No. 695,249. Patented Mar. 11, 1902.

F. O. STROMBORG.

FEED TABLE FOR SHEET ROLLS.

(Application filed June 26, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

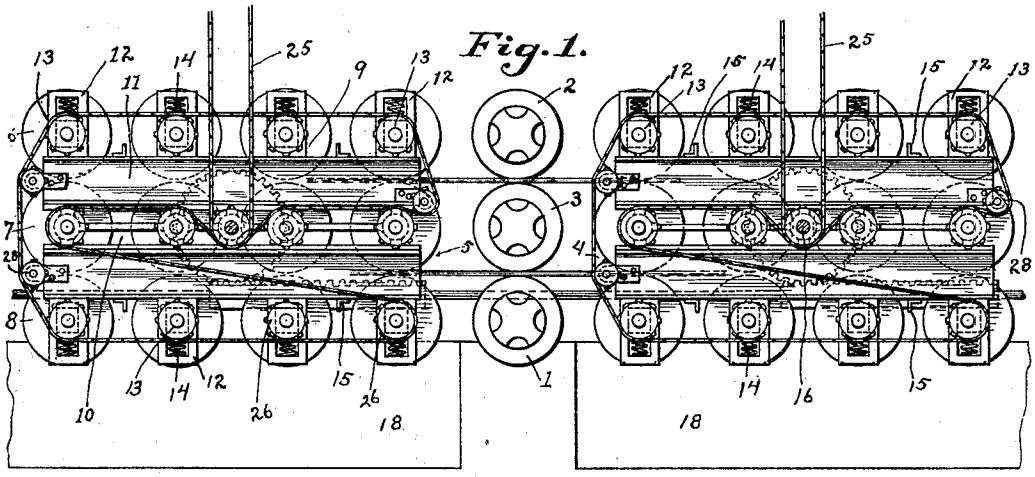


Fig. 2.

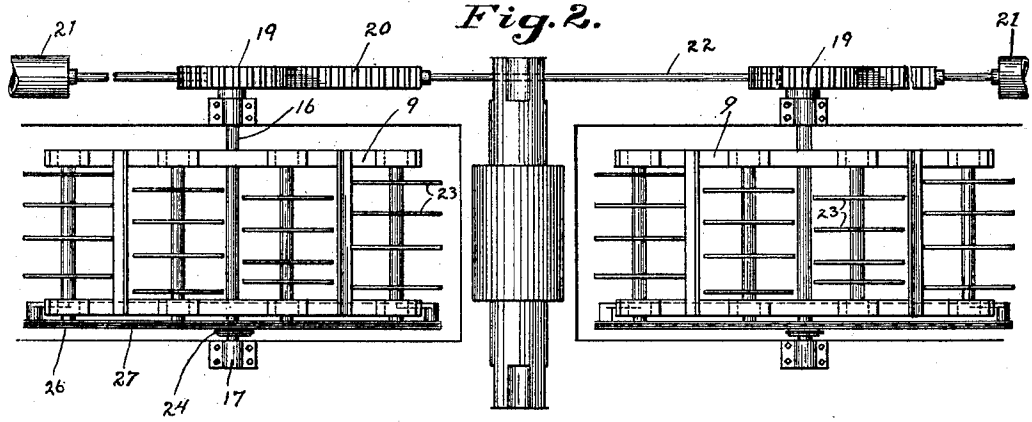
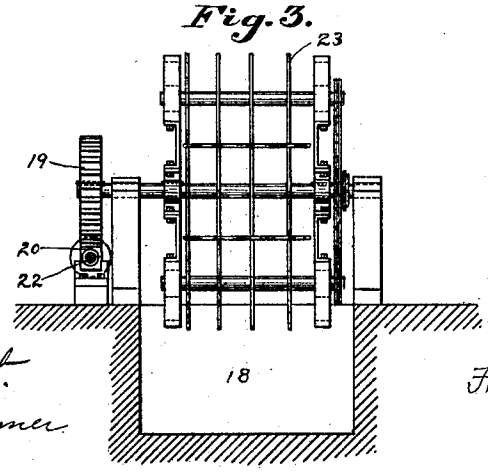


Fig. 3.



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No. 695,249. Patented Mar. 11, 1902.

