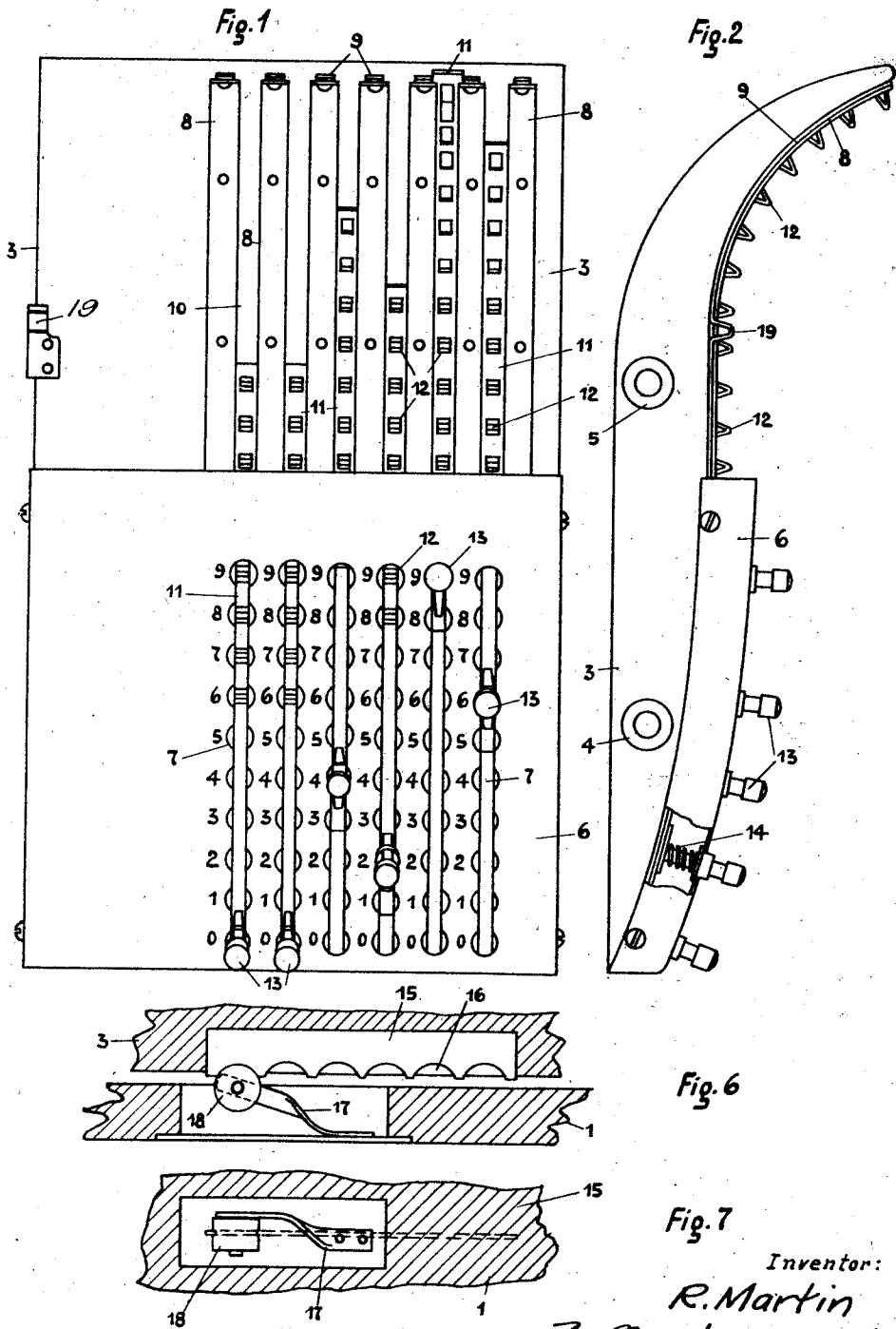


June 14, 1932.

R. MARTIN
CALCULATING MACHINE
Filed June 22, 1927

1,862,901

4 Sheets-Sheet 1



Inventor:
R. Martin
By *Marks & Clerk*
Attys.

June 14, 1932.

