P. G. GARDINER.

Tempering Apparatus.

No. 21,603. Patented Sept. 28, 1858.

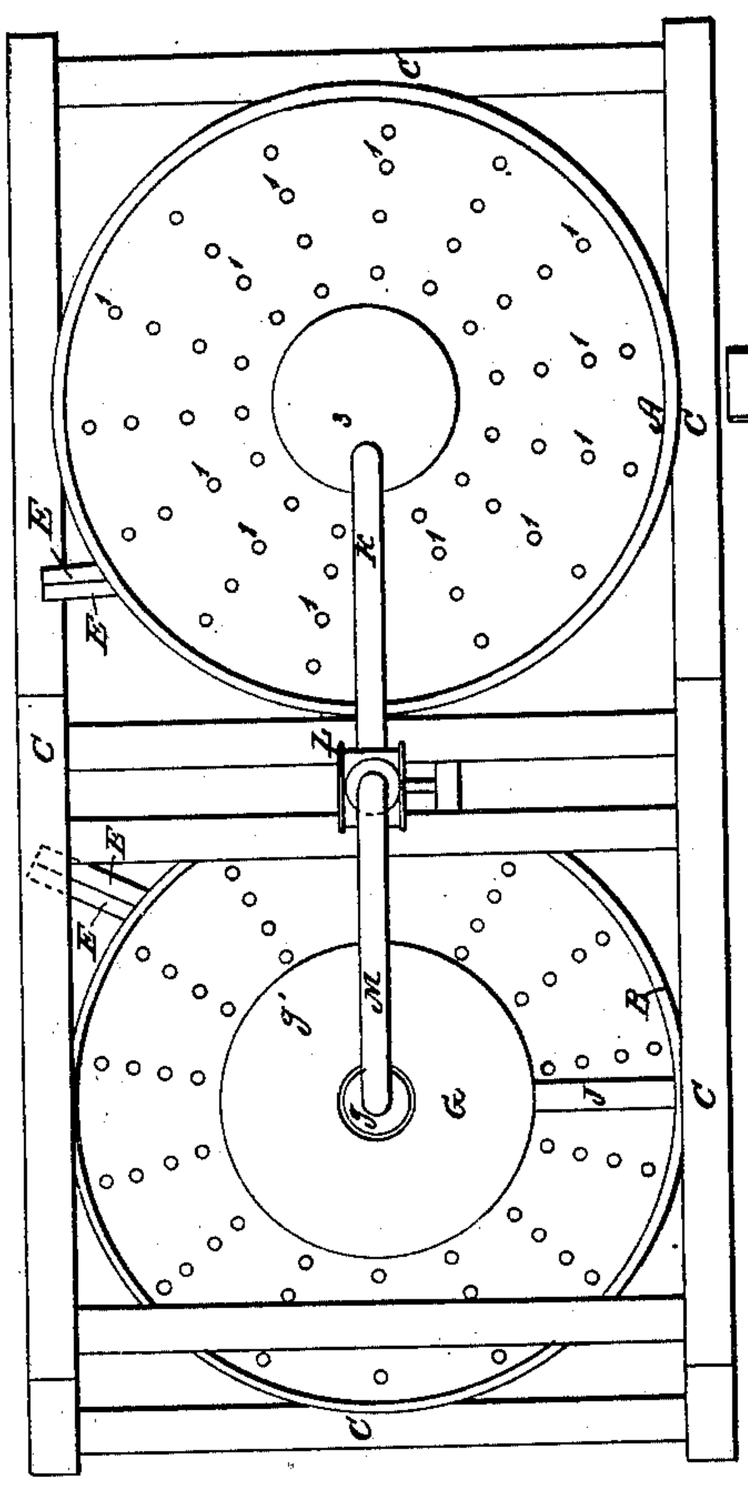

Fig: 2.

