No. 810,889. PATENTED JAN. 23, 1906.

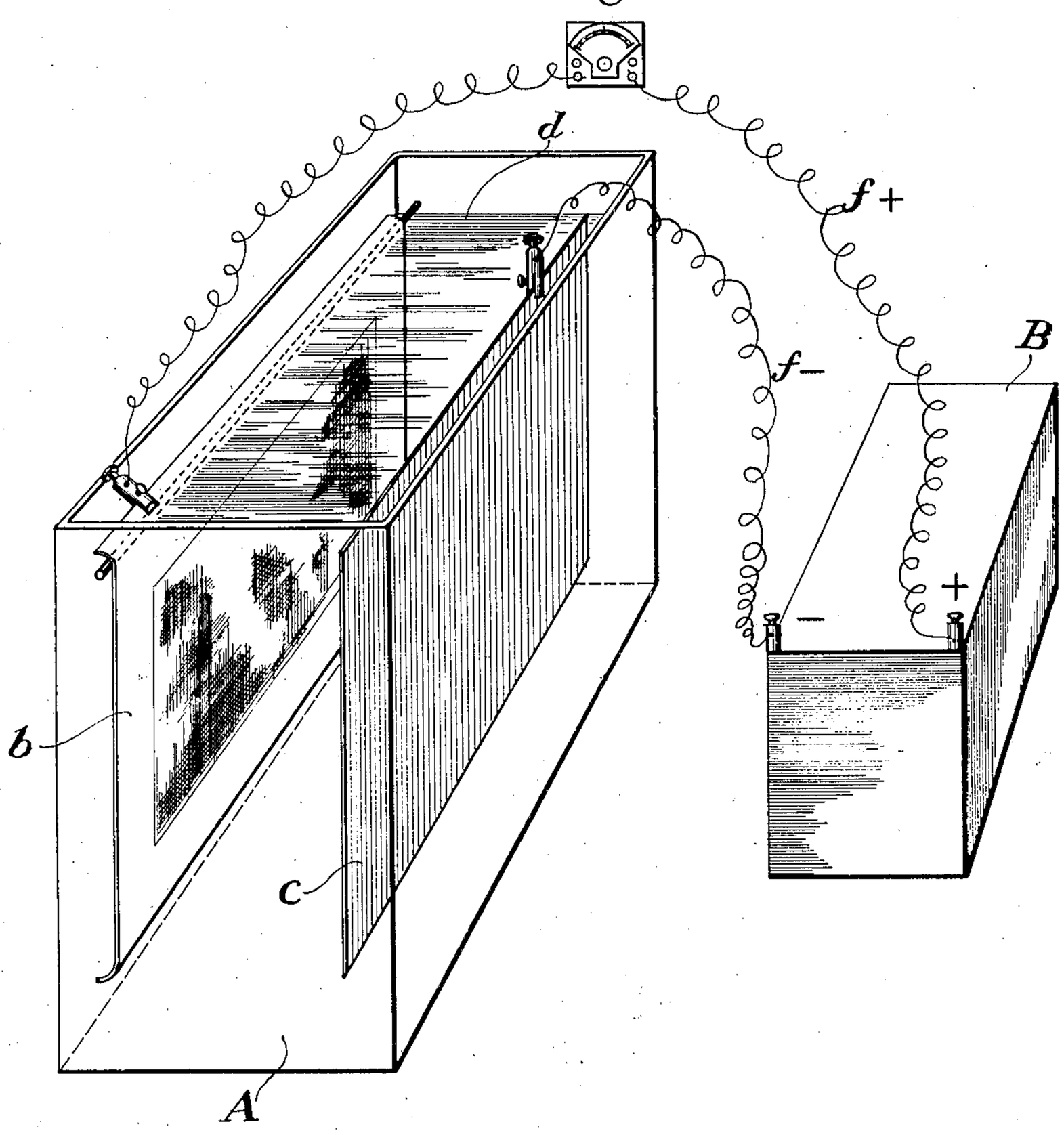
O. C. STRECKER.