R. MARTIN

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Fig. 3

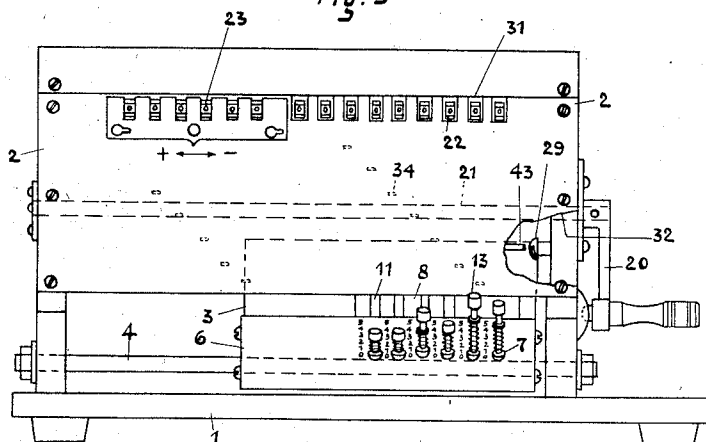
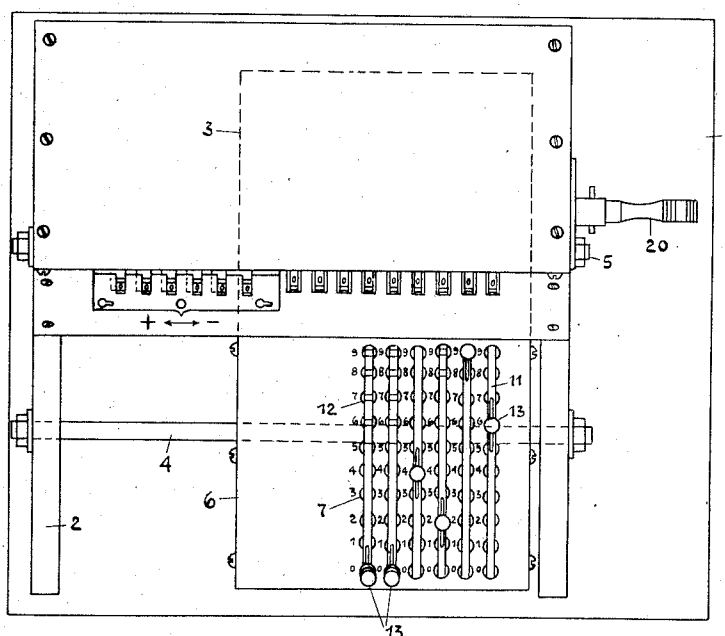


Fig. 4



Inventor:

R. Martin
By Marks & Clerk
Attys

June 14, 1932.

R. MARTIN
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Fig. 5

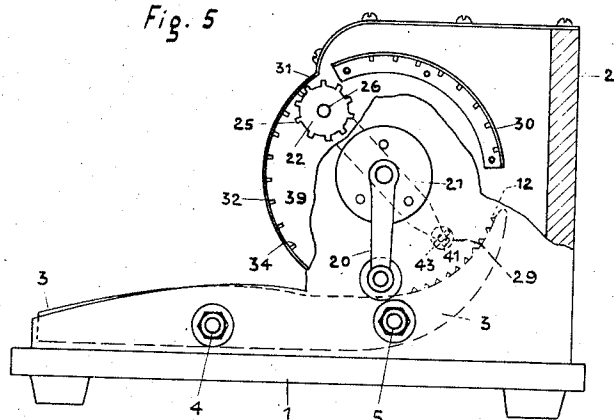


Fig. 12

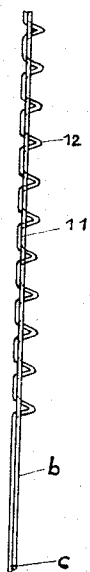


Fig. 13

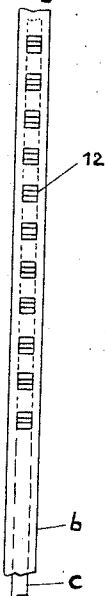


Fig. 14

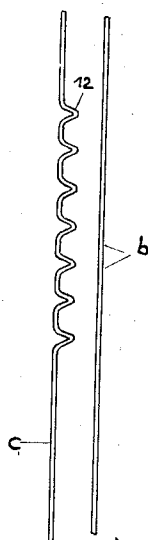
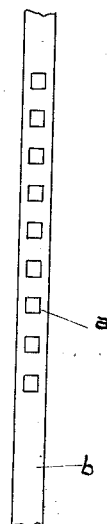


Fig. 15



Inventor:

R. Martin
By Marks & Clerk
Attys.

June 14, 1932.