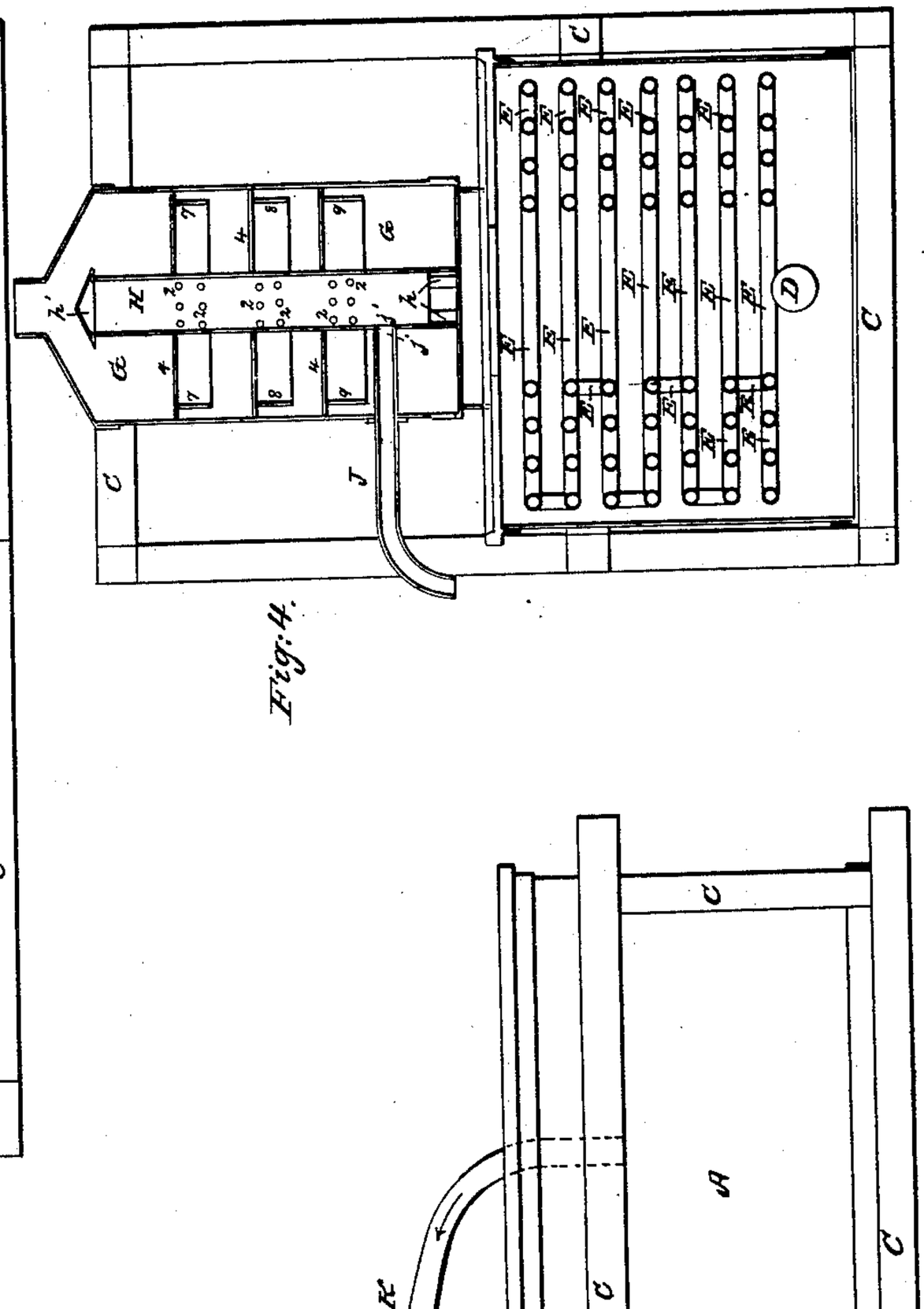

Fig: 4.