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FEED TABLE FOR SHEET ROLLS.

(Application filed June 26, 1901.)

(No Model.) 2 Sheets—Sheet 2.

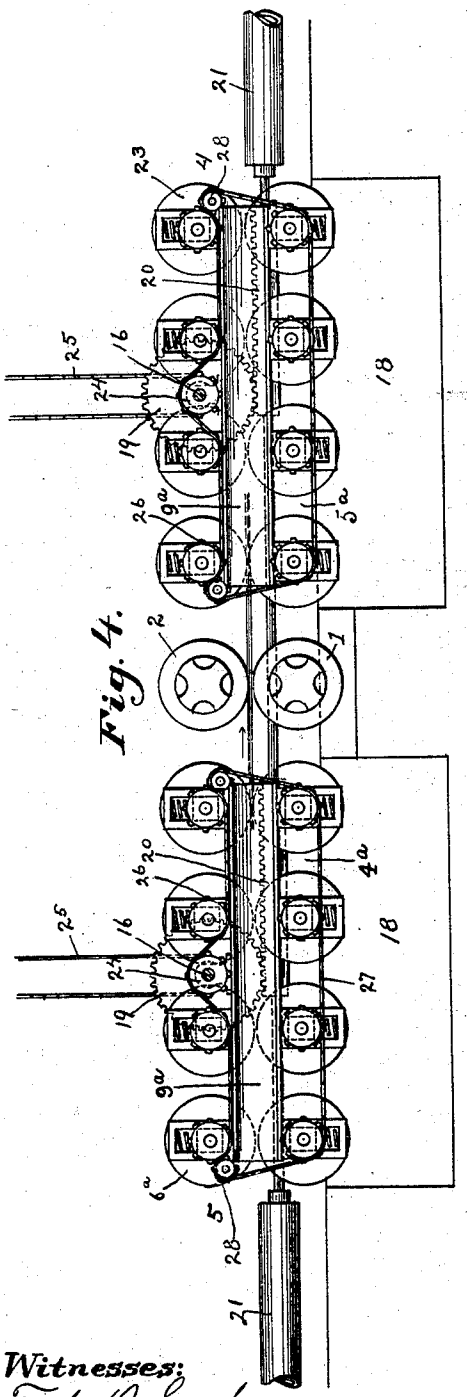


Fig. 4.

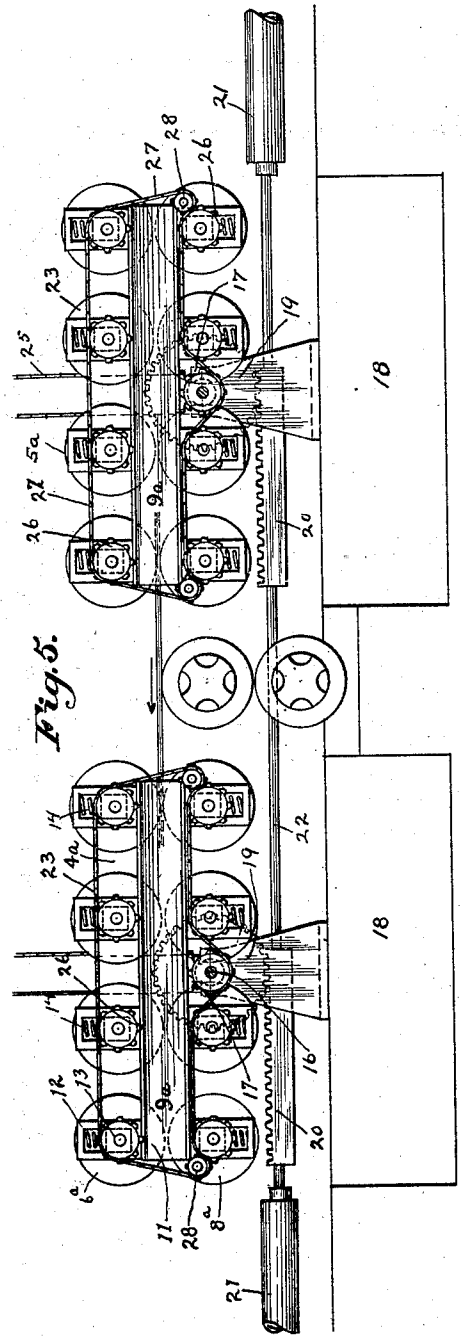


Fig. 5.

