is not in our province to enter into details. Suffice it to say that when the train is in use all the apparatus which has been described is kept constantly charged in full with compressed air, generally to the density of 70 pounds to the inch, which has continuous and unobstructed flow from the main reservoir on the engine to all the auxiliary reservoirs on the cars. While the apparatus is thus full-charged from the engine, through the train pipe to the auxiliary reservoirs, the piston of each triple valve is held to its normal position with all ports closed, there being an equipoise of pressure on each side of it. It follows that whenever the pressure of the air on the train pipe side of the piston is reduced, the piston moves out into its chamber, and thereby opens a passage for the compressed air from each auxiliary reservoir into each brake cylinder, resulting automatically in an application of the brakes. This reduction of pressure in the train pipe has the result described, whether it is caused by the engineer in intentionally opening his valve for the purpose, or by any accident which

may produce a rupture in any part of the train pipe. Such action of the engineer, or such accident, opens the train pipe for the escape of pressure from that side of each triple-valve piston, causes the piston to move forward in its chamber, and thereby to open a passage for discharging compressed air from the auxiliary reservoir to the brake cylinder for action upon the brakes. This automatic action was a very important achievement, and gave to the air brake of Westinghouse a part of its name.

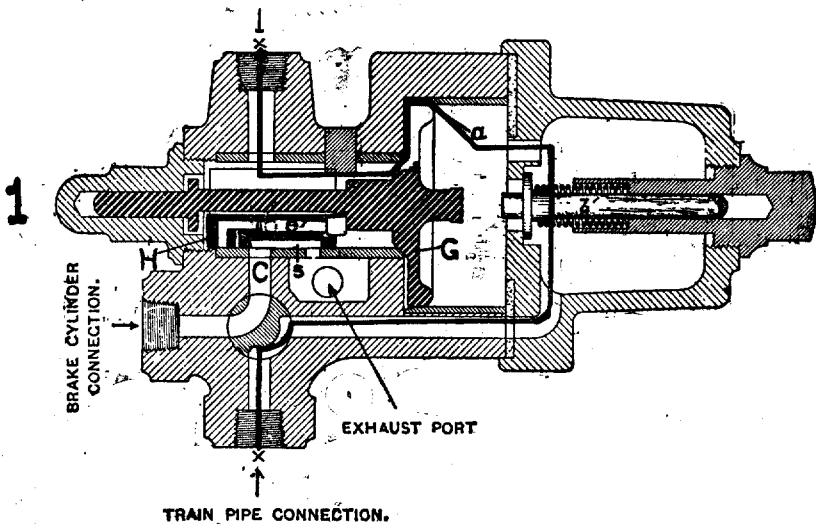
Before this invention, the brake cylinders were charged directly from the engine by forcing the compressed air backward into them along the entire length of the train. In the triple-valve device the movement was reversed. While the train is running, all the apparatus except the brake cylinders is full of air of the density of 70 pounds, stored distributively in the several auxiliary reservoirs. The engineer operates by opening wide his valve on the engine for the escape of train pipe air, which thereby takes a course the reverse of the former, beginning at the rearmost car, and moving forward along all the cars to its escape at the engineer's valve. Thus, before the invention of the improved device patented in No. 217,838, when the engineer desired to apply his brakes with full force he operated the valve at the engine, and opened the port wide, letting the compressed air out of the train pipe at the locomotive, then its only vent. The air, as before said, had to travel from the rear car along all the cars, forward to the engine, before it could lessen the pressure of the train pipe air on the train pipe side of the chamber of each triple-valve piston, and before it could thereby operate the brake cylinders with air from the auxiliary reservoirs. In a train of 50 cars it would have to travel nearly half a mile to get out at the engine. Westinghouse devised in patent 217,838 a means of quickly emptying the train pipe by providing release valves on each car connected directly with the train pipe; so that the air of the train pipe could be vented promptly at each car, and thus shorten the time of bringing all the brakes along the whole train into action. But while the triple-valve and other mechanism patented in No. 217,838 and carried into No. 220,556 was found to accomplish the purpose of producing simultaneous action by the brakes in every car, and thus to prevent, in a great measure, the jostling of cars against each other, thereby securing a comparatively steady, smooth, uniform arrest of movement along the whole train, yet it was found to be effective for this purpose in very long freight trains only on ordinary occasions, such as the stopping of trains at stations, or slowing them at side tracks, or holding their speed in check on descending grades. The mechanism of the patents just named did not provide effectively for sudden emergencies, and therefore failed to meet a great necessity of the service. It is true that the design of the inventor was to devise in these patents an apparatus that would be effective for both the gradual and the sudden stoppage of trains. For the former purpose he inserted a sensitive valve in the stem of the triple-valve piston of 220,556, by which, on a partial movement of the piston in its chamber, a graduated discharge of air from the auxiliary reservoir into the brake cylinder was effected. For the latter purpose—the sudden stoppage of trains—he provided a main valve at the end of the stem of the piston, by which, on a complete traverse by the triple-valve piston in its chamber, a large venting of compressed air from the auxiliary reservoir was effected; so that, in the language of one of the Westinghouse witnesses: "If an emergency arises demanding that the brakes be instantly applied with full force to effect a sudden stoppage of the train, the pressure of air is suddenly and considerably or entirely reduced in the train pipe, with the result that the piston of the triple valve makes its full stroke, * * * permitting auxiliary reservoir air to flow directly into the brake cylinder, * * * [making what is known as] the 'emergency stop.'" The inventor, however, failed in this latter object. It was found in practice that the air from the auxiliary reservoir did not act with sufficient promptitude on the brakes for emergency purposes, and that it would be necessary to devise some other means for effecting a quick action of the brake cylinder. Patent 217,838, repeated in patent 220,556, was a most valuable invention. It had great utility. It produced a uniform stoppage of the cars of long trains on ordinary occasions; and on short trains, whether passenger or freight, it was practically effective even for emergency purposes. Yet for the sudden stoppage of long trains in the face of immediate