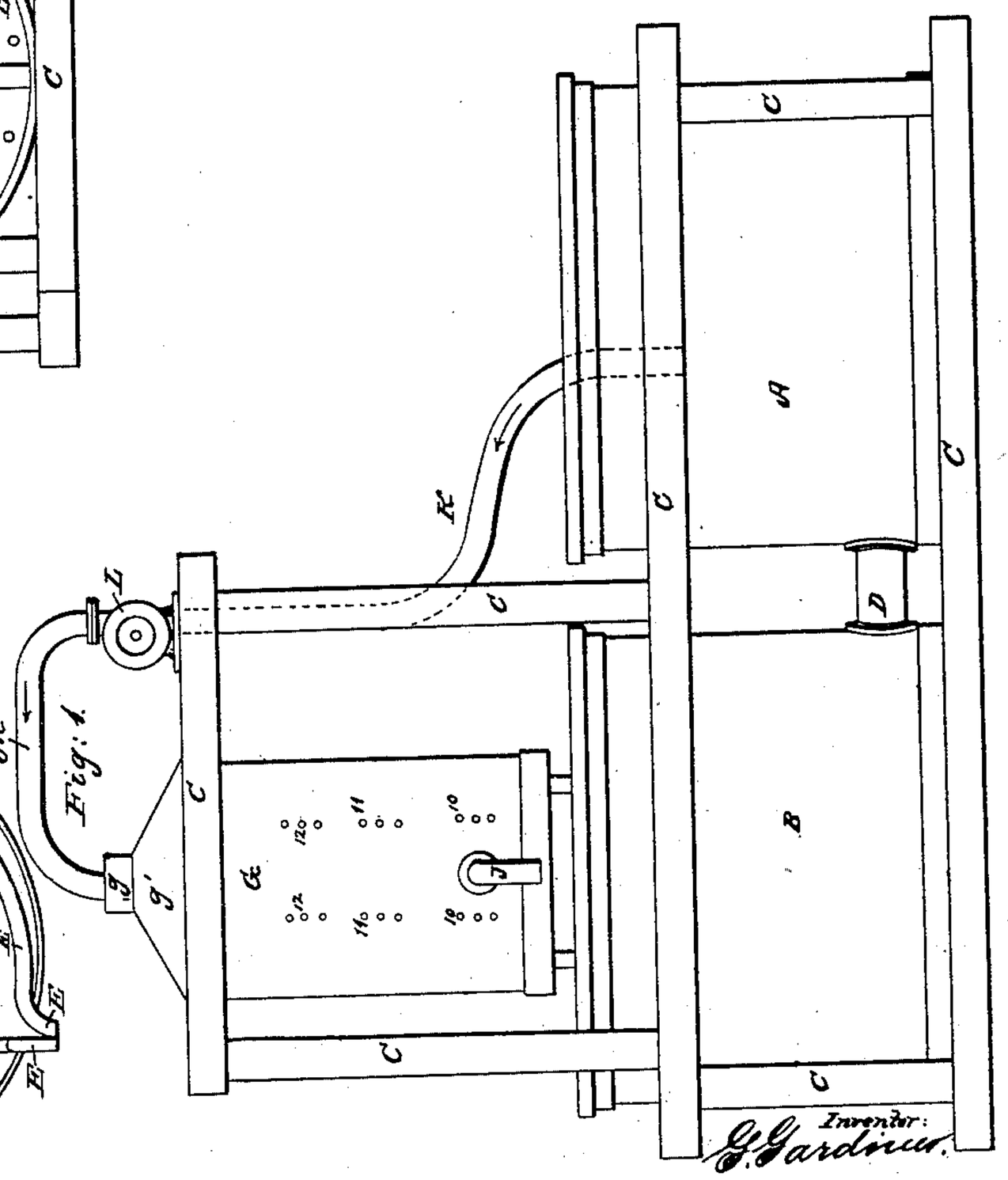

Fig: 1.