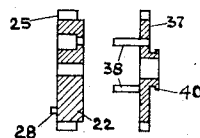
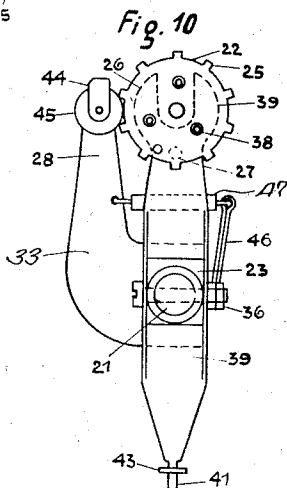
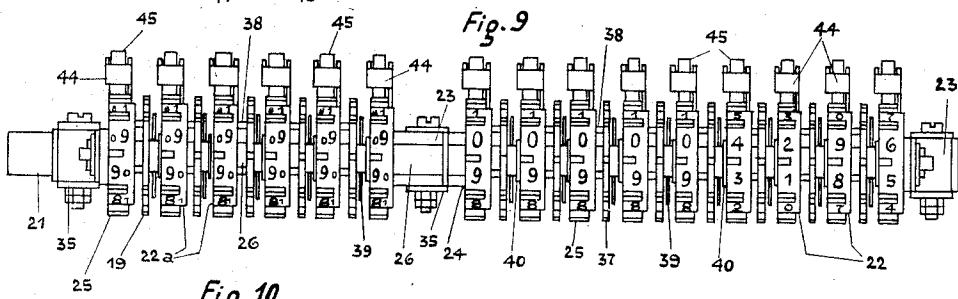
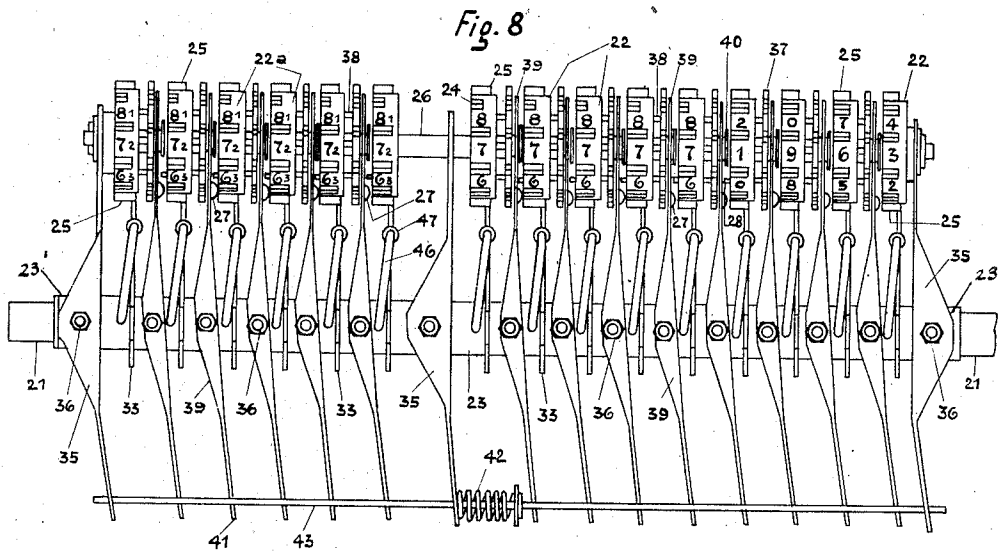
R. MARTIN

1,862,901

CALCULATING MACHINE

Filed June 22, 1927

4 Sheets-Sheet 4



Inventor:

R. Martin
By Marks & Clerk
Attys

UNITED STATES PATENT OFFICE

RUDOLF MARTIN, OF BERLIN-CHARLOTTENBURG, GERMANY, ASSIGNOR TO JEAN BERGMANN, OF BERLIN-WANNSEE, GERMANY

CALCULATING MACHINE

Application filed June 22, 1927, Serial No. 200,629, and in Germany June 16, 1925.