PROCESS OF ELECTROLYTICALLY PREPARING METALS OR ALLOYS FOR LITHOGRAPHIC PURPOSES.

APPLICATION FILED MAY 12, 1902.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
E. Hannach.
L. Waldman

Inventor.
Otto Carl Strecker
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Att'y.

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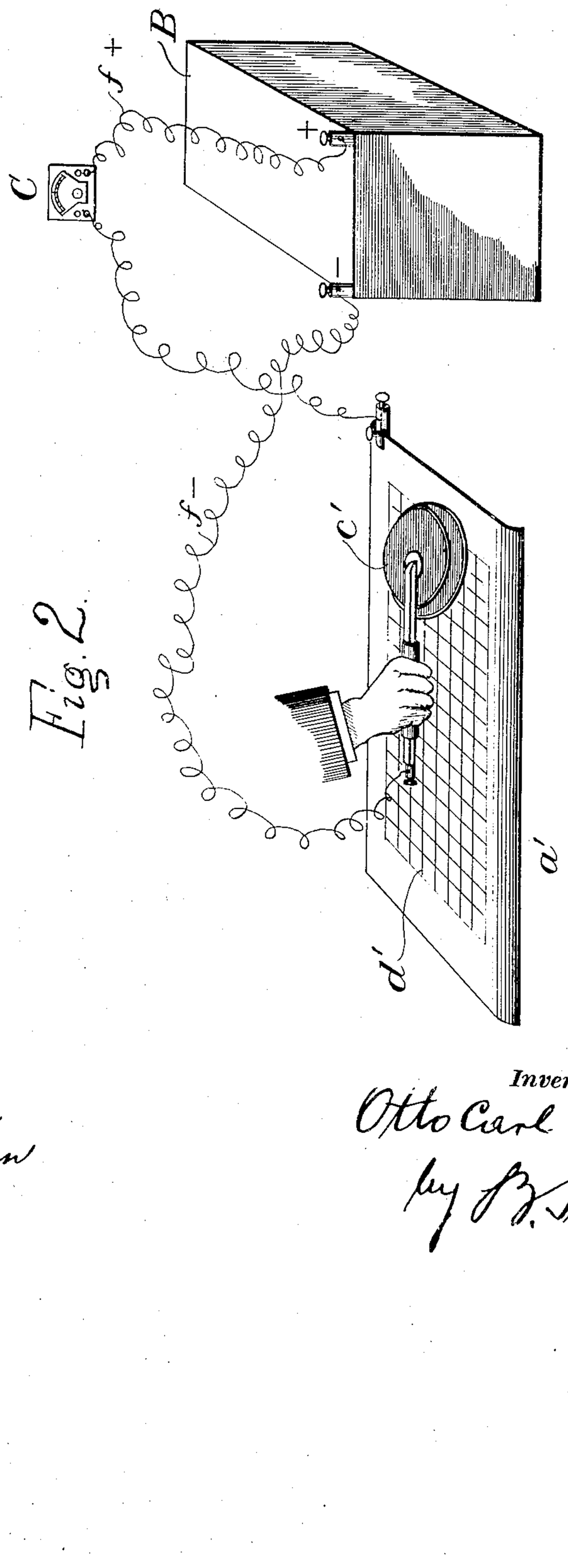

Fig. 2.

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UNITED STATES PATENT OFFICE.

OTTO CARL STRECKER, OF DARMSTADT, GERMANY.

PROCESS OF ELECTROLYTICALLY PREPARING METALS OR ALLOYS FOR LITHOGRAPHIC PURPOSES.

No. 810,889. Specification of Letters Patent. Patented Jan. 23, 1906.

Original application filed April 19, 1900, Serial No. 13,466. Divided and this application filed May 12, 1902. Serial No. 106,960½.