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UNITED STATES PATENT OFFICE.

FRITZ OSCAR STROMBORG, OF PITTSBURG, PENNSYLVANIA.

FEED-TABLE FOR SHEET-ROLLS.

SPECIFICATION forming part of Letters Patent No. 695,249, dated March 11, 1902.

Application filed June 26, 1901. Serial No. 66,069. (No model.)

To all whom it may concern:

Be it known that I, FRITZ OSCAR STROMBORG, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Feed-Tables for Sheet-Rolls; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to feeding devices for plate and sheet rolling-mills, and more especially to devices for feeding packs to sheet-rolls.

The object of my invention is to dispense with the hand labor which is commonly employed for feeding sheets and packs to the rolls and to provide mechanism for this purpose which will feed a plate or pack to the rolls and pass the same continuously back and forth through the rolls in the case of a three-high mill or in the case of a two-high mill pass the same continuously through the rolls and back over the same, said mechanism reversing the plate or pack, so that the same end will always be entered into the rolls.

A further object of my invention is to so construct the feeding mechanism as to prevent the too-rapid chilling of the plate or pack.

According to the common method of rolling sheet metal the sheet-bar is broken down in roughing-rolls and a number of these roughed-down sheets are then piled and given several passes in the hot rolls until reduced to such a gage that further reduction is impossible on account of the spring in the rolls. These piles are then folded and then reheated, if necessary, and given further passes through the hot rolls, and if then not reduced to the desired gage are further folded and again rolled as before. This process is in every-day use and is well understood by those skilled in the art. In all of these rolling steps —that is, whether roughing down or rolling in packs in the hot rolls—the plate or pack is entered into the rolls by one workman and is received at the rear of the rolls by the catcher, who returns the same over the rolls to the roller, who again enters the same into the rolls, the plate or pack being thus passed through the rolls and back over the rolls until reduced to the desired gage or until further folding or reheating becomes necessary. This method of feeding the plate or pack to the rolls is not only slow, so that the plate or sheets must be frequently reheated, but it is also quite expensive by reason of the skilled labor which is necessary and the correspondingly high wages which must be paid for such labor. The object of my invention is to do away with this skilled labor and also to some extent reduce the number of reheatings necessary in reducing the sheets to the desired gage. To this end it comprises mechanism in front of the rolls for feeding the plate or pack to the rolls and receiving the same when passed back to the front of the rolls and similar mechanism at the rear of the rolls for receiving the pack or plate as it emerges therefrom and for returning it to the front of the rolls, such mechanisms passing the pack back and forth through the rolls continuously and rapidly and being so constructed that the same end of the pack is always entered into the rolls and so that the chilling of the plate or sheets is avoided.

In the accompanying drawings, Figure 1 is a side elevation, partly in section, of my invention applied to a three-high mill. Fig. 2 is a plan view of the same. Fig. 3 is an end view thereof; and Figs. 4 and 5 are side elevations, partly in section, of the invention applied to a two-high mill, said figures showing the feeding mechanisms in different positions.

In the drawings the bottom roll of the sheet-mill is shown at 1, the top roll at 2, and, in case of three-high mill, the middle roll at 3, these rolls being of the usual construction and mounted and driven in the usual way. In front of the rolls is located the feeding mechanism 4 and at the rear the feeding mechanism 5, these mechanisms being exact duplicates of each other, so that a description of one will suffice for the description of both, and I will first describe the same as adapted for the three-high mill.