danger it failed to answer the requirements of the service. One of the counsel of Westinghouse expressed it in his oral argument before this court: "A passenger train, or a freight train of moderate length, and therefore of moderate weight, could be stopped, as is shown by the proofs, by the old automatic brake [patent 220,556], within reasonable limits of distance of space and lapse of time; but, the railroad conditions of the country and the system of traffic altering, by which large locomotives, drawing heavy and long trains, came into use, a new development of the art was called for; that is, for a brake which would act quickly on any car, and act quicker from car to car than any which had previously existed." With this brake of patent 220,556, gradual stopping and slowing was executed by giving the piston a partial or half traverse in its chamber, by which air passed through the sensitive valve in the stem of the piston to the brake cylinder; and emergency stopping was done by a full or extreme traverse of the piston in its chamber, which closed the sensitive valve in its stem and opened the main valve fixed upon the end of the stem, and allowed a full and direct venting of air from the auxiliary reservoir into the brake cylinder. The best illustrations available for the better understanding of the preceding remarks are the diagrams that are found below.

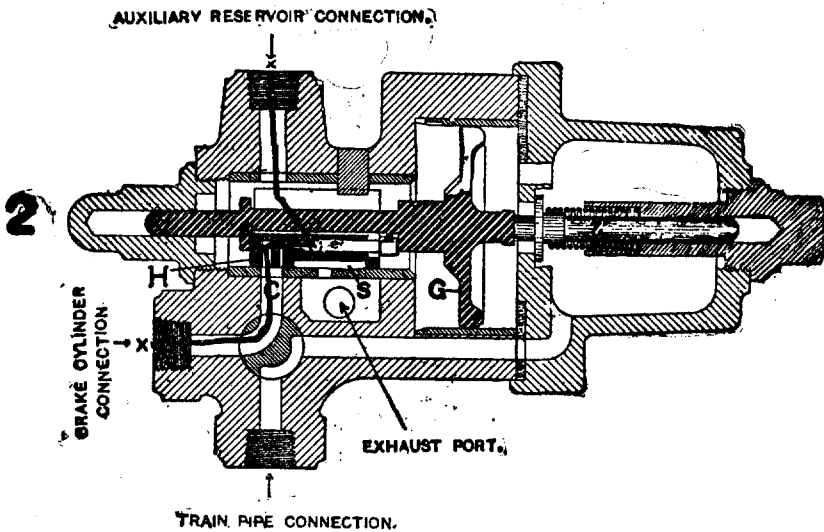
TRIPLE VALVE DEVICE OF PATENT 220,556.

And as shown in the Westinghouse Trade Catalogue of 1886.

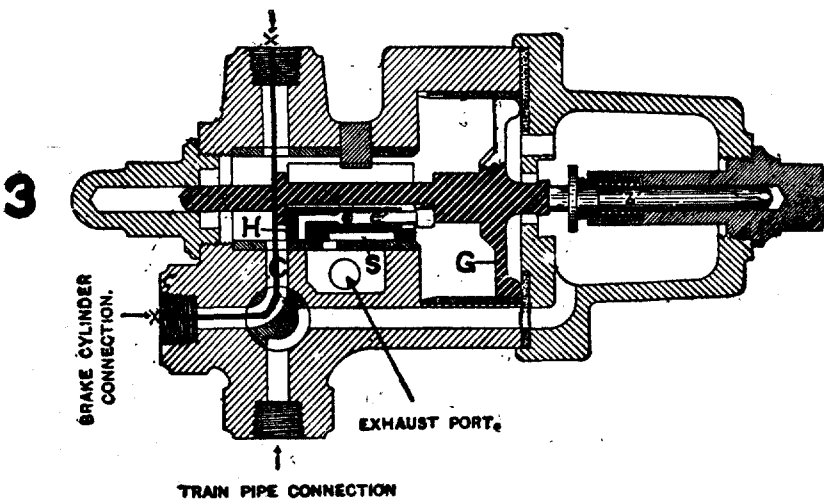
AUXILIARY RESERVOIR CONNECTION.



This cut shows the Valves and Piston G in the Release Position, as used in 1879. The course of the air in charging the Auxiliary Reservoir passing through the Port A is shown by the line indicated by the arrows, x x.



This cut shows the "preliminary traverse" of the piston G and the valves *e'* and H in position for graduating and service stops, as used in 1879. The course of the air from the Auxiliary Reservoir to the Brake Cylinder passing through the port opened by the graduating valve *e'* is shown by the line indicated by the arrows, *x x*.



This cut shows the "further traverse" of the piston G with the main valve H in position for an emergency stop. The port G thereby being opened to its full capacity to admit air to the Brake Cylinder quickly as used in 1879. The course of the air from the Auxiliary Reservoir to the Brake Cylinder passing through the port opened by the main valve H is shown by the line indicated by the arrows, *x x*.