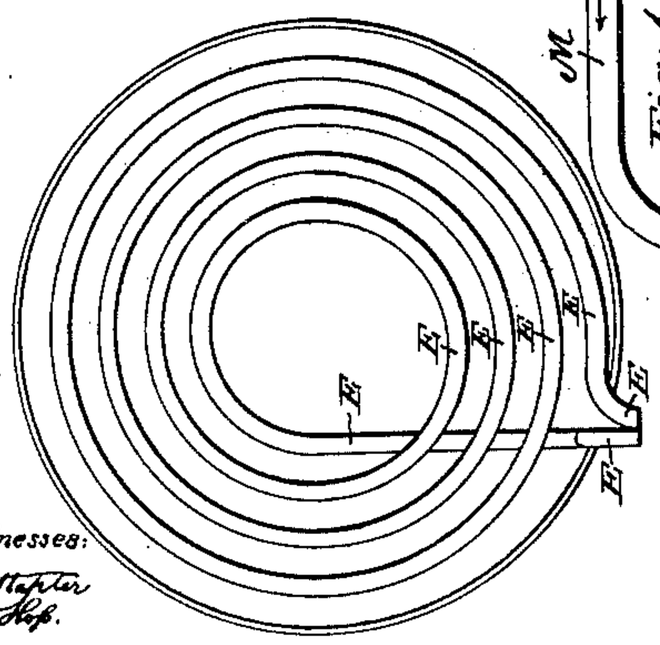

Fig: 3.

Witnesses:
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UNITED STATES PATENT OFFICE.

PERRY G. GARDINER, OF NEW YORK, N. Y.

TEMPERING STEEL CAR-SPRINGS.

Specification of Letters Patent No. 21,603, dated September 28, 1858.

To all whom it may concern:

Be it known that I, PERRY G. GARDINER, of the city, county, and State of New York, mechanical engineer, have invented a new and useful apparatus for cooling and preserving an equable and low temperature in the oil or composition or other fluid mixtures used for the purposes of tempering, annealing, or hardening steel, and that the following is a full and exact description of my said apparatus and invention, reference being had to the drawings accompanying and making part of this specification.

In establishments where a large amount of steel is to be tempered, such as manufactories of railroad car springs, the bath of oil or fluid mixture used for the purpose is liable to become unduly heated by the constant immersion of the heated metal, and when this takes place the bath ceases to have the desired effect upon the steel; or becomes useless altogether, and is also liable to take fire upon the immersion of the hot steel while the oil or composition fluid is at a high temperature; and it also suffers great loss by evaporation.

When three or four hundred steel railroad car springs are manufactured daily, it is necessary to have a bath for immersion containing several hundred gallons of oil or fluid composition, and in such case in addition to the difficulties above referred to the upper strata of the fluid becomes more highly heated than the lower, and in consequence the desired effect upon the steel is but imperfectly produced.

The object of my apparatus is to keep the temperature of the fluid uniform throughout and also to maintain the desired low temperature constant, while a great number of the heated springs or pieces of steel are being rapidly immersed and withdrawn in succession.

The apparatus by which this result is accomplished is constructed as follows:

In the drawings Figure I, represents a side elevation of the apparatus Fig. II represents a top view and of the covers of the tanks. Fig. III represents a horizontal section across the interior of the tanks. Fig. IV is a vertical cross section through the center of one of the tanks, and of the cylindrical chamber upon it in which the fluid is subjected to a constant current of cold air.

In all the figures the same letters represent the same parts.

I first construct two large iron cylindrical tanks A, B, of the same dimensions, and which are placed side by side at a short distance from each other upon a platform and in a suitable framing of timber *c*. The two tanks A, B, are connected by a tube or pipe D near the bottom of the sides and which should be of sufficient size to allow the fluid to run freely from one vessel into the other. Within each of these tanks I place a worm or coil of metal pipe which beginning at the top of the tank passes around four times and then descends so as to make another coil of the same number of turns, and so on until the coil reaches to the level of the pipe D where the coiled tube is conducted vertically upward and has its exit by the side of the entrance pipe. These coils are shown in vertical section in Fig. IV and in horizontal section in Fig. III at E, the entrance and exit of the pipe is shown at E in Fig. II. A sufficient space is left at the center of the coils in the tank A, for a well in which the springs or metal may be plunged and withdrawn without interfering with the coils. These tanks have movable covers F F (Fig. II) which are perforated with small holes 1, 1, 1, and the cover of the tank A, which is the immersion tank has a circular opening at the center shown at 2 (Fig. II) large enough to admit the plunging and withdrawal of the springs or pieces of steel with facility. The small holes 1, 1, 1, in the cover of A, act as strainers for the oil from the springs or pieces of steel placed upon them and also assist in keeping the air cool upon the surface of the oil or fluid.

Over and upon the central part of the cover of tank B I construct the metallic cylindrical chamber G, Figs. I, IV. This stands upon a circular perforated bottom slightly raised above the cover of tank B, so as to admit air freely under it.