Each of the feeding mechanisms for the three-high mill comprises three series of rollers 6, 7, and 8, arranged one above the other, each series being shown as composed of four rollers; but the number of rollers in each series will be varied according to the length of the plates or pack to be rolled. These rollers are all mounted in a suitable frame 9, which, as well as the rollers themselves, are prefer-

ably constructed as light as possible, so as to require little power to reverse the same end for end in the manner which will hereinafter be described. The details of the construction of this frame may vary within very wide limits. As illustrative of one manner of constructing the frame I have shown the middle series of rollers 7 mounted in a casting 10, provided with top and bottom flanges, to which are riveted or bolted the flanges of the channels 11. On the outer edges of each of these channels 11 are secured suitable brackets or housings 12 for receiving the journal-boxes 13 of the upper and lower series of rollers 6 and 8. The housings 12 are slotted, so that the rollers of each of these series can move toward and from the middle series of rollers to accommodate plates or packs of different thicknesses, as will be readily understood. To hold the outside rollers against the middle rollers, suitable means—such as the spiral springs 14, bearing on the journal-boxes—are employed. To stiffen the frame 9, cross-braces, such as the angle-irons 15, may be riveted or otherwise suitably secured to the channel-pieces 11.

The frame 9 is fixedly secured at its center or middle portion to a transverse shaft 16, journaled in the standards or housings 17 and serving as trunnions around which the said frame may be rotated and reversed end for end. Suitable pits 18 are formed both in front and at the rear of the sheet-rolls to allow for this rotation of the frames. Any suitable means may be employed for reversing the frame end for end—such, for instance, as the gear 19 on the shaft 16, which gear is engaged by a rack 20. The rack may be actuated by any suitable mechanism—such, for instance, as the hydraulic or other power cylinder 21. The feed mechanisms at both sides of the rolls should preferably, although not necessarily, be actuated in unison, so that they will always be in line, and for that reason it is desirable to connect the racks 20 by means of a suitable tie-rod 22, and one of the cylinders 21 can be used to draw the said racks in one direction and the other cylinder to draw the same in the opposite direction, thus alternately rotating the mechanisms 4 and 5 about their trunnions first in one direction and then in the opposite direction.

The rollers of the series 6, 7, and 8 are preferably composed of a series of thin disks 23, spaced apart so that each of said rollers has but a slight contact with the plate or pack, thereby reducing the chilling effect of the same thereon, and the disks of the several rollers in each series are arranged out of line or staggered with each other, as shown in plan view, Fig. 2, in order not to groove or otherwise mutilate the plate or pack being passed between the same. These disks must bear on the plate or pack with sufficient firmness to feed the same into the rolls; but this pressure should not be sufficient to groove or otherwise mutilate the packs. The spiral springs 14, therefore, will only be made of sufficient strength to cause a sufficient grip to feed the pack. The pack or plate is held either between the series 6 and the middle series 7 or between said middle series and the series 8, and in order to feed the same into the sheet-rolls it is necessary that at least the middle series 7 be positively driven, and it is preferable that all of the series of rollers be positively driven. I have shown means for positively driving all of said series, said means comprising a double sprocket-wheel 24, running loosely on the shaft 16 and adapted to be driven from any suitable source by the sprocket-chain 25. The shafts of each of the rollers of all three series are provided with suitable sprocket-wheels 26, and an endless sprocket-chain 27 is caused to engage each of the sprocket-wheels 26 and the driven sprocket-wheel 24, said chain passing in the course shown and being guided by suitable guide wheels or sheaves 28, so as to be held in contact with all of these sprocket-wheels and to drive the rollers in the series 6 and 8 in one direction and the rollers in the series 7 in the opposite direction. In this way the meeting faces of the rollers in the series 6 and 7 will feed a plate or pack in one direction—as, for instance, draw the same therebetween, as shown at the upper pass in Fig. 1—while the meeting faces of the rollers in series 7 and 8 will feed a pack contained therein in the opposite direction—as, for instance, into and through the lower pass in Fig. 1. Instead of the three series of rollers 6, 7, and 8 I may use any other suitable means, such as three endless chains, the upper and lower ones being driven in one direction and the middle one driven in the opposite direction. The direction of travel of these means, whether rollers or chains, is never reversed, even where the frames 9 are reversed end for end.