It is obvious from what has been said that the piston of the triple valves is a most prominent instrumentality in the present controversy. The brakes are operated by the engineer from the engine. The engineer's duty in connection with them is, first, to keep his apparatus full charged with compressed air whenever the train is in use, and, second, when the occasion requires, to let off air from the train pipe, and thereby cause, in the manner heretofore described, the escape of more or less air from the auxiliary reservoirs into the brake cylinders, for action upon the brakes. The mechanism is such, also, as before stated, that an escape of compressed air from the train pipe results not merely from the intentional action of the engineer himself, but automatically from any accident that may happen to cause a severance of the train into parts, or a rupture of the train pipe or its connecting hose or branches. It is the escape or venting of compressed air, either intentional or accidental, from the auxiliary reservoirs in which it is stored into the brake cylinders, that operates the brakes; and this venting is done through the triple valves, by means, as heretofore stated, of the triple-valve pistons. In the Westinghouse automatic air brake, as patented in No. 220,556, the ordinary work of braking was performed by a partial traverse of its chamber by a triple-valve piston, graduated, according to the purpose desired, at the will of the engineer; and emergency work was done by an extreme traverse of the piston to the end of its chamber. It may be observed that the automatic air brake, patented as No. 220,556, which embraced all previous improvements, is now free to public use, the patent having expired, and ceased to be confined to the exclusive use of its inventor.

A study of patent 220,556 will show that compressed air, driven by the engineer into the train pipe, passed through the triple valve of each car to its auxiliary reservoir; that there was no vent for this air into the brake cylinder except through the auxiliary reservoir, and that this vent from the auxiliary reservoir to the brake cylinder ordinarily occurred when the triple-valve piston had made but a partial movement or traverse in its chamber. The text and diagram of 220,556 show that even a full or extreme traverse of the piston in its chamber would vent no other compressed air into the brake cylinders except from the auxiliary reservoirs. The device embraced in patent 220,556, valuable and efficient as it is and was for ordinary work on all trains with the triple-valve piston in partial traverse, and for emergency work on short trains with the triple-valve piston in extreme traverse, yet failed to meet the requirements of the service for emergency work on long trains of 50 large freight cars. For the latter work it was found insufficient in practice, the insufficiency consisting in not acting with sufficient promptitude. It is not for us to explain why the passage of compressed air exclusively from the auxiliary reservoirs to the brake cylinders was not sufficiently prompt on long freight trains. It is assumed in the briefs and testimony that the mechanism of this patent did not suffice for this work. It is admitted on both sides that, while the mechanism of 220,556, though effective for the ordinary purposes of braking trains, such as stopping them at stations, slowing them in passing switches and other points requiring continuous movement, and checking them on descending grades, yet that it was not effective for abruptly stopping long trains in sudden emergencies. This deficiency of the Westinghouse brake in the stage of improvement which it had reached in patent 220,556, from whatever cause resulting, created the necessity for some additional invention, by which, on sudden emergencies in the presence of immediate danger, a long train of cars in rapid motion should be immediately brought to an abrupt stoppage by an instantaneous and simultaneous application of all the brakes of every car. The thing wanted was what has technically come to be called "quick action." Each of the chief contestants in the present suit set himself laudably to work in devising a means to accomplish this important desideratum, each taking the air brake patented as No. 220,556, Westinghouse's exclusive property in which having expired, as the basis of his new device, the common object being to produce a mechanism by which to secure instantaneously, whenever and only when a sudden emergency arose, such a quickened discharge of compressed air into the several brake cylinders that each car would simultaneously, and the entire train as a whole, be brought to a sudden halt, but leaving all the mechanism already existing for use in ordinary braking unmolested and unchanged.

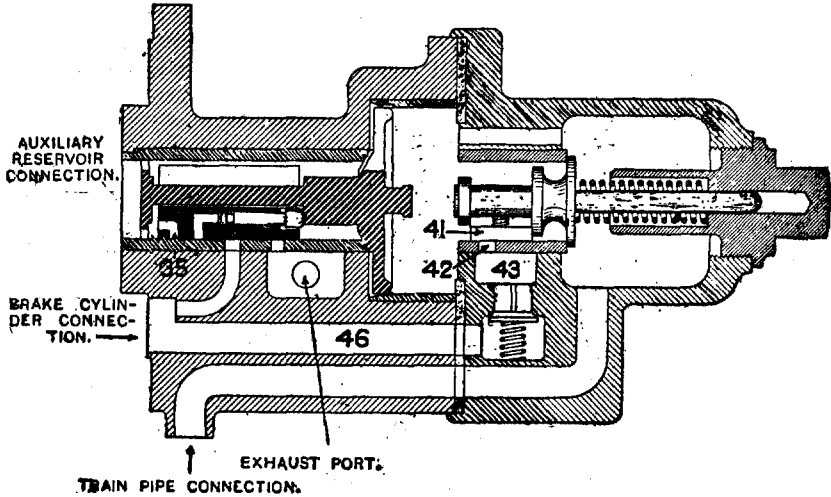
Counsel for appellees, in his oral argument, well described the need that was