This invention refers broadly to calculating machines with rotating counting mechanism, and it is intended to devise means of simplifying the construction of the machine and to make provision for a simple, easily controlled and rapid operation of the machine, and to accomplish other important objects and advantages which will appear, as the specification proceeds.

10 In view of the various objects of the invention a circularly moving totalizing or counting mechanism is combined with a casing section or the like displaceable with relation thereto and provided with teeth or the like and adapted to operate that portion of the totalizing or counting mechanism which operates as the adding mechanism. The displacement is transmitted to the stopping mechanism which actuates that part of the counting or totalizing mechanism which operates as the rotating counting mechanism. The adding mechanism referred to may evidently be also made to act in the well-known manner as a subtracting mechanism, and is also effective in combination with the multiplying and dividing operation.

As regards the teeth or the like provided in the displaceable casing-section, a certain number thereof, as is well-known, should be moved into the operative position in accordance with the figures submitted to the calculating operation. Now, in accordance with the means provided by this invention, this setting of the teeth in the operative or working position may be performed in a very simple manner by disposing the teeth on a flexible rack bar which is disposed in the arc-shaped casing in such a manner, as to be displaceable in the peripheral direction thereof, so that the operative position and the in-operative position may be respectively produced merely by a displacement of the rack bar.

The general arrangement and construction of the machine according to this invention makes it possible to impart an exceedingly simple and very convenient formation to the moving mechanism for the tens digits, and it should be noted in particular that there is no necessity of making special provisions for

the prevention of incorrect engagement of the rotating counting mechanism with the stops or the like for the actuation of the tens-moving means of the adding mechanism.

In the case of the bipartite formation of the counting wheels, which construction has already been suggested and in which in the operation of displacement of the tens-digits the one wheel section is axially displaced with relation to the other wheel section which is axially stationary and not displaceable, and without thereby causing the disengagement of the tappet-connection of the two wheel sections, the axial displacement of the displaceable wheel section in one embodiment of the invention may be effected by means of a guide arm movably disposed upon the rotating shaft of the circularly moving counting mechanism. The upper extremity of this arm is adapted to engage in a guide groove provided on the wheel hub of the particular wheel section and being displaced upon each rotation of the counting wheel belonging to the preceding decade together with the wheel section controlled thereby and with relation to the stationary wheel section, the said displacement being effected by a feeding stud on said counting wheel of the preceding decade.

After the displacement has been effected the displaceable wheel portions in accordance with an exemplification of the invention are made to engage with stopping pins arranged in a casing or jacket of the general shape of cylindrical jacket portions. In a preferred form of construction the stops may be step-wise and staggeringly arranged with relation to each other in such a manner that they will become serially and not simultaneously engaged with the sections of the tens-feeding wheels of the different digits.

By means of a spring-actuated guide bar loosely connected to the ends of the guide arms and adapted to be laterally displaced by a disengaging tappet or the like provided in the wall of the casing and operated by the rotation of the crank upon each rotation thereof, the guide arms and the wheel sections connected therewith are automatically restored to their normal position after the

tens-feeding motion has been effected. With this kind of construction of the setting mechanism and of the counting or totalizing mechanism the general construction of the machine may be further simplified by coaxially disposing the adding mechanism and the rotating counting mechanism, and preferably upon one and the same shaft which is circularly moved with relation to the crank shaft, and without any liability of incorrect engagement of the stops for the operation of the small counting wheels of the two counting mechanisms, as already referred to.

The rack bars heretofore mentioned and provided in connection with the setting mechanism are preferably made to consist of several sections, and in such a manner that the teeth, seen from the side of the rack bar disposed contrariwise to the indentation are mounted in bores or recesses of supporting bars, and preferably so as to be readily exchangeable and removable. The indentation in a preferred construction may for instance be obtained by corresponding bends of one or several metal bands.

