

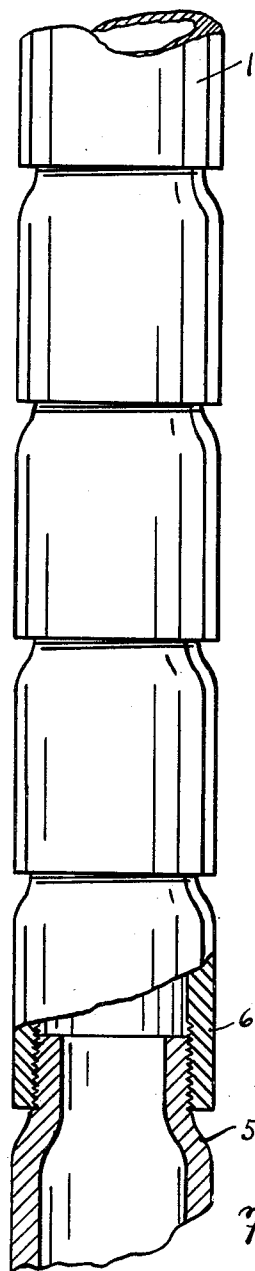
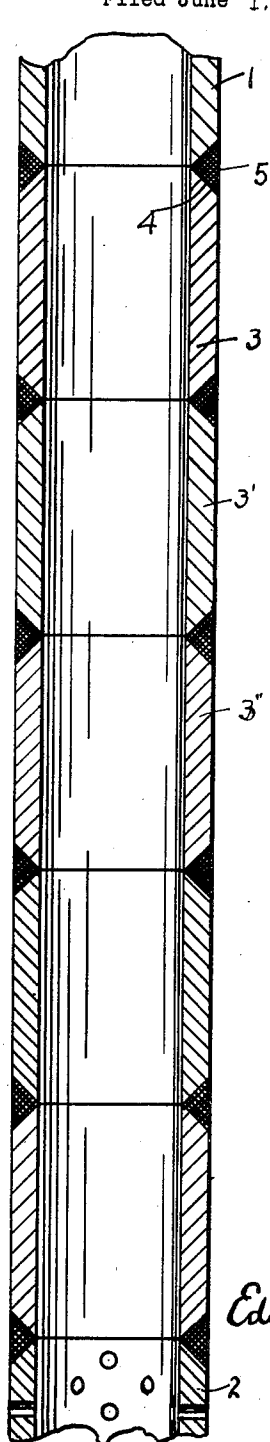
Jan. 4, 1927.

E. A. JOHNSON

1,613,461

CONNECTION BETWEEN WELL PIPE SECTIONS OF DIFFERENT MATERIALS

Filed June 1, 1926



Edwin A. Johnson INVENTOR.

BY

Jesse P. Stone

ATTORNEY.

## UNITED STATES PATENT OFFICE.

EDWIN A. JOHNSON, OF HOUSTON, TEXAS.

## CONNECTION BETWEEN WELL-PIPE SECTIONS OF DIFFERENT MATERIALS.

Application filed June 1, 1926. Serial No. 112,754.

My invention relates to connecting means between pipe sections. The invention pertains particularly to pipe employed in deep well operations, although obviously the invention has a wider application.

In equipping a well for producing oil, water or other liquids, it is usually necessary to place a strainer at the lower end of the well pipe, said strainer having straining openings therein for the purpose of screening the sand and other sediment in the producing formation from entering the well. A strainer must ordinarily be made of better material than is the upper portion of the pipe serving as a liner for the well. A better quality of steel, such as nickel steel or even brass, may be employed in the construction of the strainer.

It has been found that, when metals of different composition, or of different solution pressures, are submerged in the liquid in the well, a difference of electrical potential is set up causing electrolysis between the different pipe sections. Metal from a pipe of one composition is eaten away and carried away in the electrolyte. This is due to the presence of foreign substances in the liquid in the well forming an electrolyte. Sulphur, salt water, and similar elements in the liquid serve to produce such a result.

The usual cause of this electrolytic action is that the pipe sections form electrodes of large surface area so that a strong galvanic current is set up flowing from one section to another of different potential. It has been found that the metal of the pipe section adjacent the strainer, being of different composition from the strainer, will act as one electrode and the strainer as the other, and that a marked disintegration of one or the other of the metals at the joint will occur, soon acting to cause holes in the pipe or strainer at the joint destroying the connection between them and allowing the entrance to the pipe of sand and other sediment.