to be supplied when he said: "Quick action does not involve greater power of the brake. It is not a question of greater force of brake, as applied to the brake shoes of any individual car. The force with which the brake shoes are applied to any individual car is no greater with the Westinghouse quick-action brake (360,070), which is in controversy here, than it was with the old automatic brake (220,556). The engineer is, in both cases, operating with seventy pounds of pressure in the main reservoir on the locomotive and in the auxiliary reservoirs on the cars throughout the train, and in the system of pipes throughout the train; and all the force he can possibly apply with the present quick-action brake (360,070), or with the old automatic brake (220,556), is seventy pounds of pressure to the piston of the brake cylinder, and through it to the brake shoes." And the same counsel well described the desideratum sought for—the gist of the urgent need—when he said that its characteristic must be "the utilization of auxiliary reservoir pressure for service or for graduation, when you do not need to use quick action; but when you want to get what is known in the art as 'quick action,'—when the question of life or death is to be settled in a few seconds,—then the pressure from the train pipe, which comes from the main reservoir on the locomotive, is to be utilized for that purpose." Westinghouse devised for each car an additional valve, which he so attached to the triple valve of patent 220,556 that when the piston should be in complete traverse, and driven to the end of its chamber, it should drive forward an additional stem provided for this additional valve, and thereby open a port in that valve, by which compressed air from the train pipe should pass, through by-passes independent of the triple valve, into the brake cylinder into which the triple valve already vented compressed air from the auxiliary reservoir. By this device of the additional stem, the additional valve, and the independent by-passes into which the latter opened, the inventor contrived to discharge compressed air from both the auxiliary reservoir and the train pipe into the brake cylinder of each car simultaneously, and thereby so quickened the action of the brakes as to accomplish the desideratum of quick action. To repeat, his device for this purpose consisted in attaching to the pre-existing triple valve, as patented in No. 220,556, a machine which embraced an additional stem, an additional valve, and additional by-passes leading from the port in the new valve to the brake cylinder. This new attachment is put in action for emergency purposes by the triple-valve piston when on its extreme traverse. The previous machine, 220,556, had provided for the extreme traverse of that piston by which it had put in action the main valve at the end of its old stem, and opened a full and direct flow of compressed air from the auxiliary reservoir into the brake cylinder for use in emergencies. Thus the new contrivance, by the same extreme traverse of the triple-valve piston, continued the old flow of compressed air for emergency purposes, and provided an additional flow of the air for emergency purposes by an additional mechanism; this latter flow being directly from the train pipe, and the former flow being from the auxiliary reservoir. Such was the make-up of patent 360,070,—two machines in one box or case. It was found, on thorough and conspicuous trials, to be imperfect and inefficient, and lacked that essential element of patented devices, utility. But it contained a valuable invention, and was afterwards so improved in details, when patented in No. 376,837, as to become a machine of great value to the public, a supplemental piston being supplied in 376,837.

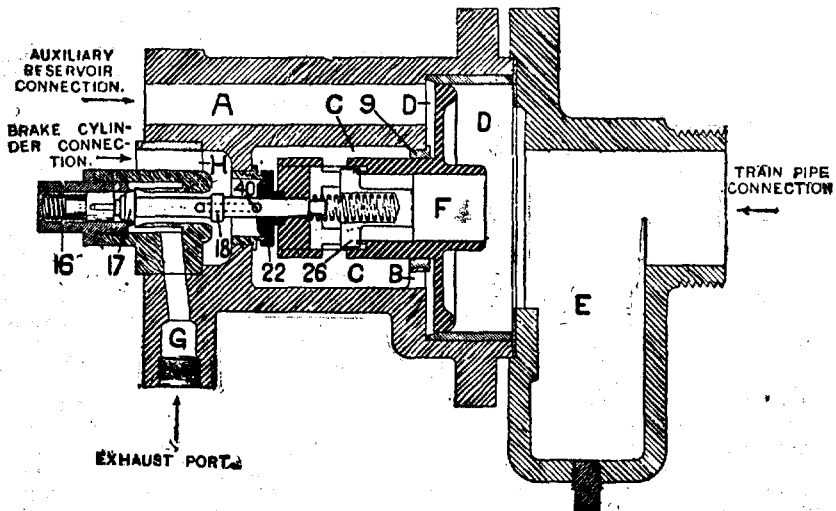
Boyden also made a successful invention for venting compressed air from the main reservoir and train pipe into the brake cylinder of each car simultaneously with venting that air from the auxiliary reservoir to the brake cylinder, as had been done for emergency purposes by the previous triple valve of patent 220,556. He did not resort to a second machine. He did not devise an additional stem, an additional valve, or by-passes independent of those of the triple valve. He accomplished the transmission of compressed air directly from the train pipe to the brake cylinder by other means. He inserted a partition in the form of a brass ring into the triple valve of patent 220,556 itself, between the chamber containing the valves and the compressed air of the auxiliary reservoir on one hand and the chamber of the piston containing train pipe air on the other, and he opened a port in that partition for the passage of compressed air from the train pipe to the brake cylinder. He thereby so provided that, whereas Westinghouse's device employed a fourth valve, another

stem, and newly-contrived by-passes for discharging compressed air from the train pipe into the brake cylinder, organized separately in a second machine, Boyden contrived to discharge both train pipe air and auxiliary reservoir air simultaneously into the brake cylinder without using an additional stem or valve or by-passes. The devices of Westinghouse and Boyden are shown herewith.

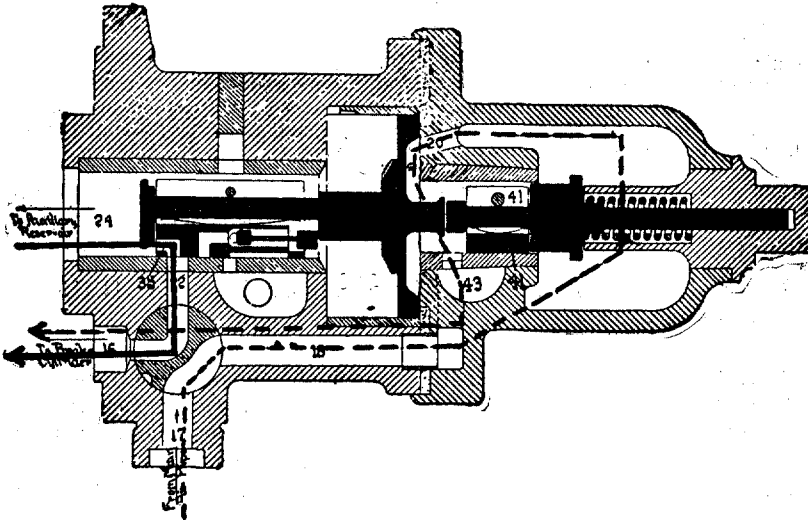
COMPLAINANT'S PATENT IN SUIT, NO. 360,070.



DEFENDANT'S STRUCTURE, PLATE XI.