To all whom it may concern:

Be it known that I, OTTO CARL STRECKER, a subject of the German Emperor, and a resident of Darmstadt, Germany, have invented certain new and useful Improvements in Processes of Electrolytically Preparing Metals or Alloys for Lithographic Purposes, of which the following is a specification, this application being a division of my prior pending application, Serial No. 13,466, filed April 19, 1900, Patent No. 716,306, dated December 16, 1902.

Metal plates for printing purposes have been hitherto prepared by coating the plates with a layer of hygroscopic materials directly, or by brushing, powdering, &c., in a mechanical way or by coating the plates with materials capable to form such layers by chemical reaction with the metal of the plate.

My invention consists in employing electrolysis or an electrolytic process for the same purpose in such manner that the plate before or after transferring the drawing serves as an electrode and as an electrolyte, the watery solution of a substance or mixture of substances whose ion going to the plate is capable of forming a layer which is either hygroscopic (having great affinity to water) or may be changed into a hygroscopic layer by further process.

For the purpose of my invention it does not matter whether the material employed will act as anode or as cathode, nor does it make any difference whether the greasy drawing has been already transferred to the plate or not. Further, the plates prepared for reprinting may be cleaned—that is, the layers may be taken off partly or fully by the same process, but proceeding in reversed order. In this case the plates are used as cathodes in a direct current, and it will make no difference whether the greasy drawing is adhering yet to the plate or not or whether the plate has been prepared according to my process or by the old process. The desired effect can be reached by electrolysis in different ways, either generally by an electric current (continuous) generated from the source of energy, or in special cases by forming a galvanic element for which the printing-plate is used as an electrode. Different electrolytes will give different results; but to a certain point such difference will not alter the procedure. In the cases described below the electrolyte will not have any influence upon the plate nor upon the drawing as long as the circuit is open. The action commences with the closing and ends with the opening of the circuit. The plates may consist of metals or alloys of such color, density, consistence, and chemical qualities as to allow their practical use. A metal plate of zinc is ground by means of a pad of steel-turnings and pumice powder, as described hereinafter. The metal is then rinsed with water and then made dry and is ready for use. On this plate a lithographic design or transfer, the negative of the intended print, is fixed. After this the plate is gummed with a solution of gum-arabic of medium strength and this is made dry. After being perfectly dry the greasy substance is washed out by lithophine, (a solution chiefly consisting of asphaltum in benzene or spirits of turpentine.) The excess is wiped off and the plate made dry. Then the gum-arabic is washed off the plate by water, and the negative is left on the plate as a layer of asphaltum. The negative is properly inked by means of the roller, and then the plate is cleaned from spots and the like. Alterations and corrections are done by lithographic ink after the method well known to lithographic printers, and the plate is ready for my process, in which it will be used as the anode.

The reaction of the process may be given as specified in the equation below, the electrolyte being a solution of 2.5 per cent. fluorid of sodium. The density of the continuous current applied is 0.5 to 0.9 ampere to the square foot, and the action of it may last from two to five minutes, according to the density. For instance, a plate two by three feet requires about $0.5 \times 6 \times 5 = 3$ amperes for five minutes or $0.9 \times 6 \times 3.3 = 5.4$ amperes for 3.3 minutes.

$$3Zn+6NaF+6H_2O=3ZnF_2+(6Na+6H_2O)=3ZnF_2+6NaOH+6H.$$

The alkali formed has to be neutralized before using the electrolyte again.

In the drawings, Figure 1 is a perspective view illustrating the practice of my invention in connection with an electrolytic cell, and Fig. 2 a like view illustrating the use of a brush instead of a cell.

In carrying out the improved process I may employ—

(*a*) The method of dipping explained by a drawing, Fig. 1. *b* is the anode with the design; *c*, the cathode. *d* is the electrolyte, and *f*+*f*− are the copper wires connecting *b* and *c* with the source of electric energy. The plate provided with the drawing is secured as an

anode by means of clips and wires to a supporting-rod laid across the open recipient. The said plate about two by three feet is completely dipped into the liquid, except at the curved edge, which carries a screw fastener for attaching the positive wire. The cathode is suspended and connected in a similar way.