The invention will be more fully and particularly described by reference to the accompanying drawings in which Figure 1 represents the setting mechanism seen from above. Figure 2 is a side view; Figure 3 is a front elevation of a calculating machine with setting mechanism incorporated therewith. Figure 4 is a plan view corresponding therewith. Figure 5 is a side view. Figure 6 shows the holding and supporting device arranged in the lower part of the setting mechanism in sectional view, and Figure 7 is a top plan view corresponding thereto. Figure 8 is a front elevation of the counting mechanism; Figure 9 is a plan view thereof. Figure 10 is a side view, and Figure 11 shows a small wheel of the counting mechanism and a tens-feeding-wheel (small coupling wheel) in sectional view. Figures 12 and 13 represent a composite rack bar of the setting mechanism respectively in side elevation and as viewed from the side of the indentation. Figures 14 and 15 are respectively side view and top plan view of the different parts of this kind of rack bar.

In the interior of the casing 2 which is mounted on the base plate 1, the laterally displaceable carriage 3 is arranged upon which the several parts of the setting mechanism are disposed and which is guided by the stationary studs 4, 5. The front portion of the carriage 3 is provided with a sheet metal cap 6 in the recessed portions 7 of which the manipulating buttons 13 are displaceably arranged. These buttons are connected to the flexible rack bars 11 and are actuated by a spring 14. The said rack bars 11 are adapted to slide in a guideway 10 formed by the guiding bands 8, 9 and are provided with a plurality of setting teeth 12.

As appears from Figures 12 to 15 the rack bars consist of a bar *b* provided with recesses *a* spaced so as to correspond to the teeth, and of a band *c* of steel, bronze or the like and provided with teeth 12 applied thereto or produced by bending the band or bar *c* accordingly.

In order to restrict the lateral displacement of the carriage 3 to the particular distance of a digit, the base plate 1 is provided with an arresting device, comprising a spring 17 and a roll 18 engageable with the grooves 16 of a guide bar 15.

Upon the cross-sectionally four-cornered portion 23' of the shaft 21 provided with a manually operated crank 20 and rotatably mounted in the casing 2 of the calculating machine the journal bearings 35 for the shaft of the counting mechanism are secured by means of the screws 36. Upon the shaft 26 the counting wheels 22 of the result counting mechanism and the counting wheels 22^a of the rotating counting mechanism are arranged, which latter wheels are connected to the so-called tens-feeding wheels 37 (coupling wheels) by the studs 38 which are permanently and slidably engaged with corresponding bores of the counting wheels 22 and 22^a. The counting wheels may be laterally displaced by means of guide arms 39 likewise movably disposed upon the four-cornered shaft 23' and the upper, fork-shaped portion of which is engaged with a guide groove provided in the wheel hub 40. This lateral displacement is effected in each case at the moment in which the tens-feeding stud 28 on the lower order counting wheel 22 strikes the cam 27 provided on the fork-shaped extremity of the guide-arm 39, that is to say, after each complete rotation of the lower order counting wheel 22.

The lower ends 41 of the guide arm 39 project into engagement with notches provided in a guide rod or bar 43 adapted to be operated by the disengaging cam 29 and normally under the influence of a spring 42. Furthermore, there are arranged in the slots of the cross-sectionally four-cornered shaft 23 the straps or yokes 33 in the head portion 44 of which the pressure rollers 45 are mounted, which latter are adapted to place themselves with uniform pressure between the teeth 25 of the counting wheels 22 and 22^a by the action of the spring 47 which is tensioned between straps 33 and on a support 46. The pressure rollers 45 also coact with the tens-feeding wheels 37 to rigidly retain the latter in adjusted position. The entire feeding mechanism is covered up by two circularly shaped jackets or housings 30, 32 provided at their insides with stopping pins 34 for the small counting wheels or for the feeding pins 28 thereof for the tens' feed. The housing 32 at its front side portion is provided with inspection windows 31 (Figure 3) through

which one figure each of the counting wheels 22 and 22^a becomes visible. The driving of the small counting wheels 22 is effected by a setting mechanism 3 displaceably arranged upon the base plate 1 and guided by the bolts or studs 4, 5.