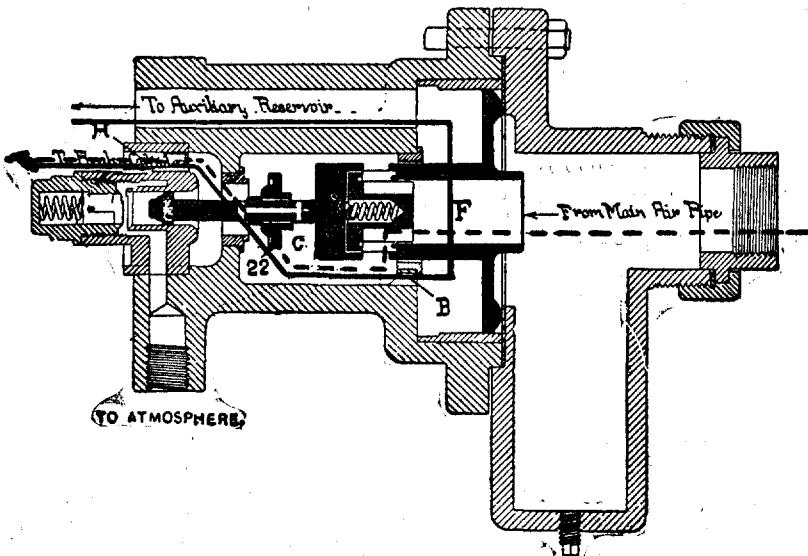
COMPLAINANT'S PATENT NO. 360,070.



Drawing No. 7.

Note.—The Check-Valve 49 is located back of the passage 18 and therefore is not visible on Cut 7.

DEFENDANT'S STRUCTURE PLATE XL



Drawing No. 8.

It is not for us to describe how the introduction of train-pipe air into the brake cylinder of each car quickens the action of the brakes which are already subject to the action of air from the auxiliary reservoir. It is sufficient to say that the engineer, by means of his valve on the engine, and by means of the branch pipe leading from the train pipe to the triple valve of each car can vent the air of the train pipe directly and more promptly into the brake cylinder than he can by the indirect conduit opened by the main valve of 220,556 into the brake cylinder from the auxiliary reservoir when its piston is in extreme traverse, as heretofore described. Quick action being the desideratum, the engineer effects it more promptly by the direct means than by the indirect.

Lysander Hill and Hector T. Fenton, for Boyden Power-Brake Co.
George H. Christy and Frederick H. Betts, for Westinghouse Air-Brake Co.

Before GOFF and SIMONTON, Circuit Judges, and HUGHES, District Judge.

HUGHES, District Judge (after stating the facts). The foregoing statement of facts and explanation of the devices upon which the decision of this case depends is of unusual length, which has been a necessary result of the extraordinary magnitude of the record and the unusual number and volume of the briefs of counsel in the case; but it has been prepared at the expense of very much labor, and is, we trust, sufficiently correct to warrant the conclusions of law which we have founded upon them.

Of the technical "claims" set out by Westinghouse in his application for the patent No. 360,070, those numbered 1, 2, and 4 are the special subjects of this suit. The device described in these claims is the one which Westinghouse charges in the bill of complaint in this case to have been infringed by the Boyden invention. The three "claims" are as follows, and the words in italics indicate the device charged to have been infringed:

"(1) In a brake mechanism, the combination of a main air pipe, an auxiliary reservoir, a brake cylinder, a triple valve and an auxiliary valve device, actuated by the piston of the triple valve, and independent of the main valve thereof, for admitting air in the application of the brake directly from the main air pipe to the brake cylinder, substantially as set forth.

"(2) In a brake mechanism, the combination of a main air pipe, an auxiliary reservoir, a brake cylinder, and a triple valve having a piston whose preliminary traverse admits air from the auxiliary reservoir to the brake cylinder, and which, by a further traverse, admits air directly from the main air pipe to the brake cylinder, substantially as set forth."

"(4) The combination, in a triple-valve device, of a case or chest, a piston fixed upon a stem and working in a chamber therein, a valve moving with the piston stem, and governing ports and passages in the case leading to connections with an auxiliary reservoir and a brake cylinder and to the atmosphere, respectively, and an auxiliary valve actuated by the piston stem, and controlling communication between passages leading to connections with a main air pipe and with the brake cylinder, respectively, substantially as set forth."

The phrase, "substantially as set forth," is technical, and is equivalent to saying, "by the means described in the text of the inventor's application for letters patent, as illustrated by the drawings, diagrams, and models which accompany the application." These words limit the general terms of the specification which set out the func-

tion performed by the invention, and confine the inventor's rights to his own special means of performing the function.

It is unnecessary to set out in totidem verbis the technical "claims" in which Boyden summarized his application to the patent office. Suffice it to say that his device, original and improved, which is represented in the patents issued to him as Nos. 481,134, 481,135, and 481,136, dated August 16, 1892, provided for the admission by a single valve, integral with the triple valve, of both train pipe air and auxiliary reservoir air to the brake cylinder, for emergency stops. He accomplished this object, as Westinghouse did, by a device acted upon by the triple-valve piston when at the same extreme traverse at which it had been previously used for emergency work. As to using this extreme traverse, the patent for which had expired with No. 220,556, he did what Westinghouse did; but the object of either being the discharge of train pipe air into the brake cylinder (which was new) simultaneously with the discharge of auxiliary reservoir air into that cylinder (which was old), Boyden invented a partitioning ring in the old triple valve to divide the chamber of the three valves from the chamber of the piston, and opened in this ring a port through which the train pipe air might pass from the piston chamber through the chamber of the valves to the brake cylinder; while Westinghouse attached an additional and individual machine to patent 220,556, consisting of a stem moved by the main piston in extreme traverse, an additional valve, and additional independent by-passages leading from the additional valve to the brake cylinder. The same result was accomplished by the two devices, but these had but one means in common. Each used one common mechanical movement of the main piston, which was a movement for which the patent had expired. But the further mechanisms employed, respectively, by the two inventions were, respectively, as has been described.