In order to overcome the difficulties arising from the placing of two pipe sections of different compositions together that set up a fairly strong difference of potential, I contemplate arranging the connection between the pipe and the strainer of short sections of pipe differing from the adjacent sections as to composition by only slight values, and in this way preventing any mate-

rial amount of electrolytic action at the adjacent ends of the sections.

It is an object of the invention, therefore, to form a connection between the well pipe and the strainer or between any sections of pipe of materially different composition so that the adjacent ends of the pipe sections will differ in composition from each other by so slight an amount that the electrolytic disintegration of the pipe will be limited and very slight at each joint.

Referring to the drawing herewith, I have illustrated in Fig. 1 a means of connecting the ends of well pipe and strainer together in a manner embodying my invention. In Fig. 2 is illustrated a slightly different embodiment of the idea.

In carrying out the invention it may be understood that, with particular reference to Fig. 1, the upper section 1 there shown is to be regarded as the lower end of the well pipe extending from the surface to a point adjacent the well screen which may be represented at 2 at the lower end of Fig. 1. Between the pipe 1 and the strainer 2 I connect a plurality of short sections of pipe 3, and it is to be understood that these sections are of different composition and are constructed for the particular purpose of gradually changing the composition of the connecting joints from that of the pipe 1 to that of the strainer 2.

In illustrating this idea, it may be understood that the pipe 1 is of ordinary iron or steel pipe and the strainer 2 may be understood as being made of a high grade nickel steel with perhaps 25% nickel therein. This difference in composition between the pipe 1 and the strainer 2 would, if they were joined directly together, set up a fairly high difference of potential causing an electrolytic action between the two joints which would soon serve to disintegrate the metal. To overcome this, the sections 3 will be so constructed that the upper section adjacent the pipe 1 will have the same composition as the pipe, with the exception that a small proportion of nickel has been added thereto. The next adjacent section 3' will be of the same composition as the section 3, with the exception of the addition thereto of a slightly larger proportion of the nickel. The next adjacent section 3'' will have a still larger proportion of nickel and this increase in the proportion of nickel in the adjacent sections

approaching the strainer will be increased until the section adjacent the screen will have nearly as high proportion of nickel as the screen itself. It is to be understood that as many sections of pipe between the well pipe 1 and the strainer 2, graduated in the quantity of alloy desired, may be employed as is necessary to overcome the tendency for an electrolytic action in the adjacent sections.

In Fig. 1 I have shown the sections as being beveled at their ends, as shown at 4, so that when they are placed end to end there will be a V-shaped groove between the adjacent ends. I then fill up this groove by welding therein a bond 5 of material, the composition of which is in all material respects the same as that of the sections which are joined together in each case.

In Fig. 2 instead of welding the sections together, I have shown them as being screwed together and in order to accomplish this, I have taken the section 5 and swedged the upper end to reduce the same in diameter to form a connection within the lower end 6 of the next adjacent section. This type of joint will be readily understood from the drawing. It is to be understood, of course, that in this modification the same arrangement of graduated alloy is employed in the construction of the adjacent sections as was described with reference to Fig. 1.

The advantages of this type of connection lie in the fact that a strong connection between the well pipe and the screen or strainer may be made which will not disintegrate under the electrolytic action of galvanic current set up by the action of the liquid upon the pipe. The strainer, which would otherwise be rapidly disintegrated through con-

nection with the pipe of different chemical composition, will by the use of my connection endure for long periods of time.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. In connecting pipe sections of different solution pressures, the improvement comprising placing between the adjacent ends of the two sections a series of shorter connecting sections graduated in their chemical composition from the pipe of highest solution pressure to that of the pipe of lowest solution pressure.

2. In connecting pipe sections of different solution pressure, the improvement comprising connecting between the adjacent ends of said sections, pipe having one end similar in chemical composition to that of the section of higher solution pressure, and the other end of a composition similar to that of the section of lower solution pressure, the intervening portion of the connecting pipe being gradually varied in its chemical construction so that its solution pressure will change by slow degrees in the manner described.

3. The combination of two pipe sections of different chemical composition having between them, a plurality of short connecting sections, the chemical composition of which is a combination of the elements of the two pipe sections, said connecting sections being arranged so that the chemical composition of adjacent sections will gradually change between the two pipe sections from one to the other, for the purpose described.

In testimony whereof I hereunto affix my signature this 28 day of May, A. D. 1926.

EDWIN A. JOHNSON.