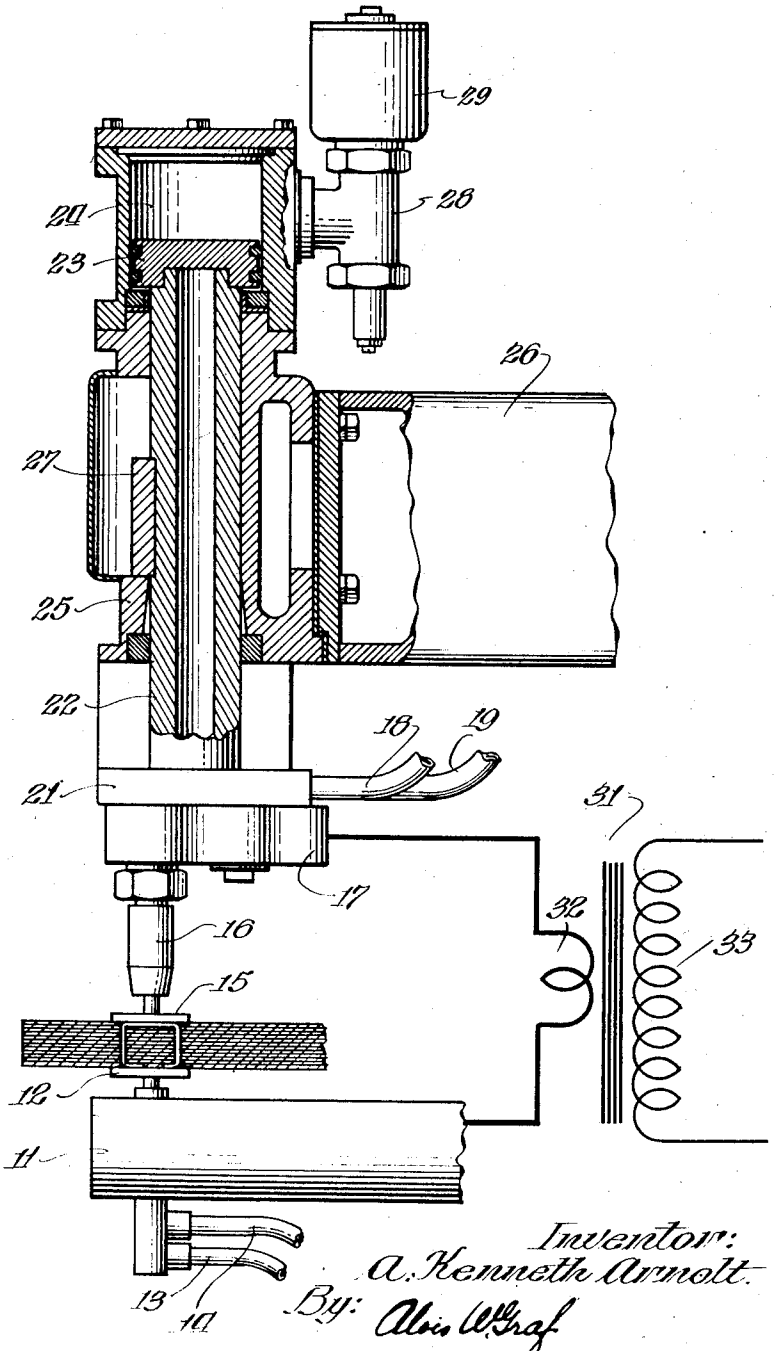
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METHOD OF REMOVING WIRE STAPLES FROM PERIODICALS

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METHOD OF REMOVING WIRE STAPLES FROM PERIODICALS

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The present invention relates to a method of rendering ineffective wire staples in periodicals, which ordinarily in the past have had to be removed. Many subscribers to periodicals desire to keep all back copies for ready reference, particularly in the instance of scientific publications. Customarily such periodicals have their pages held together by a plurality of wire staples, which pass through the entire issue. When it is desired to bind a volume covering a certain period of time, it is necessary to remove the paper covers and to unbend the ends of the wire staples and withdraw the staples. Various attempts have been made to provide some form of tool which would facilitate the withdrawal of these staples. Not infrequently staples in a particular issue might be slightly bent, and hence, any attempt to withdraw the staples usually produces greatly enlarged holes and sometimes numerous torn pages, which then must be mended. After the staples have been removed from the various issues, the issues are stacked to form a volume and are sewed together in the customary practice in book binding.

Since the problem of removing staples from periodicals is one which has not been satisfactorily solved, it would be highly desirable to provide an improved method or apparatus for either rendering ineffective the wire staples or removing them. In accordance with the present invention it is proposed to produce the same result as the removal of staples under present methods with the assurance of never tearing or mutilating pages. It is proposed to dispense with the necessity of removing the staples by rendering them ineffective by a form of disintegration. In accordance with the present invention a method has been developed whereby wire staples in periodicals are subjected to a method which changes the cohesive crystalline metal structure of the staple so that no staple exists.

It is, therefore, an object of the present invention to produce the effect of removing wire staples from periodicals by rendering them ineffective.

A further object of the present invention is to provide a method for substantially disintegrating a wire staple in a periodical to change the state of the metal staple without injuring the periodical.

A still further object of the present invention is to provide a method for disintegrating wire staples in periodicals by changing the cohesive crystalline metal structure thereof into an extremely fine powder.

Other and further objects of the present invention subsequently will become apparent from the following description taken in conjunction with the accompanying drawing, which illustrates a typical apparatus employed in carrying out the objectives and method of the invention.