The transmission of train pipe air and auxiliary reservoir air simultaneously to the brake cylinder is a result or function, and is not patentable. The means by which this or any other result or function is accomplished may be many and various, and, if these several means are not mechanical equivalents, each of them is patentable. The question at bar is whether Boyden's brass ring partition, with the port it contains, inserted in and made a part of the triple valve itself, successfully accomplishing the function of discharging train pipe air into the brake cylinder simultaneously with the triple valve's discharge of auxiliary reservoir air into that cylinder, is the mechanical equivalent of Westinghouse's attached machine, nonintegral, segregate, and individual, consisting of another stem, another valve, and by-passages peculiar to itself leading from the additional valve to the brake cylinder; both devices being put in action by the triple-valve piston when on its old extreme traverse. This question was presented, necessarily, to the patent office of the United States when Boyden applied for a patent for the device under consideration. That office employs the best experts in mechanics which it can secure in this and other countries. Its examinations are, indeed, *ex parte* in form, but they are, nevertheless, conducted under hot and

skilled contestation in every case of importance; and its decisions, though not conclusive, are entitled to great respect. That office, after full examination, awarded a patent to Boyden on the 16th day of August, 1892, for his quick-action improvement on the expired patent 220,556, and thereby ruled that the Boyden device did not infringe Westinghouse's quick-action patent No. 360,070. That ruling takes rank here as the testimony of experts of the highest experience, skill, and knowledge in mechanics. That ruling was subsequent to the issuing to Westinghouse of both the patents Nos. 360,070 and 376,837, four years after the latter patent, when the patent office had full knowledge of them.

The circuit court held, in its decision of this case, that the Boyden device was the functional equivalent of that of Westinghouse, as described in claim 2 of patent 360,070; that both devices depended upon the extreme traverse of the triple-valve piston of patent 220,556, and that this traverse was new and unusual. It held, virtually, that the novelty of this extreme traverse, on which both the quick-action devices of the two inventions depended, and their functional equivalency, made Boyden's device an infringement of Westinghouse's. That the mechanism of Boyden differed from that of Westinghouse, so far as the mechanical means which were used in availing of the extreme traverse was concerned, does not seem to have been controverted by the circuit court. But it held, virtually, that because the extreme traverse was new, and was a pioneer invention of Westinghouse, and was necessary to put both of the two devices into action, and because the means devised for utilizing the extreme traverse in emergency work were functional equivalents of Westinghouse's, therefore Boyden's device was an infringement. It is obvious to us that the circuit court erred in imputing novelty to the extreme traverse of the triple-valve piston of patent 220,556 and its predecessor, 217,838. That machine was designed both for graduated braking and for emergency braking. The former was provided for in the sensitive valve inserted in the stem of the triple-valve piston, through which compressed air was vented, in quantity graduated at the will of the engineer, from the auxiliary reservoir into the brake cylinder. But this earlier and expired patent contained more than the sensitive valve in the stem of the piston, and more room in the piston chamber than was necessary for a partial traverse of the piston. It contained a main valve, and a sufficient prolongation of the piston chamber for the extreme traverse. This main valve and this prolongation of the chamber were entirely useless for graduated work, and was intended and employable only for emergency work. The main valve would not have been contrived, nor the chamber prolonged, except for the purpose, by giving the piston its extreme traverse in the extended chamber, and thus bringing the main valve into action, of fitting it for emergency work. The machine patented as Nos. 217,838 and 220,556 did good emergency work in short trains, and the extreme traverse of the piston was constantly employed in that work; and this employment of it was not "unusual." But in long trains, and especially in long trains of heavy freight cars, it

failed to do emergency work with sufficient quickness. The emergency apparatus, however, was there, to wit, the main valve and the extended chamber. They had been patented, and the patent had expired when patent 360,070 was issued. The extreme traverse of the piston in its extended chamber for emergency use was as old as the expired patent, No. 220,556. The circuit court, therefore, erred in supposing and ruling that it was new and unusual.

As there was no novelty in the extreme traverse of the old triple-valve piston, it must be eliminated from consideration, and the mechanical equivalency of Boyden's device of the partitioning ring integral with the triple-valve itself on one hand, and, on the other hand, the Westinghouse device attached to the triple valve, and consisting wholly of apparatus not integral, but segregate, individual, several, additional to and independent of it, depends upon the character of the two devices themselves, considered and compared apart from the extreme traverse, and not upon their being put into action by the extreme traverse of the triple-valve piston. Comparing the two devices apart from the triple-valve piston in extreme traverse, we are unable to entertain a doubt that the ruling of the patent office was correct to the effect that Boyden's device was not the mechanical equivalent of that of Westinghouse. They seem to us to differ as widely from each other as two devices for accomplishing the same result can well differ. We think that when claim 2 of 360,070, in its language describing the action of that device, failed to describe the means by which the extreme traverse of the piston produced it, declaring merely that the piston, "by a further traverse, admits air directly from the main air pipe to the brake cylinder," it was fatally defective, claiming only a result, which is public property, and not identifying the specific means (his own property) by which the result is achieved. That this invention of Westinghouse, thus undefined, is one of the highest value to the public, and that it is a pioneer one in the art of quick-action air brakes, is not denied, and is conceded. It is conspicuously one of those pioneer inventions which entitle the proprietor to a liberal protection from the courts in construing the claim. But there is a limit to the judicial liberality in this direction. If an inventor is ambiguous, or obscure, or halt, or limp in his language of description, the courts will help him out, and so construe the claim as to give distinct identity to his device. If there be a doubt in the mind of the court or of a jury on the issue of mechanical equivalency, the court will give, and instruct the jury to give, the benefit of the doubt to the pioneer inventor. But where the inventor falls so far short in his description as to claim only the result which his machine accomplishes, and omits an explicit definition of the means by which he does it, as in the case at bar, the courts have another duty to perform, one which they owe to the public and to the worthy fraternity of inventors, and must decline to give him general rights where he is entitled only to special rights.