Within the chamber G I place the eccentric vertical cylindrical tube H, closed at the bottom and standing upon the legs or supports, *h*, *h*. This tube has perforations in circles at different points through its height as shown at 3, 3, 3. The top of the tube H is closed by a conical cap *h'* (Fig. IV). Around this tube are placed the three parallel plates or disks 4, 5, 6 Fig. IV, which are fast to H and also to the inner sides of the chamber G, thus dividing the chamber G into a column of compartments or parallel chambers and with which chambers the pipe

H communicates through the perforations in the pipe at 3, 3, 3 Fig. IV. From the under surfaces of the plates 4, 5, 6, project the circular flanges 7, 8, 9, near to but not touching the inner surface of the chamber G. The flanges 7, 8, 9, are placed opposite a series of perforations in the sides of the chamber G as seen at 10, 11, 12, Fig. I. Each of the plates or disks 4, 5, 6 is perforated with a series of vertical holes sufficient to admit the flow of oil or fluid through them as hereafter described. Into the side of chamber G, near the bottom is introduced the air pipe J, which passes through the chamber until it meets the inner vertical tube H into which it is admitted at *j'*, through an orifice in which it fits air tight.

In the circular orifice 2 of cover of tank A (Fig. II) is inserted the metallic pipe K, so that its mouth will be always below the surface of the fluid in the tank A. This pipe is carried up to the cross piece at the top of the timber frame where it is connected with the exhaust of rotary pump L, Figs. I, II, which is also a force pump; from the exit of the force pump is the pipe M, which connects with the cylindrical chamber G through the opening *g* in the conical head *g'*, Figs. I, II.

Having thus described the different parts of my apparatus and the construction of the same I will now describe the manner of operating therewith. The tanks A, B, being filled with the oil or fluid to be used for the immersion of the steel so that the surface of the fluid will be above the upper tier of coils within the tanks, the force pump L is put in motion and by its action the fluid near to the surface (always the warmer portion) in tank A is taken off and carried up to the head of the cylindrical chamber G, through the pipes K, M, and the oil or fluid then descends by its own gravity upon the conical head 1′ of chamber H and thence into the compartments of chamber G, made by the horizontal disks 4, 5, 6, through the holes perforated in the disks above described, the fluid is thereby divided into numerous small streams or showers; at the same time a blast of cold air is introduced into the inner chamber H through the pipe J and which coming out through the perforations 3, 3, 3, meets the streams or showers of falling fluid and cools it in every part of it—the air passing off through the perforations in G at 10, 11, 12, Fig. I. The oil or fluid thus subjected to contact with the cold air runs down through perforations in the bottom plate into the tank B and flows and rises into tank A through the connecting pipe B above described thus keeping a constant current and change from the one tank into the other, at the same time a constant flow of cold water is made to pass through the worm or coils of tubes within the tanks A, B, from some suitable reservoir by which the coils are kept cold in every part and these presenting a very large surface of cold metal to the oil or fluid in which they are placed, constantly neutralize the tendency of the oil or fluid to become heated. The workman operating stands upon the cover of tank A and as the heated springs or pieces of steel are brought from the heating oven plunges them into the bath and withdraws them, placing them upon the cover where the oil drains from them and falls back into the reservoir.

By this apparatus and manner of operating it a very large number of springs or pieces of steel may be immersed in the bath throughout the day without the bath becoming unduly heated, and without suspension of the work.

Having thus described my apparatus and manner of constructing and operating the same, what I claim therein as my invention and for which I desire Letters Patent is:

1. The subjecting the oil or fluid divided into small streams or showers to the contact of a blast of cold air while falling, by means of the cylindrical chambers or compartments and the cylindrical air chamber operating as described or in any manner substantially the same.

2. I claim the construction, arrangement and combination of the cylindrical chamber G, the cylindrical chamber for distributing the air H, and the disk and perforations as described.

3. I claim the arrangement and combination of the tanks A, B, and the coils of tubes or worms, the chambers G, H, and their connections operating together so as that at the same moment the oil or fluid is subjected to the cooling by both air and water as described.

P. G. GARDINER.

Witnesses:
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