The operation of the mechanism so far described is as follows: Supposing that a pack of sheets suitably heated is contained in the lower pass of the feed mechanism 4 in front of the rolls and a similar pack held in the upper pass of the feed mechanism 5 at the rear of the rolls and that the three-high rolls and the various rollers of the feed mechanisms are being positively driven. The effect is to feed the pack contained in the lower pass of the feed mechanism at the front of the rolls, through the lower pass thereof, and into the lower pass of the feed mechanism at the rear of the rolls, while the pack contained in the upper pass of the latter mechanism is fed forward through the upper pass of the rolls into the upper pass of the feed mechanism in the front of the rolls. As soon as both packs are clear of the reducing-rolls the racks 20 are reciprocated by means of the hydraulic cylinders 21, thereby rotating the gears 19 and shafts 16 and rotating the feed mechanisms 4 and 5 on said shafts. This reverses each of said feed mechanisms end for end, so that the pack which has just been received in the up-

per pass of the feed mechanism 4 is now held in the lower pass of said feed mechanism and with its forward end toward the rolls, while the pack which has just been received in the lower pass of the feed mechanism 5 is now held in the upper pass of said feed mechanism, with its forward end also directed toward the rolls. In this position, since the direction of rotation of the rollers 6, 7, and 8 is not reversed, said packs immediately begin to move in opposite directions and through the lower and upper passes, respectively, of the sheet-rolls in the manner just described. It will thus be seen that by means of this mechanism the said packs are passed continuously back and forth first through the lower and then through the upper pass of the three-high rolls and that no matter in which direction they are being passed their forward end will always be entered into the rolls, this being necessary by reason of the fact that the rear ends of a folded pack have a tendency to spring, curve, or fan apart, so that it is impossible to enter said rear end into the rolls. The packs or sheets by the mechanism described can therefore be quickly reduced and with a minimum loss of heat, and no skilled labor for this is necessary, as all of the work can be done by the man who operates the adjusting-screws for the sheet-rolls, the lever for controlling the hydraulic or other power cylinders being located within convenient reach.

In Figs. 4 and 5 the same mechanisms have been shown applied to a two-high mill, and the mechanisms are in all substantial particulars the same as those just described, the only difference being that only two series of rollers 6^a and 8^a are employed and that the rollers of both of said series are shown as spring-pressed toward each other. The frame 9^a for this series of rollers comprises a single channel 11, on which the housings 12 for the journal-boxes 13 of the rollers are mounted, said channels being suitably united by angle-irons 15 and having secured thereto the projections 30, which are fixed to the transverse shaft 16. These shafts 16 and the mechanisms 4^a and 5^a are rotated by gears, racks, and hydraulic cylinders, as before described. Each of the rollers in these mechanisms is also composed of a series of disks spaced apart, as shown in Fig. 2, and the disks of the various rollers are staggered with relation to each other, as described. Said rollers are also driven in substantially the same manner by means of sprocket wheels and chains, the only difference being that the sprocket-chain 27 is so arranged and guided that it will drive the rollers in the two series in opposite directions. In the use of this modified form of my invention the operation is precisely as described in relation to the three-high mill, the only difference being that in order to give the pack a pass through the rolls the feeding mechanisms must be in the position shown in Fig. 4, and as soon as the pack has cleared the sheet-rolls the said feeding mechanisms are reversed end for end to the position shown in Fig. 5 and the pack returned to the front of the rolls over the top thereof, no pack in the meantime being passed through the rolls.

It is obvious that the feed mechanisms shown in Figs. 1, 2, and 3 could be used with a two-high mill, and in that case the upper pass of rollers in the feed mechanisms would merely return the pack contained therein to the front of the rolls over the top thereof, while the pack in the bottom thereof would be reduced between the rolls. It is also obvious that the form of feed mechanism shown in Figs. 4 and 5 could be used with a three-high mill; but in that case only one of the passes of said three-high rolls could be utilized at the same time.

As heretofore stated, the details of construction of the mechanisms may vary within wide limits, and I do not wish to be limited in any way to the particular construction of frames shown, nor to the use of rollers for feeding the packs, nor to the means shown for driving the rollers or other feeding means in said frames, nor to the mechanism shown for reversing said frames end for end. While I have shown my invention as particularly adapted for feeding packs to sheet-rolls, I do not wish it limited thereto, but intend it to be applied to any work for which it is adapted.

What I claim as my invention, and desire to secured by Letters Patent, is—

1. In a device for feeding plates or packs to sheet-rolls, the combination with the rolls, of mechanism for feeding the plate or sheets to the rolls and mechanism for receiving the same from the rolls, and returning them to the front of the same set of rolls, said last-named mechanism being reversible endwise, whereby the plate or pack is returned to the front of the rolls with its front end foremost.