The inventor in the present case seemed himself to feel that his claim was too broad in terms. In his original application for patent 360,070 his first claim was couched in this language:

"In a brake mechanism, the combination of a main pipe, an auxiliary reservoir, a brake cylinder, and a triple valve provided with a device for admitting air directly from the main air pipe to the brake cylinder."

This language covered any device which might accomplish the object mentioned, and he found it necessary to erase it from his specification, and to substitute claim 1 as it now stands. In the same specification Westinghouse had also used this language:

"Further, while in the specific construction described and shown the function of admitting air from the main pipe is performed by a valve separate from that which effects the preliminary admission of reservoir pressure to the cylinder, a modification in which the same office is performed by a valve integral with the main valve, and formed by an extension thereof, would be included in and embody the essential operative features of my invention."

Here, again, was a claim for a function irrespectively of the mechanical means used in accomplishing it, which the inventor found it necessary to erase from his specification. In the suit at bar he virtually asks the court to restore to his claim the two erasures which he felt himself unable to sustain at the patent office. Our duty to the public and to inventors at large forbids our doing so.

Some notice is proper, in this connection, of the contention of appellees that the additional valve, 4, in the additional stem of the quick-action apparatus attached to the original triple valve 220,556 by Westinghouse in patent 360,070, is the mechanical equivalent of the poppet valve of Boyden which he designates as 22 in the triple valve of 220,556 as he improves it in his device. This contention is urged on the ground, as alleged, that Boyden makes it perform the same purpose which Westinghouse's fourth valve performs in his attached apparatus. But Boyden simply substituted in the original triple valve his poppet valve 22 for the slide valve which is the main valve of patent 220,556. Boyden's is not an "auxiliary" valve; it is mechanically the original main valve of the original triple valve, and it performs the service which is performed by the main valve of 220,556. It is not the mechanical equivalent of valve 4 in the attached apparatus of Westinghouse simply by taking part in emergency service in admitting train pipe air into the brake cylinder. In the original triple valve it performed no other service than admitting auxiliary reservoir air into the brake cylinder. In Boyden's device it continues to perform that service, and is made incidentally instrumental in allowing the passage of train pipe air. The performance incidentally of quick-action service does not make it an auxiliary valve. It is the same valve. The incidental service is auxiliary, but the valve itself is the same and unchanged. We think the circuit court was correct in its view that the poppet valve, 22, of Boyden, is the original main valve of 220,556.

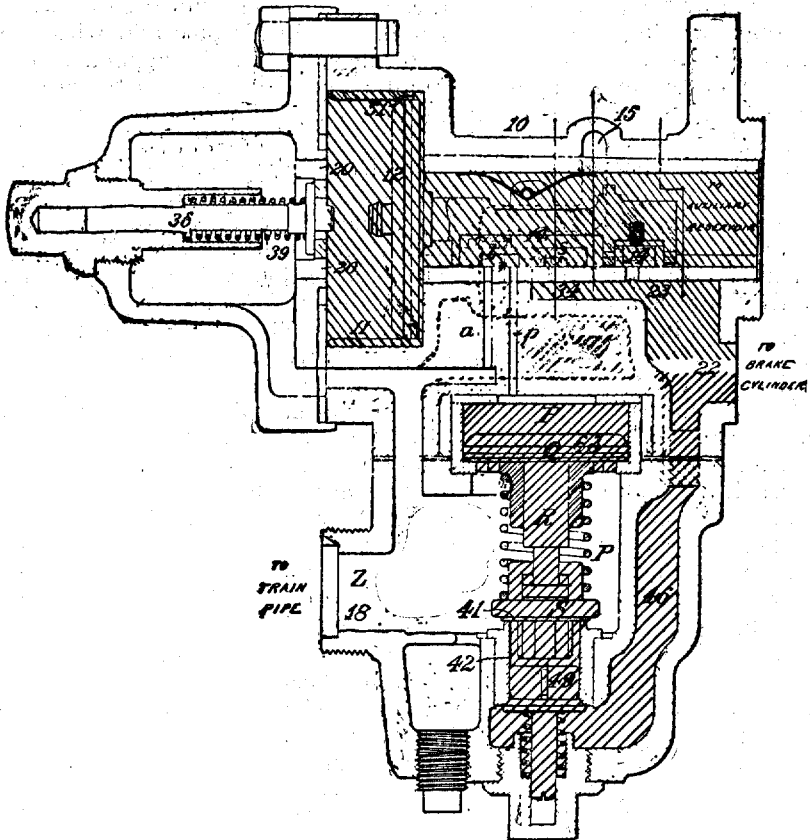
We think the circuit court was correct in ruling that Boyden's invention under consideration does not infringe claim 1 of Westinghouse. The language of that claim, in defining the additional apparatus of Westinghouse embraced in patent 360,070, is, "and an auxiliary valve device, actuated by the piston on the triple valve, and independent of the main valve," for admitting air directly from the train

pipe to the brake cylinder. Obviously, there is no "auxiliary valve," "independent of the main valve," in the Boyden device, and we think the ruling was correct. The case is similar in respect to claim 4 of Westinghouse. The language there is, "And an auxiliary valve actuated by the piston stem, and controlling communication between passages leading to connections with a main air pipe and with the brake cylinder." None of these terms can fairly be applied to the Boyden device, or to any of its details; and we think that the circuit court ruled correctly in holding that claim 4 is not infringed by Boyden.