In the drawing there is shown a lower support or anvil **11** which is a part of an apparatus having a strong resemblance to a spot and projection welding apparatus. The anvil **11** carries an electrode **12** having a square or rectangular face. The electrode **12** is carried by a suitable support member which is water cooled by fluid conduits **13** and **14** connected to a suitable source of cooling medium. Cooperating with the electrode **12** is a similar electrode **15** carried by a chuck or support **16** depending from a plate or bracket **17**. Immediately above the plate or bracket **17** is an insulated member **21**, which is supplied with cooling fluid or water by means of conduits **18** and **19**. The member **21** supplies cooling fluid to the chuck **16** so as to keep the electrode **15** from reaching any appreciable elevated temperatures. The member **21** is mounted on the end of a piston rod **22**, which at its other extremity is connected to a piston **23** mounted within a cylinder **24**. The cylinder **24** is carried by a frame **25** bolted to a support arm **26**. In order to safely limit the travel of the piston rod **22**, there may be provided a stop member **27** which is keyed into the outer surface of the piston rod **22**. The stop member **27** at opposite limits of travel engages upper and lower portions of the support member **25**. The cylinder **24** is suitably controlled by a valve **28**, which is actuated by a solenoid **29**. The valve **28** controls the flow of a fluid medium, such as air, into the cylinder **24**.

In accordance with the method contemplated by the present invention current of low voltage and high intensity is supplied to the electrodes **12** and **15** by a transformer **31** having a low-voltage, high-current secondary winding **32**. The transformer **31** has a primary winding **33**, which is connected to a suitable source of alternating current.

The mechanism illustrated in the drawing is adaptable to accommodate various periodicals of different thicknesses. In accordance with the invention the transformer **31** is provided with a suitable selector tap switch and other control elements not shown but customary in the art to provide certain regulations. The transformer **31**, as further is customary, may be provided with water cooled secondary windings and a thermostatic water control to prevent undesired condensation on the exterior of the transformer.

A suitable sequence control such as that commonly used in squeeze-weld-hold-and-off timers may be provided for control of the mechanism where a plurality of copies of a particular publication are to be processed. Since such sequence control arrangements are old in the welding art, they are not shown nor described in this specification but merely mentioned for a better understanding of the intended operation.

The pneumatic cyclinder **24** has its piston **23** actuated so as to provide a firm and relatively complete electrical contact with the wire staple of the periodical and the two flat solid faced electrodes **12** and **15**. When adequate pressure has been applied to the electrodes **12** and **15** to insure good electrical conductivity with the wire staple, low-voltage, high-intensity current is supplied. Preferably the electrodes **12** and **15** extend a short distance beyond the elements of the staple so as to exclude free air from the staple or the paper immediately adjacent the staple. The pressure applied by the cylinder **24** displaces practically all of the air adjacent the staple. The difference in staple sizes requires voltage and current adjustment in the range from 20,000 amperes at 2½ volts to 50,000 amperes at 15 volts.

The passage of current through a staple effectively produces a change in the metal so that it does no longer appear to exist as a staple. This is accomplished without distortion or injury of the pages in any manner. Since the electrodes **12** and **15** are cooled, any heat which may be generated due to the passage of current through the staple is dissipated at a rate sufficient to prevent scorching or undue heating of the paper of the periodical.

While no definite proof as yet is available to show exactly what occurs when high intensity low voltage current is passed through staples, it is believed that the staple is disintegrated by a breaking down of the cohesive crystalline metal structure of the staple. The only residue thus far observed is extremely fine dust. This dust or powder apparently is not an oxide in the more common sense of the term, since the portions of the staple passing through the pages of the periodicals are completely surrounded by paper so as to be shielded from any oxygen available for oxidation of the metal. It, however, is apparent that the condition or state of the metal forming the staple has been so changed that it no longer appears to exist, since the pages of the periodicals now may be turned as freely as though the staple had been completely removed by more conventional methods.

Since different sized staples are used dependent upon the sizes of the periodicals, it, of course, is to be understood that different time intervals are contemplated during which current of high intensity is supplied to the staple.

Furthermore within certain limits the relation between the time interval and the current intensity may be varied to produce identical or comparable effects.

By means of the present method, it is possible to quickly produce the effect of removing staples from periodicals without the tiersome and relatively slow manual effort required under present practice. No detrimental effects upon the paper have been ascertained and there is no evidence of a heat intensity such as might be expected, which would produce any scorching or enlargement of the holes formerly filled by the wire staple.

While for the purpose of illustrating and describing the present method of operation a single apparatus has been shown in the drawing, it is to be understood that the invention is not to be limited thereby, since any other apparatus might be employed which is operated in accordance with the method of the invention as defined in the accompanying claims.

I claim as my invention:

1. The method of effectively removing wire staples in periodicals which comprises applying to each staple low-voltage, high-density electric current to change the metal into a fine powder, and dissipating generated heat rapidly to prevent scorching of the paper of the periodical.

2. A method of removing wire staples from periodicals which comprises, limiting the amount of air surrounding a staple, passing a controlled quantity of low-voltage, high-intensity current through each staple, and dissipating

generated heat rapidly to prevent any detrimental effects on the paper of the periodical.

3. A method of removing wire staples from periodicals comprising applying electrodes to the top and bottom of each staple, and supplying high-amperage, low-voltage electric power to said electrodes to disintegrate the cohesive crystalline metal structure of the staple.

4. The method of removing wire staples from stapled periodicals which comprises applying a low-voltage, high-density electric current between the top and bottom of each staple, to destroy the staple leg structure therebetween, while covering the exposed portions of the staple on each side of the periodical.

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