2. In mechanism for feeding plates or packs to sheet-rolls, the combination with the rolls, of endwise-reversible feeding mechanism in front of the same and endwise-reversible feeding mechanism at the rear of the same, whereby said plate or pack is fed through the rolls, reversed endwise, returned to the front of the same set of rolls, again reversed endwise and again fed to the rolls.

3. In mechanism for feeding plates or packs to sheet-rolls, the combination with the rolls, of positively-driven feeding means in front of the same, and positively-driven feeding means at the rear of the same, both of said feeding means being reversible endwise in line with the same set of rolls.

4. In mechanism for feeding plates or packs to sheet-rolls, the combination with the rolls, of two or more series of live rollers for receiving the plate or pack between the same, and means whereby said series of rollers may be reversed endwise, to return the plate or pack to the front of the same set of rolls from which it was received.

5. In mechanism for feeding plates or packs

to sheet-rolls, the combination with the rolls, of two or more series of live rollers in front of the same, a similar arrangement of rollers at the rear of the same, and means whereby each of said series of rollers may be reversed endwise, to return the plate or pack to the front of the same set of rolls from which it was received.

6. In mechanism for feeding plates or packs to sheet-rolls, the combination with the rolls, of feeding and receiving mechanism in front of the same, feeding and receiving mechanism at the rear of the same, transverse trunnions on which each of said mechanisms are mounted, and means for rotating said mechanisms about said trunnions.

7. In a device for feeding plates or packs to sheet-rolls, the combination with the rolls, of positively-driven feeding means in front of the rolls, positively-driven feeding means at the rear thereof, frames in which each of said feeding means are mounted, said frames being mounted on transverse trunnions, and means for rotating said frames on said trunnions.

8. In a device for feeding plates or packs to sheet-rolls, the combination with the rolls, of a series of positively-driven rollers, a frame in which the same are mounted, said frame being mounted on transverse trunnions at the center thereof, and means for rotating said frame on its trunnions.

9. In mechanism for feeding plates or packs to sheet-rolls, the combination with the rolls, of two or more series of live rollers in front of the same, a similar arrangement of live rollers at the rear of the same, frames in which said series of rollers are mounted, transverse trunnions for said frames, and means for rotating said frames about said trunnions.

10. In mechanism for feeding plates or packs to sheet-rolls, the combination with the rolls, of two or more positively-driven feeding means in different horizontal planes, a frame in which said means are mounted, means for yieldingly holding one of said means against the other, and means for reversing said frames endwise.

11. In mechanism for feeding plates or packs to sheet-rolls, the combination with the rolls, of two or more series of live rollers in different horizontal planes, a frame in which said rollers are mounted, means for holding the rollers of one series yieldingly against the rollers of the other series, and means for reversing said frame endwise.

12. In mechanism for feeding plates or packs to sheet-rolls, the combination with the rolls, of three series of rollers or the like, a frame in which the same are mounted, means for holding the rollers of the two outer series yieldingly against the rollers of the middle series, and means for positively driving the rollers of the middle series.

13. In mechanism for feeding plates or packs to sheet-rolls, the combination with three-high rolls, of mechanism at the front thereof for receiving a pack from one pass of said rolls and simultaneously feeding another pack to the other pass of said rolls, and a similar mechanism at the rear of said rolls, said mechanisms being reversible endwise.

14. In mechanism for feeding plates or packs to sheet-rolls, the combination with three-high rolls, of feed mechanisms at the front and rear thereof, said mechanisms each comprising three series of live rollers or the like in different horizontal planes, suitable frames in which said rollers are mounted, and means for reversing said frames endwise.

15. In mechanism for feeding plates or packs to sheet-rolls, the combination with a series of positively-driven rollers each composed of disks spaced apart, the disks of said several rollers being staggered with relation to each other.

16. In mechanism for feeding plates or packs to sheet-rolls, the combination of two or more series of live rollers, each of which is composed of disks spaced apart, and means for holding the rollers of one series yieldingly against the rollers of the other series.

In testimony whereof I, the said FRITZ OSCAR STROMBORG, have hereunto set my hand.

FRITZ OSCAR STROMBORG.

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