The distinction suggested by the circuit court between inventions employing cranks and levers visible to the senses and those employing compressed air, which operates by modes not visible to the senses,—as to which latter devices the circuit court held that, "in judging of an infringement we are to direct our attention rather to functional equivalents than to mechanical equivalents,"—we do not think well taken, even in favor of pioneer inventions. The supreme court, in its ruling in the great leading case of *O'Reilly v. Morse*, 15 How. 62, which was one in which the far more subtle agency of electricity was under consideration, neither made nor intimated such a distinction. As to the adjudications in the federal courts of the Southern district of New York on the subject of the air brakes invented by Westinghouse, it is incumbent upon us to consider whether the questions now before this court are in any respect *res judicata*, and binding precedents in the case at bar. Technically, they are not. The patent charged to have been infringed in the first suit in the circuit court of New York, and on appeal in the appellate court of that circuit, was that taken out by Westinghouse as No. 376,837. That patent contained an important—indeed, a vital—improvement upon No. 360,070, which is in suit here, and which has been found in practice to be insufficient for its purposes. It contained a supplemental or auxiliary piston, as well as an additional stem, an additional valve, and independent by-passes, composing an additional segregate machine, as we have before mentioned. In the second suit before the New York circuit and appellate courts, the parties complainant and defendant being the same, and the defendant's invention being the same, suit was based upon two patents of Westinghouse, Nos. 360,070 and 376,837, and also upon a patent issued to H. S. Park, numbered 393,784. The question in both suits was whether the air brake contrived by the defendant in those suits had infringed the three patents. Judge Lacombe—who was affirmed on appeal—described the machine of the defendant there as having "the main air pipe [train pipe], an auxiliary reservoir, a brake cylinder, a triple valve [these constituting the old triple-valve mechanism of patent 220,556], and an auxiliary valve device independent of the main valve for admitting air in the application of the brake directly from the main air pipe to the brake cylinder." A diagram which illustrates this additional and "auxiliary valve device independent of the main valve" of the defendant in the New York suits is given below, and is attached to and made part of this opinion.

NEW YORK AIR BRAKE CO.'S VALVE.

Decreed by Judge Lacombe to Infringe Patent No. 360,070, because it contains the "additional members" of that Patent.



The upper part of the mechanism in the above cut (represented by the left oblique shading, thus: ) constitutes the "triple valve," said parts are numbered 10, 11, 12, 14, 20,  36, 39 and 51.

The lower part (represented by the right oblique shading, thus: ) infringes the Westinghouse invention because it includes the "additional  members," a separate "auxiliary valve 41" and passage 46, leading from the train pipe direct to the brake-cylinder.

It will be seen the above structure has the "two machines," the left oblique shading and the right oblique shading the same as Patent 360,070, whereas Defendant's Structure Plate XI here in suit, has only one—the left oblique shading—and therefore is minus the "additional members."

It will be apparent, from an inspection of this diagram, that no decision affecting that device can affect one as different from it structurally and in every respect as is that of the Boyden device. It would require the verdict of a jury and the conclusive testimony

of experts upon the question of mechanical equivalency to enable a court to decide whether they present a case of *res judicata*.

Prima facie, a decision founded upon one patent not in suit here, and another decision founded upon three patents collectively, one only of which is in suit here, the two decisions declaring that an invention used by a defendant who is not the defendant here, against a machine of that defendant differing widely in its structure from the one complained of here, cannot be treated as binding in the decision which this court may feel bound to render in the suit at bar. Here it is contended that the mere use of the extreme traverse of the triple-valve piston to effect the same functional result which was effected by Westinghouse in 360,070 constitutes an infringement, irrespectively of the additional means employed. There it was ruled that the use of the extreme traverse and of an additional machine attached to the original 220,556, which was structurally and mechanically equivalent to 360,070, was an infringement of the latter patent. The cases are different, and not on all fours with each other, and do not control or affect our own ruling.

Decrees will be entered, in accordance with the views expressed in this opinion, affirming the ruling of the court below in respect to claims 1 and 4 of the complainant's patent No. 360,070, and reversing the ruling of the court below in respect to claim 2 of the said patent.

WHEATON v. NORTON et al.

(Circuit Court of Appeals, Ninth Circuit. October 31, 1895.)

No. 141.

1. PATENTS—LIMITATIONS OF CLAIMS—AMENDMENTS IN PATENT OFFICE.

Where an applicant narrows his claims in consequence of objections raised by the patent office, he cannot, after the patent is allowed, broaden them by construction, so as to drop out any element which he was compelled to include in his combination in order to obtain the patent.

2. SAME—CAN-HEADING MACHINES.

Where a patent for a can-heading machine, as finally allowed after amendments introduced to meet objections of the patent office, made an annular space in the clamping mold and a piston for forcing the can head thereon essential elements of the combination, *held*, that no device which omitted these elements or their mechanical equivalents would be an infringement.

3. SAME.

The Norton patent, No. 267,014, for a can-heading machine, analyzed and construed, and *held* not infringed, as to any of its claims, by the Wheaton patent, No. 477,584, which omits some of the essential elements of the combination covered by the claims of the Norton patent. 57 Fed. 927, reversed. (The construction placed upon the Norton patent by this court in *Norton v. Jensen*, 1 C. C. A. 452, 49 Fed. 859, modified upon new evidence, consisting of the file wrapper showing the proceedings in the patent office.)

Appeal from the Circuit Court of the United States for the Northern District of California.

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