(*b*) The method of sponging explained by a drawing, Fig. 2. *a* is the anode; C, the cathode (the rotative plate with an insulated handle;) *d*, the electrolyte, is invisible on the plate, and *f*+*f*− are the copper wires connecting *a* and *c* with the source of electric energy. The plate provided with the drawing or transfer is brought to a horizontal position and connected to the positive pole of the supply of electricity. Upon this electrode I pour liquid, while the negative pole is brought into contact with the electrolyte by means of a flat metal plate provided with an insulated handle. The metal plate is faced with a layer (four to five millimeters) of cotton and constitutes the cathode, which is passed (in accordance with the tension of the current) over the anode. The intensity of the continuous current applied is 0.1 ampere to four inches square, which is the size of the rotative plate and the duration is, according to the size of the printing-plate, five to ten minutes.

Instead of using the expensive copper or nickel plates I could use alloys of them with zinc or with other metals; but I prefer zinc on account of its cheapness and the exceedingly good results obtained by it. Such a zinc plate (best No. 12 of the Belgian gage) is ground by means of a coarse emery and pumice powder equal parts and a pad made of steel-turnings of the finest and selectest shape. This pad is covered with a soft leather in order to prevent the fingers being hurt. Before grinding the plate is washed with a solution of acid fluorid of ammonia, three ounces to the gallon of water and one-fourth of a pint of ammonia, in order to remove grease or oxid. Then the zinc is rinsed properly and the plate is ground by passing the pad with a slight pressing and rotative movement over the plate. After having done so for about twenty to twenty-five minutes, the size of the plate being a yard square, the plate is washed off and then poured and distributed on it two pints of water acidulated with about eighty drops of nitric acid and then left for about three minutes. After this the plate is washed and made dry and the plate has now a soft whitish appearance and is ready for use.

In the case that a plate was furnished with its coating before printing thereon a transfer or design it will be necessary to free it from the gum which adheres yet and wash the plate well or wash first with a solution of alum and then with water when zinc was used or with other means on other metals, or zinc plates may also be washed with a weak solution of soda to neutralize the gum or the reaction of the salts used. Then the plate may be provided with a transfer or design and treated with gum, and after drying it will be ready for printing.

As to the electrolyte which is used for the electrolysis under *a* and *b*, I use the solution of salts of those acids which form insoluble salts with the metals applied or other efficient solutions, such as very weak solutions of suitable acids, which are dissociated electrolytically. For example, hydrofluoric, phosphoric, arsenic, phosphorous, arsenious, and like salts may be used; but these may be varied according to the metals used as anodes.

In carrying out my improved process one must be careful to attend to the rules given in this specification for producing transfers, as otherwise it inadvertently occurs that the negative is easily smeared or daubed before even my process may be applied.

Having now particularly described and ascertained my invention, what I claim, and desire to secure by Letters Patent, is—

1. The process for producing a water-retaining layer on metal plates or alloys for lithographic and printing purposes which consists in submitting suitably-prepared plates, furnished with lithographic designs, in a suitable electrolyte to the action of a continuous current, whereby an insoluble layer will be formed by the ions of the substances in the electrolyte which will combine with the metal of the plate and thus protect the plates against lithographic oil or grease and retain the water, substantially as described.

2. The process of producing a water-retaining layer on metal plates or alloys by first submitting the plates, which have been suitably prepared and provided with a lithographic design, to the action of a continuous current, which passing from a suitable cathode to the plate to be treated causes the ions of the substances employed in the electrolytes to form a layer which consists of oxids or hydroxids of the metals applied and subsequently submitting the plate to a chemical treatment with suitable acids or chemicals by which said layer or layers will be transformed into insoluble salts of the metal or plates applied which will retain water and repulse lithographic oil or grease.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

OTTO CARL STRECKER. [L. S.]

Witnesses:
HANS STRECKER,
WALTER HAUSING.