The machine operates in the following manner:

The movable carriage 3 of the setting mechanism is adjusted in accordance with the calculation desired. For performing adding and subtracting operations, the carriage is displaced in such a manner that its right-hand recess 7 lies just below the small unit counting wheel. If it is desired to carry out multiplying or dividing operations, the carriage 3 is displaced according to the number of digits to the extent of one counting wheel or further to the left. After the lateral adjustment has been effected, the flexible racks 11 slidably arranged in the path 10 are displaced according to the digit to be adjusted by means of the buttons 13 connected to the racks (for the purpose of adjusting the multiplicand or one of the sums) after the button 13 has been pressed downwardly against the pressure of the spring 14 so that the enlarged portion of the button protrudes from the recesses 7. The small wheels 22 of the counting mechanism rotatably mounted on the shaft performing a circular movement around the driving shaft 21 come in contact at each rotation on the driving shaft with the teeth 12 of the racks 11 which through the displacement of the racks 11 have entered the path of the wheels 22 of the counting mechanism so that at each rotation of the shaft 21, the small counting wheels 22 entering into engagement with the teeth 12 undergo a larger or smaller rotation. If, for instance, the numbers 96 and 72 are to be added, the small counting wheels are adjusted in the zero position and then the carriage 3 is adjusted, as already explained, so that the recess 7 furthest to the right registers with the small unit counting wheel. Now the number "96" is set by means of the displaceable buttons 13 on the sheet-metal cap 6 provided on the carriage 3 so that the unit "6" of the number "96" (see Fig. 1) is on the unit row and the tens-digit "9" is on the second row. The corresponding racks 11 thus become displaced in the curved part 3 of the carriage so that six and nine setting teeth respectively are moved into the operative position. During the operation of the counting mechanism, the small unit wheel will be turned to the extent of six teeth and the small tens wheel to the extent of nine teeth. The second number "72" is set in the same manner and carried into the counting mechanism.

The laterally displaceable handle of the crank 20 engages after each rotation in a groove provided therefor.

When one of the counting wheels, for in-

stance, the unit counting wheel passes from 9 to 0 or vice versa, the tens-shift pin 28 provided on the small counting wheel 22 comes in contact with the cam 27 on the upper part of the guide arm 39 whereby the guide arm 39 or the tens shift wheel 37 (coupling wheel) connected therewith, whose pins 38 engage in the bores of the next counting wheel 22 registering, for instance, the "tens", will become displaced towards the counting wheel arranged on the left-hand side thereof and thus assume a position in which, on the rotation of the crank 20, the tens shift wheel 37 will come in contact with the stop pin 34 provided on the inside of the casing or housing 32 and corresponding thereto so that the said tens shift wheel is turned by the pin to the extent of one tooth together with the small counting wheel coupled thereto.

The stop pins are arranged stepwise on the casings or housings 32, 30 in order that a continuous consecutive tens transfer will take place. The casing or housing 32 arranged in front effects the tens transfer of the shifting mechanism when rotating to the right and the rear casing or housing 30 effects the tens transfer of the shifting mechanism when rotating to the left.

After the registration of the tens has been effected, the guide arms 39 and the coupling wheels 37 connected thereto are again automatically restored to their normal position by means of a guide rod 43, which is loosely connected to the ends 41 of the guide arms 39 and at each rotation is laterally displaced by a disengaging cam 29 provided in the wall 2 of the casing.

The tens shifting or transfer in connection with the counting wheels 22^a of the rotary counting mechanism is effected in exactly the same manner.

I claim:—

1. Setting mechanism for calculating machines with planet-like circularly moving counting mechanism including a flexible setting rack provided with setting teeth and movable through a partly curved path.

2. Setting mechanism for calculating machines with planet-like circularly moving counting mechanism including a carriage with guides having curved rear portions, and flexible setting racks provided with setting teeth movable in partly curved paths in said guides.

3. Setting mechanism for calculating machines with planet-like circularly moving counting mechanism including a flexible setting rack provided with setting teeth and movable through a partly curved path, said flexible setting rack including a supporting bar having openings therein for the setting teeth.

4. Setting mechanism for calculating machines with planet-like circularly moving counting mechanism including a flexible set-

ting rack provided with setting teeth and
movable through a partly curved path, said
flexible setting rack including a supporting
bar having openings therein and a strip pro-
vided with indentations defining said setting
teeth and passing through said openings.

In testimony whereof I affix my signature.

RUDOLF MARTIN.

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